Embedded Command Line Interface

Contents

Chapter 1. Changes in the CLI and script commands in this release

This topic lists changes in the latest ThinkSystem System Manager releases of the CLI command and Script commands.

Note: When issuing SMcli commands at the command prompt, an additional backslash (\) character is required as an escape character in the file path name of an input or output file when using the Windows OS. The additional backslash (\) must be included when using SMcli in secure, https mode, by providing the -u option to specify a role-based access management user. Example: `C:\\dir\\subdir\\filename`

ThinkSystem SAN OS 11.60.2

The Command Line Interface for release 11.60.2 can only be performed over the secure Ethernet management interface. In-band management over the host connections is not supported. The following tables list changes to the CLI and Script Commands for release 11.60.2.

Table 1. **ThinkSystem SAN OS** *11.60.2*

Command	Description of Change
" Set controller host port properties " on page 112	Added `Physical` and `Virtual` values for `host Port` parameter.
" Save storage array support data " on page 191	Added `object-bundle.json` data type.
"Save auto-load balancing statistics" on page 293	Added "Drive Lost Primary Path" note
"Download environmental card firmware" on page 229	Updated *Important* note.
"Set thin volume attributes" on page 500	Update `repositoryMaxCapacity` and `addRepositoryCapacity` parameters.
"Set storage array to enable or disable automatic load balancing " on page 144	Added "Drive Lost Primary Path" note
"Create initiator" on page 109	Added NVMe over RoCE and NVMe over Fibre Channel compatibility.
"Delete initiator" on page 110	Added NVMe over RoCE and NVMe over Fibre Channel compatibility.
"Set initiator" on page 111	Added NVMe over RoCE and NVMe over Fibre Channel compatibility.
"Create snapshot group" on page 335	Added a note to the context section.
"Set controller host port properties" on page 112	Modifed the description of the maxFramePayload portSpeed parameters. Added information about the NVMe over RoCE settings. Noted that the IPv4VlanId, IPv6VlanId, IPv4Priority, IPv6Priority, enableIPv6Priority, enableIPv4Priority, enableIPv6Vlan, and enableIPv4Vlan parameters are not supported in an NVMe over RoCE environment.

ThinkSystem SAN OS 11.50.3

The in-band CLI for release 11.50.3 supports in-band management for controllers running all firmware releases including 11.60.2.

ThinkSystem SAN OS 11.50.2 and below

This release contains only minor enhancements and fixes.

Chapter 2. Formatting the commands

The command line interface (CLI) is a software application that provides a way to configure and monitor storage arrays. Using the CLI, you can run commands from an operating system prompt, such as the DOS `C:` prompt or a Linux operating system path.

The CLI gives you direct access to a script engine that is a utility in the storage management software. The script engine runs commands that configure and manage the storage arrays. The script engine reads the commands, either through a script file or directly from the command line, and performs the operations instructed by the commands.

The script commands configure and manage a storage array. The script commands are distinct from the CLI commands. You can enter individual script commands, or you can run a file of script commands. When you enter an individual script command, you embed the script command in a CLI command. When you run a file of script commands, you embed the file name in the CLI command.

Some software features described in this document might not be available for your DE Series Storage System. For questions about available features, contact your account representative.

With release 11.50.3 and earlier, the CLI is a feature of the ThinkSystem Storage Manager software. With release 11.60.2, you can download the CLI installation package from System Manager via the **Add-ons** section in **Settings ➞ System**.

Structure of a CLI command

The CLI commands are in the form of a command wrapper and elements embedded into the wrapper. A CLI command consists of these elements:

- A command wrapper identified by the term `SMcli`
- The storage array identifier
- Terminals that define the operation to be performed
- Script commands

The CLI command wrapper is a shell that identifies storage array controllers, embeds operational terminals, embeds script commands, and passes these values to the script engine.

All CLI commands have the following structure:

`SMcli` *storageArray* *terminal* *script-commands*;

- `SMcli` invokes the command line interface.
- *storageArray* is the name or the IP address of the storage array.
- *terminal* is a CLI value that defines the environment and the purpose for the command.
- *script-commands* are one or more script commands or the name of a script file that contains script commands. (The script commands configure and manage the storage array.)

If you enter an incomplete or inaccurate `SMcli` string that does not have the correct syntax, parameter names, options, or terminals, the script engine returns usage information.

Interactive mode

If you enter `SMcli` and a storage array name, but do not specify CLI parameters, script commands, or a script file, the command line interface runs in interactive mode. Interactive mode lets you run individual commands without prefixing the commands with `SMcli` .

In interactive mode, you can enter a single command, view the results, and enter the next command without typing the complete `SMcli` string. Interactive mode is useful for determining configuration errors and quickly testing configuration changes.

To end an interactive mode session, type the operating system-specific command. For Linux, this key combination is **Control-D** . For Windows, this key combination is **Control-Z + ENTER** .

CLI command wrapper syntax

General syntax forms of the CLI command wrappers are listed in this section. The conventions used in the CLI command wrapper syntax are listed in the following table.

Convention	Definition
a | b	Alternative ("a" or "b")
italicized-words	Needs user input to fulfill a parameter (a response to a variable)
[...] (square brackets)	Zero or one occurrence (square brackets are also used as a delimiter for some command parameters)
{ ... } (curly braces)	Zero or more occurrences
(a | b | c)	Choose only one of the alternatives
a &| b	And/or. This is used for https client mode, when you can use with one or both controller IP addresses. This way, if one controller is not responding, SMcli will use the alternative IP address. This also covers the case when both IP addresses are required, such as for firmware download.

Attention: To run all of the CLI commands you must have administrator privileges. Some CLI commands will run without administrator privileges. Many commands, however, will not run. If the CLI command does not run because you do not have correct privileges, the CLI returns an exit code of 12.

Example in https client mode

The following examples demonstrate the `https` client mode command line parameters described in ".

`SMcli` (*Controller A host-name-or-IP-address*&|
Controller B host-name-or-IP-address) `-u` *username* `-p` *password* `-c` "*commands*;" [`-clientType` (`auto | https | symbol`)]

Note: If you do not specify a `clientType`, but do include the `-u` option and the *username* variable, the system will use either `https` or `symbol` client mode, whichever is available.

Examples in symbol client mode

The following examples demonstrate the `symbol` client mode command line parameters described in ".

`SMcli` **-a email:** *email-address* [*host-name-or-IP-address1* [*host-name-or-IP-address2*]] [**-n** *storage-system-name* | **-w** *wwID* | **-h** *ho*

The `-a` command line option is not supported for the DE2000H/ DE4000H / DE4000F or DE6000H / DE6000F storage array.

SMcli **-x email:** *email-address* [*host-name-or-IP-address1* [*host-name-or-IP-address2*]] [**-n** *storage-system-name* | **-w** *wwID* | **-h**

The -x command line option is not supported for the DE2000H/ DE4000H / DE4000F or DE6000H / DE6000F storage array.

SMcli (**-a** | **-x**) **trap:** *community, host-name-or-IP-address* [*host-name-or-IP-address1* [*host-name-or-IP-address2*]] [**-n** *storage-sys*

The -a and -x command line options are not supported for the DE2000H/ DE4000H / DE4000F or DE6000H / DE6000F storage array.

SMcli **-d** [**-w**] [**-i**] [**-s**] [**-v**] [**-S**]

The -s command line option is not supported for the DE2000H/ DE4000H / DE4000F or DE6000H / DE6000F storage array.

SMcli *host-name-or-IP-address* **-F** *email-address* [**-g** *contactInfoFile*] [**-S**]
SMcli **-A** [*host-name-or-IP-address* [*host-name-or-IP-address*]] [**-S**]
SMcli **-X** (**-n** *storage-system-name* | **-w** *wwID* | **-h** *host-name*)
SMcli **-?**

Command line parameters

Command line parameters that apply to all controllers running with a symbol client type

Parameter	Definition
-R (uppercase)	Defines the user role for the password. The roles can be either: • **admin** – The user has privilege to change the storage array configuration. • **monitor** – The user has privilege to view the storage array configuration, but cannot make changes. The **-R** parameter is valid only when used with the **–p** parameter, which specifies that you define a password for a storage array. The **-R** parameter is required only if the dual password feature is enabled on the storage array. The **-R** parameter is not necessary under these conditions: • The dual password feature is not enabled on the storage array. • Only one admin role is set and the monitor role is not set for the storage array.

Command line parameters applicable to all controllers and all client types

Parameter	Definition
host-name-or-IP-address	Specifies either the host name or the Internet Protocol (IP) address (*xxx.xxx.xxx.xxx*) of an in-band managed storage array or an out-of-band managed storage array. • If you are managing a storage array by using out-of-band storage management through the Ethernet connection on each controller, you must specify the *host-name-or-IP-address* of the controllers.
-c	Indicates that you are entering one or more script commands to run on the specified storage array. End each command with a semicolon (*;*). You cannot place more than one -c parameter on the same command line. You can include more than one script command after the -c parameter.
-d	Shows the contents of the script configuration file. The file content has this format: *storage-system-name host-name1 host-name2*
-e	Runs the commands without performing a syntax check first.
-F (uppercase)	Specifies the email address from which all alerts will be sent.

Parameter	Definition
-f (lowercase)	Specifies a file name that contains script commands that you want to run on the specified storage array. The -f parameter is similar to the -c parameter in that both parameters are intended for running script commands. The -c parameter runs individual script commands. The -f parameter runs a file of script commands. By default, any errors that are encountered when running the script commands in a file are ignored, and the file continues to run. To override this behavior, use the `set session errorAction=stop` command in the script file.
-g	Specifies an ASCII file that contains email sender contact information that will be included in all email alert notifications. The CLI assumes that the ASCII file is text only, without delimiters or any expected format. Do not use the -g parameter if a `userdata.txt` file exists.
-h	Specifies the host name that is running the SNMP agent to which the storage array is connected. Use the -h parameter with these parameters: • -a • -x
-I (uppercase)	Specifies the type of information to be included in the email alert notifications. You can select these values: • eventOnly – Only the event information is included in the email. • profile – The event and array profile information is included in the email. You can specify the frequency for the email deliveries using the -q parameter.
-i (lowercase)	Shows the IP address of the known storage arrays. Use the -i parameter with the -d parameter. The file content has this format: *storage-system-name IP-address1 IPaddress2*
-n	Specifies the name of the storage array on which you want to run the script commands. This name is optional when you use a *host-name-or-IP-address* . The storage array name is required when the *host-name-or-IP-address* is not used.
-o	Specifies a file name for all output text that is a result of running the script commands. Use the -o parameter with these parameters: • -c • -f If you do not specify an output file, the output text goes to standard output (stdout). All output from commands that are not script commands is sent to stdout, regardless of whether this parameter is set.
-p	Defines the password for the storage array on which you want to run commands. A password is not necessary under these conditions: • A password has not been set on the storage array. • The password is specified in a script file that you are running. • You specify the password by using the -c parameter and this command: `set session password=` *password*
-P	This argument requires one of two arguments: • *password_file* - contains the password to use for authentication. • - (dash) - read the password from `stdin` . Note that the addition of this argument is applicable to all controllers, regardless of whether the **https** client type or **symbol** client type is used.

Parameter	Definition
-q	Specifies the frequency that you want to receive event notifications and the type of information returned in the event notifications. An email alert notification containing at least the basic event information is always generated for every critical event. These values are valid for the -q parameter: • everyEvent – Information is returned with every email alert notification. • 2 – Information is returned no more than once every two hours. • 4 – Information is returned no more than once every four hours. • 8 – Information is returned no more than once every eight hours. • 12 – Information is returned no more than once every 12 hours. • 24 – Information is returned no more than once every 24 hours. Using the -I parameter you can specify the type of information in the email alert notifications. • If you set the -I parameter to eventOnly , the only valid value for the -q parameter is everyEvent . • If you set the -I parameter to either the profile value or the supportBundle value, this information is included with the emails with the frequency specified by the -q parameter.
-quick	Reduces the amount of time that is required to run a single-line operation. An example of a single-line operation is the recreate snapshot volume command. This parameter reduces time by not running background processes for the duration of the command. Do not use this parameter for operations that involve more than one single-line operation. Extensive use of this command can overrun the controller with more commands than the controller can process, which causes operational failure. Also, status updates and configuration updates that are collected usually from background processes will not be available to the CLI. This parameter causes operations that depend on background information to fail.
-S (uppercase)	Suppresses informational messages describing the command progress that appear when you run script commands. (Suppressing informational messages is also called silent mode.) This parameter suppresses these messages: • Performing syntax check • Syntax check complete • Executing script • Script execution complete • SMcli completed successfully
-v	Shows the current global status of the known devices in a configuration file when used with the -d parameter.
-w	Specifies the WWID of the storage array. This parameter is an alternate to the -n parameter. Use the -w parameter with the -d parameter to show the WWIDs of the known storage arrays. The file content has this format: *storage-system-name world-wide-ID IP-address1 IP-address2*
-X (uppercase)	Deletes a storage array from a configuration.
-?	Shows usage information about the CLI commands.

Structure of a script command

All script commands have the following structure:

command operand-data (statement-data)

- *command* identifies the action to be performed.
- *operand-data* represents the objects associated with a storage array that you want to configure or manage.
- *statement-data* provides the information needed to perform the command.

The syntax for *operand-data* has the following structure:

(*object-type* | `all` *object-types* | [*qualifier*] (*object-type* [*identifier*] (*object-type* [*identifier*] | *object-types* [*identifier-list*])))

An object can be identified in four ways:

- Object type – Use when the command is not referencing a specific object.
- **all** parameter prefix – Use when the command is referencing all of the objects of the specified type in the storage array (for example, **allVolumes**).
- Square brackets – Use when performing a command on a specific object to identify the object (for example, **volume [engineering]**).
- A list of identifiers – Use to specify a subset of objects. Enclose the object identifiers in square brackets (for example, **volumes [sales engineering marketing]**).

A qualifier is required if you want to include additional information to describe the objects.

The object type and the identifiers that are associated with each object type are listed in this table.

Object Type	Identifier
controller	a or b
drive	For enclosures with drawers, use tray ID, drawer ID, and slot ID. Alternatively, just tray ID and slot ID.
replacementDrive	For enclosures with drawers, use tray ID, drawer ID, and slot ID. Alternatively, just tray ID and slot ID.
driveChannel	Drive channel identifier
host	User label
hostChannel	Host channel identifier
hostGroup	User label
hostPort	User label
iscsiInitiator	User label or iSCSI Qualified Name (IQN)
iscsiTarget	User label or IQN
storageArray	Not applicable
tray	Tray ID
volume	Volume user label or volume World Wide Identifier (WWID) (`set` command only)
volumeCopy	Target volume user label and, optionally, the source volume user label
volumeGroup	User label Valid characters are alphanumeric, a hyphen, and an underscore.

Statement data is in the form of:

- Parameter = value (such as **raidLevel=5**)
- Parameter-name (such as **batteryInstallDate**)
- Operation-name (such as **redundancyCheck**)

A user-defined entry (such as user label) is called a variable. In the syntax, it is shown in italic (such as *trayID* or *volumeGroupName*).

Synopsis of the script commands

Because you can use the script commands to define and manage the different aspects of a storage array (such as host topology, drive configuration, controller configuration, volume definitions, and volume group definitions), the actual number of commands is extensive. The commands, however, fall into general categories that are reused when you apply the commands to configure or maintain a storage array. The following table lists the general form of the script commands and a definition of each command.

Syntax	Description
`accept` *object* {*statement-data*}	Performs the pending operation.
`activate` *object* {*statement-data*}	Sets up the environment so that an operation can take place or performs the operation if the environment is already set up correctly.
`autoConfigure` `storageArray` {*statement-data*}	Automatically creates a configuration that is based on the parameters that are specified in the command.
`check` *object* {*statement-data*}	Starts an operation to report on errors in the object, which is a synchronous operation.
`clear` *object* {*statement-data*}	Discards the contents of some attributes of an object. This operation is destructive and cannot be reversed.
`create` *object* {*statement-data*}	Creates an object of the specified type.
`deactivate` *object* {*statement-data*}	Removes the environment for an operation.
`delete` *object*	Deletes a previously created object.
`diagnose` *object* {*statement-data*}	Runs a test and shows the results.
`disable` *object* {*statement-data*}	Prevents a feature from operating.
`download` *object* {*statement-data*}	Transfers data to the storage array or to the hardware that is associated with the storage array.
`enable` *object* {*statement-data*}	Sets a feature to operate.
`load` *object* {*statement-data*}	Transfers data to the storage array or to the hardware that is associated with the storage array. This command is functionally similar to the `download` command.
`recopy` *object* {*statement-data*}	Restarts a volume copy operation by using an existing volume copy pair. You can change the parameters before the operation is restarted.

Syntax	Description
`recover` *object* {*statement-data*}	Re-creates an object from saved configuration data and the statement parameters. (This command is similar to the `create` command.)
`remove` *object* {*statement-data*}	Removes a relationship between objects.
`repair` *object* {*statement-data*}	Repairs errors found by the `check` command.
`replace` *object* {*statement-data*}	The specified object replaces an existing object in the storage array.
`reset` *object* {*statement-data*}	Returns the hardware or an object to an initial state.
`resume` *object*	Starts a suspended operation. The operation starts where it left off when it was suspended.
`revive` *object*	Forces the object from the Failed state to the Optimal state. Use this command only as part of an error recovery procedure.
`save` *object* {*statement-data*}	Writes information about the object to a file.
`set` *object* {*statement-data*}	Changes object attributes. All changes are completed when the command returns.
`show` *object* {*statement-data*}	Shows information about the object.
`start` *object* {*statement-data*}	Starts an asynchronous operation. You can stop some operations after they have started. You can query the progress of some operations.
`stop` *object* {*statement-data*}	Stops an asynchronous operation.
`suspend` *object* {*statement-data*}	Stops an operation. You can then restart the suspended operation, and it continues from the point where it was suspended.
`validate` *object* {*statement-data*}	Validates a security key.

Recurring syntax elements

Recurring syntax elements are a general category of parameters and options that you can use in the script commands. The following table lists the conventions used in the recurring syntax elements.

Convention	Definition
a | b	Alternative ("a" or "b")
`italicized-words`	Needs user input to fulfill a parameter (a response to a variable)
[...] (square brackets)	Zero or one occurrence (square brackets are also used as a delimiter for some command parameters)
{ ... } (curly braces)	Zero or more occurrences
(a | b | c)	Choose only one of the alternatives

The following table lists the recurring syntax parameters and the values that you can use with the recurring syntax parameters.

Recurring Syntax	Syntax Value
autoconfigure-vols-attr- value-list	*autoconfigure-vols-attr-value-pair* {*autoconfigure-vols-attr-value-pair*}

autoconfigure-vols-attr- value-pair	`driveType=`*drive-type* `|`
	`driveMediaType=`*drive-media-type* `|`
	`raidLevel=`*raid-level* `|`
	`volumeGroupWidth=`*integer-literal* `|`
	`volumeGroupCount=`*integer-literal* `|`
	`volumesPerGroupCount=`*integer-literal*[6]`|`
	
	`hotSpareCount=`*integer-literal* `|`
	`segmentSize=`*segment-size-spec* `|`
	`cacheReadPrefetch=(TRUE | FALSE)`
	`securityType=(none | capable | enabled)`[7]`|`
	`dataAssurance=(none | enabled)`[5]

boolean	`(TRUE | FALSE)`
cache-flush-modifier- setting	`immediate, 0, .25, .5, .75, 1, 1.5, 2, 5, 10,` `20, 60, 120, 300, 1200, 3600, infinite`
capacity-spec	*integer-literal* **[KB | MB | GB | TB | Bytes]**

count-based-repository- spec	`repositoryRAIDLevel =`*repository-raid-level*
	`repositoryDriveCount=`*integer-literal*
	`[repositoryVolumeGroupUserLabel =`*user-label*`]`
	`[driveType=`*drive-type*[4]
	`] [trayLossProtect=(TRUE | FALSE)`[1]`] |`
	`[drawerLossProtect=(TRUE | FALSE)`[2]`] |`
	`[dataAssurance=(none | enabled)`[5]`] |`

create-raid-vol-attr- value-list	*create-raid-volume-attribute-value-pair* {*create-raid-volume-attribute-value-pair*}

create-raid-volume- attribute-value-pair	`capacity=`*capacity-spec* `|`
	`owner=(a |`
	`b) |`
	`cacheReadPrefetch=(TRUE | FALSE) |`
	`segmentSize=`*integer-literal* `|`
	`usageHint=`*usage-hint-spec*

create-volume-copy-attr- value-list	*create-volume-copy-attr-value-pair* {*create-volume-copy-attr-value-pair*}

create-volume-copy-attr- value-pair	`copyPriority=(highest | high | medium | low | lowest) |`
	`targetReadOnlyEnabled=(TRUE | FALSE) | copyType=(offline | online) |`
	`repositoryPercentOfBase=(20 | 40 | 60 | 120 | default) |`
	`repositoryGroupPreference=(sameAsSource | otherThanSource | default)`

drive-media-type	**(HDD | SSD | unknown | allMedia)** *HDD* means hard disk drive. *SSD* means solid state disk.
drive-spec	*trayID,slotID* or *trayID,drawerID,slotID* A drive is defined as two or three integer literal values separated by a comma. Low-density trays require two values. High-density trays, those trays that have drawers, require three values.
drive-spec-list	*drive-spec drive-spec*

Recurring Syntax	Syntax Value
drive-type	**(fibre | SATA | SAS)** **Note:** Only SAS drives are supported for firmware versions 11.50 and later.
error-action	**(stop | continue)**
ethernet-port-options	`enableIPv4=(TRUE | FALSE)	enableIPv6=(TRUE | FALSE) |` `IPv6LocalAddress=`*ipv6-address* `|` `IPv6RoutableAddress=`*ipv6-address* `|` `IPv6RouterAddress=`*ipv6-address* `|` `IPv4Address=`*ip-address* `|` `IPv4ConfigurationMethod= (static | dhcp)	IPv4GatewayIP=`*ip-address* `|` `IPv4SubnetMask=`*ip-address* `|` `duplexMode=(TRUE | FALSE) |` `portSpeed=(autoNegotiate | 10 | 100 | 1000)`
feature-identifier	**Note:** All features in ThinkSystem SAN OS 11.50 are enabled by default.
filename	*string-literal*
gid	*string-literal*
hex-literal	A literal in the range of 0x00 - 0xFF.
host-card-identifier	**(1 | 2 | 3 | 4)**
host-type	*string-literal | integer-literal*

instance-based- repository-spec	`(repositoryRAIDLevel =`*repository-raid-level*
	`repositoryDrives= (`*drive-spec-list*`)`
	`[repositoryVolumeGroupUserLabel =`*user-label*`]`
	`[trayLossProtect=(TRUE | FALSE)`[1]`]) |`
	`[drawerLossProtect=(TRUE | FALSE)`[2]`]) |`
	`(repositoryVolumeGroup=`*user-label*
	`[freeCapacityArea=`*integer-literal*
	[3]`])`
	Specify the **repositoryRAIDLevel** parameter with the **repositoryDrives** parameter. Do not specify the RAID level or the drives with the volume group. Do not set a value for the **trayLossProtect** parameter when you specify a volume group.

ip-address	**(0-255).(0-255).(0-255).(0-255)**
ipv6-address	**(0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF): (0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF)** You must enter all 32 hexadecimal characters.
iscsi-host-port	`(1 | 2 | 3 | 4)` The host port number might be 2, 3, or 4 depending on the type of controller you are using.

Recurring Syntax	Syntax Value

iscsi-host-port-options	`IPv4Address=`*ip-address* `|`
	`IPv6LocalAddress=`*ipv6-address* `|`
	`IPv6RoutableAddress=`*ipv6-address* `|`
	`IPv6RouterAddress=`*ipv6-address* `|`
	`enableIPv4=(TRUE | FALSE) | enableIPv6=(TRUE | FALSE) |`
	`enableIPv4Priority=(TRUE | FALSE) |`
	`enableIPv6Priority=(TRUE | FALSE) |`
	`IPv4ConfigurationMethod=(static | dhcp) |`
	`IPv6ConfigurationMethod= (static | auto) |`
	`IPv4GatewayIP=`*ip-address* `|`
	`IPv6HopLimit=`*integer* `|`
	`IPv6NdDetectDuplicateAddress=`*integer* `|`
	`IPv6NdReachableTime=`*time-interval* `|`
	`IPv6NdRetransmitTime=`*time-interval* `|`
	`IPv6NdTimeOut=`*time-interval* `|`
	`IPv4Priority=`*integer* `|`
	`IPv6Priority=`*integer* `|`
	`IPv4SubnetMask=`*ip-address* `|`
	`IPv4VlanId=`*integer* `|`
	`IPv6VlanId=`*integer* `|`
	`maxFramePayload=`*integer* `|`
	`tcpListeningPort=`*tcp-port-id* `|`
	`portSpeed=(autoNegotiate | 1 | 10)`

iscsiSession	[*session-identifier*]
nvsram-offset	*hex-literal*
nvsramBitSetting	*nvsram-mask, nvsram-value = 0xhexadecimal, 0xhexadecimal* | *integer-literal* The *0xhexadecimal* value is typically a value from 0x00 to 0xFF.
nvsramByteSetting	*nvsram-value = 0xhexadecimal* | *integer-literal* The *0xhexadecimal* value is typically a value from 0x00 to 0xFF.
portID	`(0-127)`
raid-level	`(0 | 1 | 3 | 5 | 6)`
recover-raid-volume-attr- value-list	*recover-raid-volume-attr-value-pair* {*recover-raid-volume-attr-value-pair*}

recover-raid-volume-attr- value-pair	`owner=(a|`
	`b) |`
	`cacheReadPrefetch=(TRUE | FALSE) |`
	`dataAssurance=(none | enabled)`

repository-raid-level	`(1 | 3 | 5 | 6)`
repository-spec	*instance-based-repository-spec* | *count-based-repository-spec*
segment-size-spec	*integer-literal* - all capacities are in base-2.
serial-number	`string-literal`

Recurring Syntax	Syntax Value
slotID	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]). (drive=(*trayID,[drawerID,]slotID*) | drives=(*trayID1,[drawerID1,]slotID1* ... *trayIDn,[drawerIDn,]slotIDn*))
test-devices	`controller`=(a|b) `esms`=(*esm-spec-list*)`drives`=(*drive-spec-list*)
test-devices-list	*test-devices* {*test-devices*}
time-zone-spec	`(GMT+HH:MM | GMT-HH:MM) [dayLightSaving=HH:MM]`
trayID-list	*trayID* {*trayID*}
usage-hint-spec	`usageHint`=(`multiMedia` | `database` | `fileSystem`) The usage hint, or expected I/O characteristics, of the volume are used by the controller to indicate an appropriate default volume segment size and dynamic cache read prefetch. For file system and database, a 128 KB segment size is used. For multimedia, a 256 KB segment size is used. All three usage hints enable dynamic cache read prefetch.
user-label	*string-literal* Valid characters are alphanumeric, the dash, and the underscore.
user-label-list	*user-label* {*user-label*}
volumeGroup-number	*integer-literal*
wwID	*string-literal*

[1]For tray loss protection to work, your configuration must adhere to the following guidelines:

Level	Criteria for Shelf Loss Protection	Minimum number of shelves required
Disk Pool	The disk pool contains no more than two drives in a single tray.	6
RAID 6	The volume group contains no more than two drives in a single shelf.	3
RAID 3 or RAID 5	Each drive in the volume group is located in a separate shelf.	3
RAID 1	Each drive in a RAID 1 pair must be located in a separate shelf.	2
RAID 0	Cannot achieve Shelf Loss Protection.	Not applicable

[2]For drawer loss protection to work, your configuration must adhere to the following guidelines:

Level	Criteria for drawer loss protection	Minimum number of drawers required
Disk Pool	The pool includes drives from all five drawers and there are an equal number of drives in each drawer. A 60-drive tray can achieve Drawer Loss Protection when the disk pool contains 15, 20, 25, 30, 35, 40, 45, 50, 55, or 60 drives.	5
RAID 6	The volume group contains no more than two drives in a single drawer.	3
RAID 3 or RAID 5	Each drive in the volume group is located in a separate drawer.	3
RAID 1	Each drive in a mirrored pair must be located in a separate drawer.	2
RAID 0	Cannot achieve Drawer Loss Protection.	Not applicable

If you have a storage array configuration in which a volume group spans several trays, you must make sure that the setting for drawer loss protection works with the setting for tray loss protection. You can have drawer loss protection without tray loss protection. You cannot have tray loss protection without drawer loss protection. If the **trayLossProtect** parameter and the **drawerLossProtect** parameter are not set to the same value, the storage array returns an error message and a storage array configuration will not be created.

[3] To determine if a free capacity area exists, run the `show volumeGroup` command.

[4] The default drive (drive type) is SAS.

The **driveType** parameter is not required if only one type of drive is in the storage array. If you use the **driveType** parameter, you also must use the **hotSpareCount** parameter and the **volumeGroupWidth** parameter.

[5] The **dataAssurance** parameter relates to the Data Assurance (DA) feature.

The Data Assurance (DA) feature increases data integrity across the storage system. DA enables the storage array to check for errors that might occur when data is moved between the controllers and drives. When this feature is enabled, the storage array appends error-checking codes (also known as cyclic redundancy checks or CRCs) to each block of data in the volume. After a data block is moved, the storage array uses these CRC codes to determine if any errors occurred during transmission. Potentially corrupted data is not written to disk.

If you want to use the DA feature, start with a pool or volume group that includes only drives that support DA. Then, create DA-capable volumes.

Note: When all the required hardware and the I/O interface is DA-capable, you can set the **dataAssurance** parameter to enabled and then use DA with certain operations. For example, you can create a volume group that includes DA-capable drives, and then create a volume within that volume group that is DA-enabled. Other operations that use a DA-enabled volume have options to support the DA feature.

[6] The **volumesPerGroupCount** parameter is the number of equal-capacity volumes per volume group.

[7] The **securityType** parameter enables you to specify the security setting for a volume group that you are creating. All of the volumes are also set to the security setting that you choose. Available options for setting the security setting include:

- none – The volume group is not secure.
- capable – The volume group is security capable, but security has not been enabled.

- enabled – The volume group is security enabled.

Note: A storage array security key must already be created for the storage array if you want to set **securityType=enabled**. (To create a storage array security key, use the `create storageArray securityKey` command.)

Naming conventions

- Names can have a maximum of 30 characters.
- You can use any combination of alphanumeric characters, hyphens, and underscores for the names of the following components:
    - Storage arrays
    - Host groups
    - Hosts
    - Volume groups
    - Dynamic disk pools
    - Volumes
    - HBA host ports
- You must use unique names. If you do not use unique names, the controller firmware returns an error.
- If the name contains more than one word, hyphens, or underscores, enclose the name in double quotation marks (" "). In some usages, you must also surround the name with square brackets ([ ]). The description of each parameter indicates whether you need to enclose a parameter in double quotation marks, square brackets, or both.
- The name character string cannot contain a new line.
- On Windows operating systems, you must enclose the name between two backslashes (\\) in addition to other delimiters. For example, the following name is used in a command that runs under a Windows operating system:

```
[\"Engineering\"]
```

- For a UNIX operating system and, when used in a script file, the name appears as in the following example:

```
["Engineering"]
```

- When you enter a World Wide Identifier (WWID) of an HBA host port, some usages require that you surround the WWID with double quotation marks. In other uses, you must surround the WWID with angle brackets (<>). The description of the WWID parameter indicates whether you need to enclose the WWID in double quotation marks or angle brackets.

Entering numerical names

When the storage management software automatically configures a storage array, the storage management software assigns names that consist of numerical characters. Names that consist only of numerical characters are valid names. Numerical character names, however, must be treated differently than names that start with alphabetic characters.

- Names that are only numbers, such as 1 or 2
- Names that start with a number, such as 1Disk or 32Volume

- [\"1\"]
- [\"1Disk\"]

Note: If you have any doubt as to the validity of a name, use both double quotation marks and square brackets. Using both makes sure that the name works and does not cause any processing issues.

Formatting CLI commands

Double quotation marks (" ") that are used as part of a name or label require special consideration when you run the CLI commands and the script commands on a Windows or Linux operating system.

When double quotation marks (" ") are part of a name or value, you must insert a backslash (\) before each double quotation mark character. For example:

```
-c "set storageArray userLabel=\"Engineering\";"
```

In this example, "Engineering" is the storage array name. A second example is:

```
-n \"My\"_Array
```

In this example, "My"_Array is the name of the storage array.

You cannot use double quotation marks (" ") as part of a character string (also called string literal) within a script command. For example, you cannot enter the following string to set the storage array name to "Finance" Array:

```
-c "set storageArray userLabel=\"\"Finance\"Array\";"
```

In a Windows operating system, if you do not use double quotation marks (" ") around a name, you must insert a caret (^) before each special script character. Special characters are ^, |, <, and >.

Insert a caret before each special script character when used with the terminals `-n`, `-o`, `-f`, and `-p`. For example, to specify storage array CLI>CLIENT, enter this string:

```
-n CLI^>CLIENT
```

Insert one caret (^) before each special script character when used within a string literal in a script command. For example, to change the name of a storage array to FINANCE_|_PAYROLL, enter the following string:

```
-c "set storageArray userLabel=\"FINANCE_^|_PAYROLL\";"
```

Note: When issuing SMcli commands at the command prompt, an additional backslash (\) character is required as an escape character in the file path name of an input or output file when using the Windows OS.

The additional backslash (\) must be included when using SMcli in secure, https mode, by providing the -u option to specify a role-based access management user. **Example:**
`C:\\dir\\subdir\\filename`

Formatting rules for script commands

Syntax unique to a specific script command is explained in the Notes section at the end of each script command description.

Case sensitivity – The script commands are not case sensitive. You can type the script commands in lowercase, uppercase, or mixed case. (In the following command descriptions, mixed case is used as an aid to reading the command names and understanding the purpose of the command.)

Spaces – You must enter spaces in the script commands as they are shown in the command descriptions.

Square brackets – Square brackets are used in two ways:

- As part of the command syntax.
- To indicate that the parameters are optional. The description of each parameter tells you if you need to enclose a parameter value in square brackets.

Parentheses – Parentheses shown in the command syntax enclose specific choices for a parameter. That is, if you want to use the parameter, you must enter one of the values enclosed in parentheses. Generally, you do not include parentheses in a script command; however, in some instances, when you enter lists, you must enclose the list in parentheses. Such a list might be a list of tray ID values and slot ID values. The description of each parameter tells you if you need to enclose a parameter value in parentheses.

Vertical bars – Vertical bars in a script command indicate "or" and separate the valid values for the parameter. For example, the syntax for the **raidLevel** parameter in the command description appears as follows:

```
raidLevel=(0 | 1 | 3 | 5 | 6)
```

To use the **raidLevel** parameter to set RAID level 5, enter this value:

```
raidLevel=5
```

Drive locations – The CLI commands that identify drive locations support both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0, and specify the ID of the slot in which a drive resides. Separate the ID values with a comma. If you enter more than one set of ID values, separate each set of values with a space.

There are two conventions for specifying drives in the CLI. The convention you should use is specified in each command. One convention uses an equal sign and parentheses:

```
drive=(trayID,[drawerID,]slotID)
```

The second convention uses no equal sign, but a pair of braces around the specified drives:

drive [*trayID,[drawerID,]slotID*]

Here are some examples using parentheses:

(1,1 1,2 1,3 1,4 2,1 2,2 2,3 2,4)

or, for a high-capacity drive tray, this example:

(1,1,1 1,2,2 1,3,3 1,4,4 2,1,1 2,2,2 2,3,3 2,4,4)

Italicized terms – Italicized terms in the command indicate a value or information that you need to provide. For example, when you encounter the italicized term:

numberOfDrives

Replace the italicized term with a value for the number of drives that you want to include with the script command.

Semicolon – Script commands must end with a semicolon (;). You can enter more than one script command on the command line or in a script file. For example, a semicolon is used to separate each script command in the following script file.

```
create volume drives=(0,2 0,3 1,4 1,5 2,6 2,7) raidLevel=5 userLabel="v1" capacity=2gb owner=a;
create volume volumeGroup=2 userLabel="v2" capacity=1gb owner=b;
create volume volumeGroup=2 userLabel="v3" capacity=1gb owner=a;
create volume drives=(0,4 0,5 1,6 1,7 2,8 2,9) raidLevel=5 userLabel="v4" capacity=2gb owner=b;
create volume volumeGroup=3 userLabel="v5" capacity=1gb owner=a;
create volume volumeGroup=3 userLabel="v6" capacity=1gb owner=b;
```

Formatting CLI commands in Windows PowerShell

Note: The Windows PowerShell with Administrator privileges is required to use the CLI.

The Windows PowerShell is an interactive and scripting shell that provides access to command-line tools. The Windows PowerShell improves upon the Windows Command Prompt with a more robust set of commands and scripting capability. You can run all of the CLI and script commands in the Windows PowerShell; however, the Windows PowerShell has some unique formatting requirements. The requirements are these:

- Begin all SMcli commands with a period and a forward slash (./)
- SMcli wrapper must be identified as an executable command with the .exe extension (SMcli.exe)
- Enclose the script command in single quotation marks (' ')
- Double quotation marks that are part of a name, file path, or value must have a backslash before each double quotation mark character (\")

The following is an example of a CLI command to create a storage array name in the Windows PowerShell. Note the use of the single quotation marks as delimiters for the script command and the backslash double quotation marks around the storage array name, identified as **userLabel** in the command syntax.

```
PS C:\...\StorageManager\client> ./SMcli.exe 123.45.67.88 123.45.67.89
-c 'set storageArray userLabel=\"Engineering\";'
```

The following is an example of a CLI command to enable a premium feature in the Windows PowerShell. Note the use of the backslash double quotation marks before the file path to the premium feature key.

```
PS C:\...\StorageManager\client> ./SMcli.exe 123.45.67.88 123.45.67.89
-c'enable storageArray feature file=\"C:\licenseKey.bin\";'
```

In the previous examples both upper case letters and lower case letters are used. This use is to help make clear how the commands are formatted. The Windows PowerShell is, however, not case sensitive and does not require the use specific cases.

Detailed error reporting

Data collected from an error encountered by the CLI is written to a file. Detailed error reporting under the CLI works as follows:

- If the CLI must abnormally end running CLI commands and script commands, error data is collected and saved before the CLI finishes.
- The CLI saves the error data by writing the data to a standard file name.
- The CLI automatically saves the data to a file. Special command line options are not required to save the error data.
- You are not required to perform any action to save the error data to a file.
- The CLI does not have any provision to avoid over-writing an existing version of the file that contains error data.

For error processing, errors appear as two types:

- Terminal errors or syntax errors that you might enter.
- Exceptions that occur as a result of an operational error.

When the CLI encounters either type of error, the CLI writes information that describes the error directly to the command line and sets a return code. Depending on the return code, the CLI also might write additional information about which terminal caused the error. The CLI also writes information about what it was expecting in the command syntax to help you identify any syntax errors that you might have entered.

When an exception occurs while a command is running, the CLI captures the error. At the end of processing the command (after the command processing information has been written to the command line), the CLI automatically saves the error information to a file.

The name of the file to which error information is saved is `excprpt.txt`. The CLI tries to place the `excprpt.txt` file in the directory that is specified by the system property `devmgr.datadir`. If for any reason the CLI cannot place the file in the directory specified by `devmgr.datadir`, the CLI saves the `excprpt.txt` file in the same directory from which the CLI is running. You cannot change the file name or the location. The `excprpt.txt` file is overwritten every time that an exception occurs. If you want to save the information in the `excprpt.txt` file, you must copy the information to a new file or a new directory.

Exit status

This table lists the exit statuses that might be returned and the meaning of each status.

Status Value	Error Name	Meaning
0	SUCCESSFUL	The command terminated without an error.
1	INVALID_USAGE	The command terminated with an error. Information about the error also appears.

Status Value	Error Name	Meaning
2	SCRIPT_FILE_DOES_NOT_EXIST	The script file does not exist.
3	ERROR_OPENING_OUTPUT_FILE	An error occurred while opening an output file.
4	NO_STORAGE_ARRAY_AT_ADDRESS	A storage array was not at the specified address.
5	ADDRESSES_SPECIFY_DIFFERENT_ARRAYS	Addresses specify different storage arrays.
6	NO_SANAME_FOR_HOST_AGENT_CONNECT	A storage array name does not exist for the host agent that is connected.
7	SANAME_NOT_AT_ADDRESS	The storage array name was not at the specified address.
8	SANAME_NOT_UNIQUE	The storage array name was not unique.
9	SANAME_NOT_IN_CONFIG_FILES	The storage array name was not in the configuration file.
10	NO_MANAGEMENT_CLASS_FOR_SA	A management class does not exist for the storage array.
11	NO_SA_IN_CONFIG_FILE_FOUND	A storage array was not found in the configuration file.
12	INTERNAL_ERROR	An internal error occurred. This exit status indicates that you do not have privileges for running a CLI command from the command line. You must have administrator privileges to run all of the CLI commands from a command line.
13	INVALID_SCRIPT_SYNTAX	Invalid script syntax was found.
14	UNABLE_TO_COMMUNICATE	The controller was unable to communicate with the storage array.
15	DUPLICATE_ARGUMENT	A duplicate argument was entered.
16	EXECUTION_ERROR	An execution error occurred.
17	NO_HOST_AT_ADDRESS	A host was not at the specified address.
18	WWNAME_NOT_IN_CONFIG_FILES	The WWID was not in the configuration file.
19	WWNAME_NOT_AT_ADDRESS	The WWID was not at the address.
20	UNKNOWN_IP	An unknown IP address was specified.
21	PM_CONFIG_FILE_CORRUPTED	The Event Monitor configuration file was corrupted.
22	UNABLE_TO_COMMUNICATE_TO_PM	The storage array was unable to communicate with the Event Monitor.
23	UNEXIST_ALERT	The controller was unable to write alert settings.

Status Value	Error Name	Meaning
24	WRONG_ORGANIZER_NODE	The wrong organizer node was specified.
25	CMD_NOT_AVAILABLE	The command was not available.
26	DEVICE_NOT_IN_CONFIG_FILE	The device was not in the configuration file.
27	ERROR_UPDATING_CONFIG_FILE	An error occurred while updating the configuration file.
28	UNKNOWN_HOST_ERROR	An unknown host error occurred.
29	SENDER_CONTACT_FILE_NOT_FOUND	The sender contact information file was not found.
30	READ_SENDER_CONTACT_FILE_FAILED	The sender contact information file could not be read.
31	USERDATA_FILE_EXISTS	The `userdata.txt` file exists.
32	BAD_EMAIL_INFORMATION_TO_INCLUDE	An invalid `-I` value in the email alert notification was specified.
33	BAD_EMAIL_FREQUENCY	An invalid `-f` value in the email alert notification was specified.
34	OPTION_REMOVED	The `-r` option is not supported anymore.
35	UNKNOWN_ALERT_PRIORITY	Invalid alert severity specified.
36	PASSWORD_REQUIRED	The operation needs either the Administrator or Monitor password to be set.
37	INVALID_MONITOR_PASSWORD	The operation cannot be completed because an invalid Monitor password was entered.
38	INVALID_ADMIN_PASSWORD	The operation cannot be completed because an invalid Administrator password was entered.
39	EXCEEDED_MAX_CHARS_FOR_PASSWORD	The password provided is exceeding the character limit.
40	INVALID_MONITOR_TOKEN	The `-R` monitor is not supported for this array. Use a valid role and retry the operation.
41	ASUP_CONFIG_ERROR	An error occurred while writing to or reading from the AutoSupport configuration file. Please retry this operation again.
42	MAIL_SERVER_UNKNOWN	Host address or mail server address is incorrect.
43	ASUP_SMTP_REPLY_ADDRESS_REQUIRED	No healthy ASUP enabled arrays detected while attempting ASUP configuration test.
44	NO_ASUP_ARRAYS_DETECTED	Reply email request required if ASUP delivery type is SMTP.

Status Value	Error Name	Meaning
45	ASUP_INVALID_MAIL_RELAY_SERVER	Unable to validate ASUP mail relay server.
46	ASUP_INVALID_SENDER_EMAIL	Sender email address you specified is not a valid format.
47	ASUP_INVALID_PAC_SCRIPT	Proxy Auto-Configuration (PAC) script file is a not a valid URL.
48	ASUP_INVALID_PROXY_SERVER_HOST_ADDRESS	The Host address specified cannot be found or is in an incorrect format.
49	ASUP_INVALID_PROXY_SERVER_PORT_NUMBER	The port number you specified is an invalid format.
50	ASUP_INVALID_AUTHENTICATION_PARAMETER	The username or password you specified is invalid.
51	ASUP_INVALID_DAILY_TIME_PARAMETER	The daily time parameter specified is invalid.
52	ASUP_INVALID_DAY_OF_WEEK_PARAMETER	The `-dayOfWeek` parameter(s) that have been entered are invalid.
53	ASUP_INVALID_WEEKLY_TIME_PARAMETER	The weekly time parameter is not valid.
54	ASUP_INVALID_SCHEDULE_PARSING	Unable to successfully parse the schedule information provided.
55	ASUP_INVALID_SA_SPECIFIED	Invalid storage array specifier provided.
56	ASUP_INVALID_INPUT_ARCHIVE	The input archive entered is invalid. The input archive parameter must be in the form of `-inputArchive=<n>` where `-n` is an integer from 0 to 5.
57	ASUP_INVALID_OUTPUT_LOG	A valid output log was not specified.
58	ASUP_TRANSMISSION_FILE_COPY_ERROR	There was an error trying to copy the AutoSupport transmission log file. The transmission log either does not exist or there was an IO error trying to copy its data.
59	ASUP_DUPLICATE_NAMED_ARRAYS	More than one storage array with the same name was found. Please retry the command using the world-wide-name parameter, `-w <WWID>`.
60	ASUP_NO_SPECIFIED_ARRAY_FOUND	The specified storage array with the -n <storage-system-name> parameter is not present or is not supported for this command.
61	ASUP_NO_SPECIFIED_WWID_FOUND	The specified storage array with the `-w <WWID>` parameter is not present or is not supported for this command.
62	ASUP_FILTERED_TRANSMISSION_LOG_ERROR	There was an unknown error trying to obtain the filtered transmission log.
63	ASUP_TRANSMISSION_ARCHIVE_DOES_NOT_EXIST	The AutoSupport input archive transmission log specified with the `-inputArchive=<n>` parameter does not exist.

Status Value	Error Name	Meaning
64	NO_VALID_REST_CLIENT_DISCOVERED	Unable to communicate with the storage array via https.
65	INVALID_CLI_VERSION	The client CLI version is not compatible with the CLI version running on the storage array.
66	INVALID_USERNAME_OR_PASSWORD	The username or password entered is invalid.
67	UNTRUSTED_CONNECTION	Unable to establish a secure connection to the storage array.
68	INVALID_PASSWORD_FILE	The password file cannot be found or is not readable.

Adding comments to a script file

The script engine looks for certain characters or a command to show comments. You can add comments to a script file in three ways:

- Add text after two forward slashes (//) as a comment until an end-of-line character is reached. If the script engine does not find an end-of-line character in the script after processing a comment, an error message appears, and the script operation is terminated. This error usually occurs when a comment is placed at the end of a script and you have forgotten to press the **Enter** key.

  ```
  // Deletes the existing configuration.
  set storageArray
   resetConfiguration=true;
  ```

- Add text between /* and */ as a comment. If the script engine does not find both a starting comment notation and an ending comment notation, an error message appears, and the script operation is terminated.

  ```
  /* Deletes the existing configuration */
  set storageArray
   resetConfiguration=true;
  ```

- Use the show statement to embed comments in a script file that you want to appear while the script file is running. Enclose the text that you want to appear by using double quotation marks (" ").

  ```
  show "Deletes the existing configuration";
  set storageArray
   resetConfiguration=true;
  ```

Usage guidelines

This list provides guidelines for writing script commands on the command line:

- You must end all commands with a semicolon (;).
- You can enter more than one command on a line, but you must separate each command with a semicolon (;).
- You must separate each base command and its associated primary parameters and secondary parameters with a space.
- The script engine is not case sensitive. You can enter commands by using uppercase letters, lowercase letters, or mixed-case letters.

- Add comments to your scripts to make it easier for you and future users to understand the purpose of the script commands. (For information about how to add comments, see " Adding comments to a script file " on page 24 .)

Note: While the CLI commands and the script commands are not case sensitive, user labels (such as for volumes, hosts, or host ports) are case sensitive. If you try to map to an object that is identified by a user label, you must enter the user label exactly as it is defined, or the CLI commands and the script commands will fail.

Firmware compatibility levels

The script commands and the command parameters do not run under all versions of the controller firmware. The script commands in the following sections list the minimum firmware levels under which the script commands can run. In the script commands, the firmware levels are listed under the heading "Minimum Firmware Level." This list describes how to interpret the information about the firmware levels.

- If a script command does not list a minimum controller firmware level, the script command and all of the parameters associated with that script command can run under any level of controller firmware.

- A controller firmware number without any explanatory information indicates that the controller firmware level applies to the entire script command and all of the parameters for that script command.

- A controller firmware number that is associated with a parameter indicates the minimum controller firmware level under which the parameter can run.

Note: The minimum controller firmware level indicates support by the software that releases the command, as well as support by all storage management software that picks up usage. CLI support capabilities depend on the hardware used. When an unsupported command is entered, an error message appears.

Chapter 3. SMcli https mode

The SMcli can operate in an **https** mode that offers additional security features.

When you use the CLI, the script engine is created in one of the following modes:

- **https** – a REST-based script engine is created, with additional security features.
- **symbol** – a SYMbol-based script engine is created.

Security features available in **https** client:

- Certificate authentication using trusted certificates is required for advanced security. You can use the -k option to use a self-signed certificate and run commands in insecure mode.
- You can use role-based access management, with different security permissions assigned to different roles. Use the -u option to run commands with a user name argument.
- Password arguments previously available in **symbol** mode can also be used in **https** mode to specify a password for a particular user role. The -p option is used to specify the password on the command line, or the -P option can read in a password from a file or from stdin .

There are several examples in this topic that help illustrate the secure command line parameters:

Operations requiring a password, https client mode, trusted certificate is installed on the array

In the following example, both the username and password options are provided, and a trusted certificate is installed on the array.

```
C:\Program Files\StorageManager\client>SMcli -n Array1 -u admin@local -p
 adminPassword -c "set storageArray cacheBlockSize=4;"

Syntax check complete.


Executing script…

Script execution complete.

SMcli completed
 successfully.
```

Operations requiring a password, https client mode, no trusted certificate is installed on the array

In the following example, both the user name and password options are provided, but no trusted certificate is installed on the array, and the -k option was not used. The example shows the output that is returned.

```
C:\Program Files\StorageManager\client>SMcli -n Array1 -u admin@local -p
 adminPassword -c "set storageArray cacheBlockSize=4;"

Unable to establish a
 secure connection to the storage array as we were unable to confirm the
 connection is secure.
Please configure the storage array to use a trusted
 security certificate. If the problem persists, contact Technical Support.
```

```
SMcli failed.
```

Operations requiring a password, https client mode, no trusted certificate installed, but using -k for self-signed certificate

In the following example, like the preceding example, both username and password options are provided, but no trusted certificate is installed on the array. However, in this case the -k option was used in order to use a self-signed certificate.

```
C:\Program Files\StorageManager\client>SMcli -n Array1 -u admin@local -p
 adminPassword -c "set storageArray cacheBlockSize=4;" -k
Performing syntax
 check...

Syntax check complete.

Executing script...

Script execution
 complete.
```

Operations requiring a password, symbol client mode

In this example using the **symbol** client mode, only the password option is required for successful completion of the command.

```
C:\Program Files\StorageManager\client>SMcli -n Array1 -p adminPassword -c "set
 storageArray cacheBlockSize=4;"
Performing syntax check...

Syntax check
 complete.

Executing script...

Script execution complete.

SMcli completed
 successfully.
```

Read only operations, symbol client mode

In this example in **symbol** client mode, neither username or password is provided. This only successfully completes for read-only operations.

```
C:\Program Files\StorageManager\client>SMcli -n Array1  -c "show allVolumes;"

Performing syntax check...

Syntax check complete.

Executing script...
```

```
STANDARD/THIN VOLUMES-----------------------------

    Number of volumes: 0

Missing Volumes

    Number of missing volumes: 0


Script execution complete.


SMcli completed successfully.
```

Read only operations, http client mode

In the following example, also using a read-only operation but in **https** client mode, both username and password are required, and provided, along with $-k$ to accept a self-signed certificate. The **https** client mode requires a password even for read-only operations.

```
C:\Program Files\StorageManager\client>SMcli -n Array1 -u admin@local -p
 adminPassword -c "show allVolumes;" -k
Performing syntax check...

Syntax
 check complete.

Executing script...

THICK/THIN VOLUMES--------------------
---------

    Number of volumes: 0
Missing Volumes

    Number of missing
 volumes: 0


Script execution complete.

SMcli completed successfully.
```

Chapter 4.   CLI commands (Alphabetical List)

Chapter 5. Storage administrators commands

Chapter 6. Storage monitor personnel commands

Chapter 7.   Support administrator commands

Chapter 8. Security administrator commands

Chapter 9. Alert configuration commands

Email alert configuration

Command Reference

Clear email alert configuration

The `clear emailAlert configuration` command clears the email alert configuration to default values.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Syntax

```
clear emailAlert configuration
```

Parameters

None.

Examples

```
SMcli -n Array1 -c "clear emailAlert configuration;"

SMcli completed successfully.
```

Configure email alert settings

The `set emailAlert` command configures the email to send an email to a specified technical support or organization. The email alert contains a summary of the event, detailed information about the affected storage, and customer contact information.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Syntax

```
set emailAlert
    serverAddress="serverAddress" |
    senderAddress="emailAddress" |
    additionalContactInfo="filename"  |
    (recipientAddresses=("emailAddress1" ... "emailAddressN") |
 addRecipientAddresses=("emailAddress1" ... "emailAddressN"))
```

Parameters

Parameter	Description
serverAddress	Allows you to set the email server address. The email server address can be a fully qualified domain name, IPv4 address, or IPv6 address.
senderAddress	Allows you to set the sender's email address.
additionalContactInfo	Allows you to provide the filename that contains the additional contact information to be used in the email alert.
recipientAddresses	Allows you to set one or more recipient email addresses. Using this set option will clear out existing email addresses. Enclose all of the names in parentheses. Enclose each of the names in double quotation marks (""). Separate each of the names with a space.
addRecipientAddresses	Allows you to add one or more recipient email addresses to the existing list. Enclose all of the names in parentheses. Enclose each of the names in double quotation marks (""). Separate each of the names with a space.

Examples

```
SMcli -n Array1 -c "set emailAlert
    serverAddress="email.server.domain.com"
    senderAddress="no-reply@server.domain.com"
    additionalContactInfo="C:\additionalInfo.txt"
    recipientAddresses=("person1@email.domain.com" "person2@email.domain.com");"

SMcli -n Array1 -c "set emailAlert addRecipientAddresses=("person3@lenovo.com");"

SMcli completed successfully.
```

Delete email alert recipient

The `delete emailAlert` command deletes recipient email address(es) from the Email alert configuration.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Syntax

```
delete emailAlert
      (allEmailRecipients |
       emailRecipients [emailAddress1 ... emailAddressN])
```

Parameters

Parameter	Description
allEmailRecipients	Allows you to delete all email recipients.
emailRecipients	Allows you to delete the recipient addresses. Enclose the email addresses in square brackets ([ ]).

Examples

```
SMcli -n Array1 -c "delete emailAlert allEmailRecipients;"

SMcli -n Array1 -c "delete emailAlert emailRecipients ["person1@email.domain.com" "person3@email.domain.com"];"

SMcli completed successfully.
```

Show email alert configuration

The show emailAlert summary command displays the email alert configuration information.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin or Storage Monitor role.

Syntax

```
show emailAlert summary
```

Parameters

None.

Examples

```
SMcli -n Array1 -c "show emailAlert summary;"

EMAIL ALERT SETTINGS
   Mail server address: email@company.com
   Email sender address: no-reply@company.com
   Recipient Email
      recipient@company.com
      recipient-two@company.com

SMcli completed successfully.
```

Test email alert configuration

The start emailAlert test command allows you to test the alert configuration by sending a sample email message.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Syntax

```
start emailAlert test
```

Parameters

None.

Examples

```
SMcli -n Array1 -c "start emailAlert test;"
```

```
The sample alert message was successfully sent to the email addresses.
```

```
SMcli completed successfully.
```

Embedded SNMP configuration

Command Reference

Register SNMP community

The `create snmpCommunity` command creates a new Simple Network Management Protocol (SNMP) community, community name string and registers the new community as a known entity to the SNMP agent. Any attempt to register a new community with the same name as that of an existing community is rejected and the firmware returns an error message.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Syntax

```
create snmpCommunity communityName="snmpCommunityName"
```

Parameters

Parameter	Description
communityName	The name of the SNMP community that you want to create. Enclose the SNMP community name in double quotation marks (" ").

Register SNMP trap destination

The `create snmpTrapDestination` command creates a new Simple Network Management Protocol (SNMP) trap destination. A trap destination is the SNMP manager to receive the trap messages.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Syntax

```
create snmpTrapDestination trapReceiverIP=ipAddress
communityName="communityName"
[sendAuthenticationFailureTraps=(TRUE | FALSE)]
```

Parameters

Parameter	Description
trapReceiverIP	The IP address of the SNMP manager to which you want to send trap messages.
communityName	The name of the SNMP community for which you want to send trap messages.
sendAuthenticationFailureTraps	This parameter turns on or turns off sending authentication failure messages to an SNMP manager. To send authentication failure messages, set the parameter to TRUE . To prevent sending authentication failure messages, set the parameter to FALSE . The default is TRUE .

Show SNMP communities

The `show allSnmpCommunities` command returns information about the Simple Network Management Protocol (SNMP) communities defined for the storage array. SNMP communities are collections of devices, such as routers, switches, printers, storage devices, grouped together to manage and monitor the devices.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin or Storage Monitor role.

Context

Information returned includes the following:

- The total number of communities
- The total number of trap destinations
- The names of the SNMP communities

Syntax

```
show (allSnmpCommunities |
snmpCommunity communityName="snmpCommunityName" |
snmpCommunities [snmpCommunityName1 ... snmpCommunityNameN])
[summary]
```

Parameters

Parameter	Description
allSnmpCommunities	This parameter returns information about all of the SNMP communities in the storage array.
communityName	The name of the SNMP community for which you want to retrieve information. Enclose the SNMP community name in double quotation marks (" ").

Parameter	Description
snmpCommunities	The names of several SNMP communities for which you want to retrieve information. Enter the names of the SNMP communities using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.
summary	This parameter returns a list of the total number of SNMP communities and the total number of SNMP trap destinations. When you use this parameter, all of the detail information is omitted.

Notes

SNMP supports one or more *communities* to which managers and managed devices belong. SNMP requests contain a *community string* in the data packets passed over the network that acts as a crude password. SNMP agents can reject GET or SET requests with an unrecognized community string. A community string is also included in TRAP notifications sent from agent to manager as well.

The embedded SNMP agent supports both IPV4 and IPV6.

This command returns SNMP community information similar to this example.

```
SNMP COMMUNITIES----------------------------
SUMMARY
   Total SNMP Communities: 2
   Total SNMP Trap Destinations: 1
DETAILS
   SNMP Community: TestComm1
   SNMP Permission: Read Only
      Associated Trap Destination:
      Trap Receiver IP Address: 10.113.173.133
      Send Authentication Failure Traps: true
   SNMP Community: Test2
   SNMP Permission: Read Only
      Associated Trap Destination:
```

Show SNMP MIB II system group variables

The `show snmpSystemVariables` command returns information about the Simple Network Management Protocol (SNMP) system variables. The system variables are maintained in a Management Information Base II (MIB-II) database.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin or Storage Monitor role.

Syntax

```
show snmpSystemVariables
```

Parameters

None.

Notes

This command returns SNMP system variables information similar to this example.

```
SYSTEM VARIABLES
    Sys Name: NONE
    Sys Contact: NONE
    Sys Location: NONE
```

Test SNMP trap destination

The `start snmpTrapDestination` command tests the connection and identification of the trap receiver for a specific Simple Network Management Protocol (SNMP) community. This command tests the trap destination by sending a trap message to the trap receiver.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Syntax

```
start snmpTrapDestination trapReceiverIP=ipAddress
communityName="communityName"
```

Parameters

Parameter	Description
trapReceiverIP	The IP address of the SNMP manager to which you want to send trap messages.
communityName	The name of the SNMP community for which you want to send trap messages.

Unregister SNMP community

The `delete snmpCommunity` command deletes an existing Simple Network Management Protocol (SNMP) community that you previously created and registered using the `create snmpCommunity` command. Deleting an SNMP community effectively unregisters the community. Any trap destinations associated with that community are also removed.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
delete snmpCommunity communityName="snmpCommunityName"
```

Parameters

Parameter	Description
communityName	The name of the SNMP community that you want to delete. Enclose the SNMP community name in double quotation marks (" ").

Unregister SNMP trap destination

The `delete snmpTrapDestination` command deletes an existing Simple Network Management Protocol (SNMP) trap destination that you previously created and registered using the `create snmpTrapDestination` command.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

`delete snmpTrapDestination trapReceiverIP=`*ipAddress*

Parameters

Parameter	Description
trapReceiverIP	The IP address of the SNMP manager from which you want to stop sending trap messages.

Update SNMP community

The `set snmpCommunity` command creates a new name for an existing Simple Network Management Protocol (SNMP) community.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Syntax

`set snmpCommunity communityName="`*snmpCommunityName*`"`
`newCommunityName="`*newSnmpCommunityName*`"`

Parameters

Parameter	Description
communityName	The name of the existing SNMP community that you want to rename. Enclose the SNMP community name in double quotation marks (" ").
newCommunityName	The new name that you want to give to the SNMP community. Enclose the SNMP community name in double quotation marks (" ").

Update SNMP MIB II system group variables

The `set snmpSystemVariables` command changes the system variables for the Simple Network Management Protocol (SNMP).

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Context

The following system variables are maintained in a Management Information Base II (MIB-II) database:

- Name of the system
- Name of the system contact
- Location of the system

Syntax

```
set snmpSystemVariables
[sysName=newSystemName]
[sysContact=contactName]
[sysLocation=systemLocation]
```

Parameters

Parameter	Description
sysName	The new name that you want to give to the SNMP system. Use standard SNMP and MIB conventions for the system name. Enclose the SNMP system name in square brackets ([ ]).
sysContact	The name of contact person for the managed system with information on how to contact this person. Enclose the SNMP contact name in square brackets ([ ]).
sysLocation	The physical location of the system, such as "3rd flr". Enclose the SNMP system location in square brackets ([ ]).

Update SNMP trap destination

The `set snmpTrapDestination trapReceiverIP` command turns on or turns off sending authentication failure messages for an SNMP trap destination. Failure occurs when the SNMP agent received a message from an SNMP manager, but the message contained an invalid community name.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Syntax

```
set snmpTrapDestination trapReceiverIP=ipAddress
[communityName="communityName"]
[sendAuthenticationFailureTraps=(TRUE | FALSE)]
```

Parameters

Parameter	Description
trapReceiverIP	The IP address of the SNMP manager to which you want to send trap messages.
communityName	The name of the SNMP community for which you want to send trap messages.
sendAuthenticationFailure-Traps	This parameter turns on or turns off sending authentication failure messages to an SNMP manager. To send authentication failure messages, set the parameter to TRUE . To prevent sending authentication failure messages, set the parameter to FALSE . The default is TRUE .

Syslog configuration

Command Reference

Clear syslog configuration

The `clear syslog configuration` command clears the syslog alert information.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Syntax

```
clear syslog configuration
```

Parameters

None.

Examples

```
SMcli -n Array1 -c "clear syslog configuration;"

SMcli completed successfully.
```

Configure syslog settings

The `set syslog` command configures the syslog alert information. You can configure the event monitor to send alerts to the syslog server whenever an alertable event occurs.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

- The syslog server address must be available. This address can be a fully qualified domain name, an IPv4 address, or an IPv6 address.
- The UDP port number of the syslog server must be available. This port is typically 514.

Syntax

```
set syslog [defaultFacility=facilityNumber]
| [defaultTag=defaultTag]
| (serverAddresses=(serverAddress:portNumber ... serverAddress:portNumber)
| addServerAddresses=(serverAddress:portNumber ... serverAddress:portNumber))
```

Parameters

Parameter	Description
defaultFacility	Optional. Allows you to specify the default facility number. The default facility must be a numerical value between 0 and 23.
defaultTag	Optional. Allows you to specify the default tag. Enclose string in quotes.
serverAddresses	Allows you to set one or more syslog server addresses with associated port numbers. Using this set option will clear out existing server addresses. A syslog server address can be a fully qualified domain name, IPv4 address, or IPv6 address. The UDP Port must be a numerical value between 0 and 65535. Typically, the UDP Port for syslog is 514. Enclose all the addresses in parentheses. If you enter more than one address, then separate them with a space.
addServerAddresses	Allows you to add one or more syslog server addresses with associated port numbers. Using this set option will not clear out existing server addresses. A syslog server address can be a fully qualified domain name, IPv4 address, or IPv6 address. The UDP Port must be a numerical value between 0 and 65535. Typically, the UDP Port for syslog is 514. Enclose all the addresses in parentheses. If you enter more than one address, then separate them with a space.

Examples

```
SMcli -n Array1 -c "set syslog serverAddresses=("ICTM1402S02H2.company.com:22");"

SMcli -n Array1 -c "set syslog addServerAddresses=("serverName1.company.com:514"
"serverName2.company.com:514");"

SMcli completed successfully.
```

Create storage array syslog configuration

The `create storageArray syslog` command allows you to archive audit logs onto an external syslog server. After a connection is established between the storage array and syslog server, audit logs are automatically saved to the syslog server.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
create storageArray syslog serverAddress="<address>" port=<port> protocol=("udp" | "tcp" | "tls")
components=(componentName=("auditLog") ...)
```

Parameters

Parameter	Description
serverAddress	Syslog receiver hostname or IP address.
port	Syslog receiver port number.
protocol	Syslog transmission protocol. Acceptable values include udp, tcp, or tls.

Parameter	Description
components	List of component entries that will be logged to the syslog server. Currently, only audit logs are supported.
componentName	Component name; currently only "auditLog" is supported.

Example

```
SMcli -n Array1 -c "create storageArray syslog
serverAddress=\"192.168.2.1\" port=514 protocol=\"udp\"
components=(componentName=\"auditLog\");"
ID: 331998fe-3154-4489-b773-b0bb60c6b48e
Server Address: 192.168.2.1.com
Port: 514
Protocol: udp
Components
1. Component Name: auditLog
SMcli completed successfully.
```

Delete storage array syslog configuration

The `delete storageArray syslog` command allows you to delete the specified syslog configuration used for storing audit logs.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
delete storageArray syslog (allServers | id="<id>")
```

Parameters

Parameter	Description
allServers	Delete all syslog configurations.
id	ID of the syslog server to delete. The ID is available using the `show storageArray syslog` command.

Delete syslog server

The `delete syslog` command deletes one or more servers from the syslog configuration so that it no longer receives alerts.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Syntax

```
delete syslog (allServers | serverAddresses [serverAddress1 ... serverAddressN])
```

Parameters

Parameter	Description
allServers	Allows the user to delete all syslog servers.
serverAddresses	Allows the user to delete the syslog servers. Enclose the servers in square brackets ([ ]).

Examples

```
SMcli -n Array1 -c "delete syslog allServers;

SMcli -n Array1 -c "delete syslog serverAddresses ["serverName1.company.com"]";

SMcli completed successfully.
```

Display storage array syslog configuration

The `show storageArray syslog` command allows you to view the configuration of a syslog server used for storing audit logs. Configuration information includes a server ID, along with its address, protocol, and port number.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
show storageArray syslog (allServers | id="<id>")
```

Parameters

Parameter	Description
allServers	Displays all syslog configurations.
id	Displays the syslog configuration with the matching ID.

Examples

```
SMcli -n Array1 -c "show storageArray syslog allServers;"
SMcli -n Array1 -c "show storageArray syslog id=\"331998fe-3154-4489-b773-b0bb60c6b48e\";"

ID:             331998fe-3154-4489-b773-b0bb60c6b48e
Server Address: 192.168.2.1.com
Port:           514
Protocol:       udp
Components
1. Component Name: auditLog

SMcli completed successfully.
```

Show syslog configuration

The `show syslog summary` command displays the syslog alert configuration information.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin or Storage Monitor role.

Syntax

```
show syslog summary
```

Parameters

None.

Examples

```
SMcli -n Array1 -c "show syslog summary;"

SYSLOG SUMMARY
   Default facility: 3
   Default tag: StorageArray
   Syslog Servers
      Server Address             Port Number
      serverName1.company.com    514
      serverName2.company.com    514

SMcli completed successfully.
```

Start storage array syslog test

The `start storageArray syslog test` command allows you to test communications between the storage array and a syslog server.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
start storageArray syslog test id="<id>"
```

Parameters

Parameter	Description
id	Syslog configuration ID to test. The ID is available using the `show storageArray syslog` command.

Example

```
SMcli -n Array1 -c "start storageArray syslog test
id=\"331998fe-3154-4489-b773
-b0bb60c6b48e\";"
SMcli completed successfully.
```

Test syslog configuration

The `start syslog test` command sends a sample message to test the syslog configuration.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Syntax

```
start syslog test
```

Parameters

None.

Examples

```
SMcli -n Array1 -c "start syslog test;"

The sample alert message was successfully sent to the syslog servers.

SMcli completed successfully.
```

Update storage array syslog configuration

The `set storageArray syslog` command allows you to change the syslog server address, protocol, or port number.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
set storageArray syslog id="<id>"
serverAddress="<address>"
port=<port> protocol=("udp" | "tcp" | "tls")
components=(componentName=("auditLog") ...)
```

Parameters

Parameter	Description
serverAddress	Syslog receiver hostname or IP address.
port	Syslog receiver port number.
protocol	Syslog transmission protocol. Acceptable values include UDP, TCP, or TLS.
components	List of component entries that will be logged to the syslog server. Currently, only audit logs are supported.
componentName	Component name; currently only "auditLog" is supported.

Example

```
SMcli -n Array1 -c "set storageArray syslog
id=\"331998fe-3154-4489-b773-b0bb60c6b48e\"
serverAddress=\"192.168.2.1\" port=514 protocol=\"udp\"
components=(componentName=\"auditLog\");"
ID: 331998fe-3154-4489-b773-b0bb60c6b48e Server Address: 192.168.2.1
Port: 514 Protocol: udp
Components
1. Component Name: auditLog
SMcli completed successfully.
```

Chapter 10. Array configuration commands

Cache mirror data assurance commands

Set storage array to enable or disable cache mirror data assurance check

The `set storageArray cacheMirrorDataAssuranceCheckEnable` command allows you to enable or disable the cache mirror data assurance check.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Syntax

```
set storageArray cacheMirrorDataAssuranceCheckEnable=(TRUE | FALSE)
```

Parameters

None.

Show storage array cache mirror data assurance check enable

The `show storageArray cacheMirrorDataAssuranceCheckEnable` command returns the enablement status of the cache mirror data assurance check feature.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Syntax

```
show storageArray cacheMirrorDataAssuranceCheckEnable
```

Parameters

None.

Controller commands

Clear drive channel statistics

The `clear allDriveChannels stats` command resets the statistics for all of the drive channels.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Syntax

```
clear allDriveChannels stats
```

Parameters

None.

Diagnose controller

The `diagnose controller` command runs diagnostic tests on the controller.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

The diagnostic tests consist of loopback tests in which data is written to the drives and read from the drives.

Syntax

```
diagnose controller [(a| b)]
loopbackDriveChannel=(allchannels | (1 | 2 | 3 | 4 | 5 | 6 | 7 | 8))
testID=(1 | 2 | 3 | discreteLines)
[patternFile="filename"]
```

Parameters

Parameter	Description
controller	The controller on which you want to run the diagnostic tests. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . Enclose the controller identifier in square brackets ([ ]). If you do not specify a controller, the storage management software returns a syntax error.
loopbackDriveChannel	The drive channels on which you want to run the diagnostic tests. You can either choose to run the diagnostics on all channels or select a specific channel on which to run diagnostics. If you select a specific channel, valid values for the drive channels are 1 , 2 , 3 , 4 , 5 , 6 , 7 , or 8 .

Parameter	Description
testID	The identifier for the diagnostic test you want to run. The identifier and corresponding tests are as follows: • 1 – Read test • 2 – Write test • 3 – Data loop-back test • discreteLines – Discrete lines diagnostic test
patternFile	The file path and the file name that contains a data pattern that you want to use as test data. Enclose the file name of the data pattern in double quotation marks (" "). For example: `file="C:\Program Files\CLI\sup\patfile.txt"`

Notes

When you run a data loop-back test, you can optionally specify a file that contains a data pattern. If you do not specify a file, the controller firmware provides a default pattern.

Discrete lines are control lines and status lines that are connected between two controllers in a controller tray. The discrete lines diagnostic test lets each controller check that control signal transitions can be observed at the control inputs of the alternate controller. The discrete lines diagnostic test automatically runs after each power-cycle or each controller-reset. You can run the discrete lines diagnostic test after you have replaced a component that failed the initial discrete lines diagnostic test. The discrete lines diagnostic test returns one of these messages:

• When the discrete lines diagnostic test runs successfully, this message appears:

```
The controller discrete lines successfully passed the diagnostic
test. No
 failures were detected.
```

• If the discrete lines diagnostic test fails, this message appears:

```
One or more controller discrete lines failed the diagnostic test.
```

• If the CLI cannot run the discrete lines diagnostic test, the CLI returns Error 270, which means that the discrete lines diagnostic test could not start nor complete.

Diagnose controller iSCSI host cable

The `diagnose controller iscsiHostPort` command runs diagnostic tests on the copper cables between iSCSI host interface cards and a controller.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

You can run diagnostics on a selected port or all ports. The ports must be able to support the cable diagnostics. If the ports do not support cable diagnostics, an error is returned.

Syntax

```
diagnose controller [(a|b)]
iscsiHostPort ([all] | [portLabel])
testID=cableDiagnostics
```

Parameters

Parameter	Description
controller	The controller on which you want to run the cable diagnostic test. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . Enclose the controller identifier in square brackets ([ ]). If you do not specify a controller, the storage management software returns a syntax error.
iscsiHostPort	The iSCSI host port on which you want to run the diagnostic tests. You can run the diagnostics on all iSCSI host ports, or you can run the diagnostics on a specific iSCSI host port. See the following for more information: " Identifying an iSCSI host port label " on page 84
testID	The identifier for the diagnostic test that you want to run. For this diagnostic test, the only choice is cableDiagnostics .

Identifying an iSCSI host port label

You must specify a label for the host port. Follow these steps to specify the host port label:

1. If you do not know the port label for the iSCSI host port, run the `show controller` command.

2. In the Host interface section of the results, locate the host port you want to select.

   Note: The port label is the complete value returned for the **Port** field.

3. Enclose the entire value of the port label in both quotes and square brackets: [" portLabel "]. For example, if the port label is Ch 2 , specify the iSCSI host port as follows:

   ```
   iscsiHostPort[\"ch 2\"]
   ```

   Note: If you are using a Windows command line and the label contains a pipe (|), the character should be escaped (using ^); otherwise, it will be interpreted as a command. For example, if the port label is e0b|0b , specify the iSCSI host port as follows:

   ```
   iscsiHostPort[\"e0b^|0b\"]
   ```

Notes

When you run the cable diagnostic test, the firmware returns the following information:

- Host Port: The port on which the diagnostic test was run.

- HIC: The host interface card associated with this port.

- The date and time the test was run.

- Status:

  - OK: All of the pairs of cables are good and do not have any faults.

  - Open: One or more of the four pairs of cables are open.

- Short: One or more of the four pairs of cables are shorted.
- Incomplete: One or more of the four pairs returned incomplete or invalid test results.
- Length – The length of the cables are listed in meters and the following information about the cables is returned:
  - When the cable status is OK, the approximate lengths of the cable pairs are returned. The lengths of the cable pairs are shown as a range (L1-L2), which are the shortest and the longest lengths of the cable pairs.
  - If the cable status is Open or Short, the approximate distance to the failure in the cable pairs. If there is one failure, the length is reported for that cable pair. If there is more than one failure, the information returned is both the shortest and longest lengths to the failures. The lengths are listed as a range (L1-L2) where L1<L2.
  - If the cable status is Incomplete, the information returned are the lengths for the shortest and longest cable pairs that the firmware can successfully test. The lengths are listed for the valid cable pairs as a range (L1-L2) where L1<L2.
- Register values for the cable diagnostic registers. The values are in a hexadecimal format:
  - Two bytes show the combined cable status (four bits per port).
  - Four two-byte numbers show the length of each channel.

Enable controller data transfer

The `enable controller dataTransfer` command revives a controller that has become quiesced while running diagnostics.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
enable controller [(a|b)] dataTransfer
```

Parameter

Parameter	Description
controller	The controller that you want to revive. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . Enclose the controller identifier in square brackets ([ ]). If you do not specify a controller, the storage management software returns a syntax error.

Reset controller

The `reset controller` command resets a controller, and is disruptive to I/O operations.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Attention: When you reset a controller, the controller is removed from the data path and is not available for I/O operations until the reset operation is complete. If a host is using volumes that are owned by the controller being reset, the I/O directed to the controller is rejected. Before resetting the controller, either make sure that the volumes that are owned by the controller are not in use or make sure that a multi-path driver is installed on all of the hosts that use these volumes.

Syntax

```
reset controller [(a|b)]
```

Parameters

Parameter	Description
controller	The controller that you want to reset. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . Enclose the controller identifier in square brackets ([ ]). If you do not specify a controller, the storage management software returns a syntax error.

Notes

The controller that receives the reset controller command resets the controller specified. For example, if the reset controller command is sent to controller A to request a reset of controller A , then controller A reboots itself by doing a soft reboot. If the reset controller command is sent to controller A to request a reset of controller B , then controller A holds controller B in reset and then releases controller B from reset, which is a hard reboot. A soft reboot in some products only resets the IOC chip. A hard reboot resets both the IOC and the expander chips in the controller.

Save controller NVSRAM

The `save controller NVSRAM file` command saves a selected set of controller NVSRAM regions to a file.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Syntax

```
save controller [(a|b)] NVSRAM file="filename"
```

Parameters

Parameter	Description
controller	The controller with the NVSRAM values that you want to save. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . Enclose the controller identifier in square brackets ([ ]).
file	The file path and the file name to which you want to save the NVSRAM values. Enclose the NVSRAM file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\nvsramb.txt"` The default name of the file that contains the NVSRAM values is `nvsram-data.txt` . This command does not automatically append a file extension to the saved file. You must specify a file extension when entering the file name.

Save drive channel fault isolation diagnostic status

The `save driveChannel faultDiagnostics file` command saves the drive channel fault isolation diagnostic data that is returned from the `start driveChannel faultDiagnostics` command.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Note: With firmware version 8.10, the `save driveChannel faultDiagnostics` command is deprecated.

You can save the diagnostic data to a file as standard text or as XML.

Syntax

```
save driveChannel faultDiagnostics file="filename"
```

Parameter

Parameter	Description
file	The file path and the file name to which you want to save the results of the fault isolation diagnostics test on the drive channel. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\sup\fltdiag.txt"` This command does not automatically append a file extension to the saved file. You must specify a file extension when entering the file name.

Notes

A file extension is not automatically appended to the saved file. You must specify the applicable format file extension for the file. If you specify a file extension of `.txt`, the output will be in a text file format. If you specify a file extension of `.xml`, the output will be in an XML file format.

Set controller

The `set controller` command defines the attributes for the controllers.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set controller [(a|b)]
[availability=(online | offline | serviceMode)]
[ethernetPort [(1| 2)] ethernetPortOptions]
[globalNVSRAMByte [nvsramOffset]=(nvsramByteSetting | nvsramBitSetting)]
[hostNVSRAMByte [hostType, nvsramOffset]=(nvsramByteSetting |nvsramBitSetting)]
[IPv4GatewayIP=ipAddress]
[IPv6RouterAddress=ipv6Address]
```

```
[iscsiHostPort [portLabel] iscsiHostPortOptions]
[rloginEnabled=(TRUE | FALSE)]
[serviceAllowedIndicator=(on | off)]
```

Parameters

Parameter	Description
controller	The controller for which you want to define properties. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . Enclose the identifier for the controller in square brackets ([ ]). If you do not specify a controller, the firmware for the controller returns a syntax error.
availability	The mode for the controller, which you can set to online , offline , or serviceMode (service).
ethernetPort	The attributes (options) for the management Ethernet ports. The entries to support this parameter are listed in the Syntax Element Statement Data table that follows. Many settings are possible, including setting the IP address, the gateway address, and the subnet mask address.
globalNVSRAMByte	A portion of the controller NVSRAM. Specify the region to be modified using the starting byte offset within the region and the byte value or bit value of the new data to be stored into the NVSRAM.
hostNVSRAMByte	The NVSRAM for the host-specific region. The setting specifies the host index for the specific host, the starting offset within the region, the number of bytes, and the byte value or bit value of the new data to be stored into the NVSRAM.
IPv4GatewayIP	The IP address of the node that provides the interface to the network. The address format for the IPv4 gateway is **(0–255).(0–255).(0–255).(0–255)**
IPv6RouterAddress	The IP address of IPv6 router that connects two or more logical subnets. The address format for the IPv6 router is (0–FFFF):(0–FFFF): (0–FFFF):(0–FFFF): (0–FFFF):(0–FFFF):(0–FFFF):(0–FFFF) .
iscsiHostPort	This parameter enables you to set options for the iSCSI ports on the controller. Enter the iSCSI port label or number and then select the options for that port. See the following for more information: " Identifying an iSCSI host port label " on page 88
rloginEnabled	The setting for whether the remote login feature is turned on or turned off. To turn on the remote login feature, set this parameter to TRUE . To turn off the remote login feature, set this parameter to FALSE .
serviceAllowedIndicator	The setting for whether the Service Action Allowed indicator light is turned on or turned off. To turn on the Service Action Allowed indicator light, set this parameter to on . To turn off the Service Action Allowed indicator light, set this parameter to off .

Identifying an iSCSI host port label

You must specify a label for the host port. Follow these steps to specify the host port label:

1. If you do not know the port label for the iSCSI host port, run the `show controller` command.

2. In the Host interface section of the results, locate the host port you want to select.

   Note: The port label is the complete value returned for the **Port** field.

3. Enclose the entire value of the port label in both quotes and square brackets: [" `portLabel` "]. For example, if the port label is `Ch 2` , specify the iSCSI host port as follows:

```
iscsiHostPort[\"ch 2\"]
```

Note: If you are using a Windows command line and the label contains a pipe (|), the character should be escaped (using ^); otherwise, it will be interpreted as a command. For example, if the port label is `e0b|0b` , specify the iSCSI host port as follows:

```
iscsiHostPort[\"e0b^|0b\"]
```

Options for the ethernetPort parameter

```
enableIPv4=(TRUE | FALSE) |
```

```
enableIPv6=(TRUE | FALSE) |
```

```
IPv6LocalAddress=(0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF): (0-FFFF):(0-FFFF):(0
-FFFF):(0-FFFF) |
```

```
IPv6RoutableAddress=(0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF): (0-FFFF):(0-FFFF):(0
-FFFF):(0-FFFF) |
```

```
IPv4Address=(0-255).(0-255).(0-255).(0-255) |
```

```
IPv4ConfigurationMethod=[(static | dhcp)] |
```

```
IPv4SubnetMask=(0-255).(0-255).(0-255).(0-255) |
```

```
duplexMode=(TRUE | FALSE) |
```

```
portSpeed=[(autoNegotiate | 10 | 100 | 1000)]
```

Options for the iSCSIHostPort parameter

```
IPv4Address=(0-255).(0-255).(0-255).(0-255) |
```

```
IPv6LocalAddress=(0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF): (0-FFFF):(0-FFFF):(0
-FFFF):(0-FFFF) |
```

```
IPv6RoutableAddress=(0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF): (0-FFFF):(0-FFFF):(0
-FFFF):(0-FFFF) |
```

```
IPv6RouterAddress=(0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF): (0-FFFF):(0-FFFF):(0
-FFFF):(0-FFFF) |
```

```
enableIPv4=(TRUE | FALSE) | enableIPv6=(TRUE | FALSE) |

enableIPv4Vlan=(TRUE | FALSE) | enableIPv6Vlan=(TRUE | FALSE) |

enableIPv4Priority=(TRUE | FALSE) | enableIPv6Priority=(TRUE | FALSE) |

IPv4ConfigurationMethod=(static | dhcp) |

IPv6ConfigurationMethod=(static | auto) |

IPv4GatewayIP=(TRUE | FALSE) |

IPv6HopLimit=[0-255] |

IPv6NdDetectDuplicateAddress=[0-256] |

IPv6NdReachableTime=[0-65535] |

IPv6NdRetransmitTime=[0-65535] |

IPv6NdTimeOut=[0-65535] |

IPv4Priority=[0-7] | IPv6Priority=[0-7] |

IPv4SubnetMask=(0-255).(0-255).(0-255).(0-255) |

IPv4VlanId=[1-4094] | IPv6VlanId=[1-4094] |

maxFramePayload=[
```
frameSize
```
] |

tcpListeningPort=[3260, 49152-65536] |

portSpeed=[( 10 | 25)]
```

Notes

When you use this command, you can specify one or more of the parameters. You do not need to use all of the parameters.

Setting the **availability** parameter to serviceMode causes the alternate controller to take ownership of all of the volumes. The specified controller no longer has any volumes and refuses to take ownership of any more volumes. Service mode is persistent across reset cycles and power cycles until the **availability** parameter is set to online .

Use the `show controller NVSRAM` command to show the NVSRAM information. Before making any changes to the NVSRAM, contact technical support to learn what regions of the NVSRAM you can modify.

When the duplexMode option is set to TRUE , the selected Ethernet port is set to full duplex. The default value is half duplex (the duplexMode parameter is set to FALSE).

To make sure that the IPv4 settings or the IPv6 settings are applied, you must set these **iscsiHostPort** options:

- **enableIPV4=** TRUE
- **enableIPV6=** TRUE

The IPv6 address space is 128 bits. It is represented by eight 16-bit hexadecimal blocks separated by colons.

The maxFramePayload option is shared between IPv4 and IPv6. The payload portion of a standard Ethernet frame is set to 1500 , and a jumbo Ethernet frame is set to 9000 . When using jumbo frames, all of the devices that are in the network path should be capable of handling the larger frame size.

The portSpeed option is expressed as megabits per second (Mb/s).

Values for the portSpeed option of the **iscsiHostPort** parameter are in megabits per second (Mb/s).

The following values are the default values for the iscsiHostOptions :

- The IPv6HopLimit option is 64.
- The IPv6NdReachableTime option is 30000 milliseconds.
- The IPv6NdRetransmitTime option is 1000 milliseconds.
- The IPv6NdTimeOut option is 30000 milliseconds.
- The tcpListeningPort option is 3260.

Set controller DNS settings

The `set controller DNSServers` command updates the Domain Name System (DNS) settings for a controller. DNS is used to resolve fully qualified domain names for the controllers and a Network Time Protocol (NTP) server.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Before you begin make sure that:

- A DNS server is configured.
- You know the addresses of a primary DNS server and a backup DNS server, in case the primary DNS server fails. These addresses can be IPv4 addresses or IPv6 addresses.

Important: You need to send this command to both controllers. This command is controller-specific.

Note: If you already configured the array's management ports with DHCP (Dynamic Host Configuration Protocol), and you have one or more DNS or NTP servers associated with the DHCP setup, then you do not need to manually configure DNS/NTP. In this case, the array should have already obtained the DNS/NTP server addresses automatically.

Syntax

```
set controller[a] DNSServers=(auto|(Address1 [Address2]))
```

Parameters

Parameter	Description
DNSServers	This parameter configures the DNS servers for the controller. Specify **auto** to use the DNS servers provided by DHCP. Otherwise, use a whitespace separated list of one or two DNS servers. **Note:** The management Ethernet ports on the array can support IPv4 or IPv6 protocols simultaneously. The addresses may be an IPv4 address or an IPv6 address. If specifying more than one address, the address types do not need to match. If more than one address is specified, they will be used in the order they are specified (first is primary, second is backup).
AddressX	IPv4Address|IPv6Address

Examples

```
set controller[a] DNSServers=auto;
set controller[a] DNSServers=(192.168.1.1);
set controller[b] DNSServers=(192.168.1.1 192.168.1.105);
set controller[b] DNSServers=(2001:0db8:85a3:0000:0000:8a2e:0370:7334 192.168.1.1)
```

Set controller NTP settings

The `set controller NTPServers` command sets the NTP settings for the controller so the controller can automatically synchronize the clocks with an external host using SNTP (Simple Network Time Protocol).

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Context

When this feature is enabled, the controller periodically queries the configured NTP server, and then uses the results to update its internal time-of-day clock. If only one controller has NTP enabled, the alternate controller periodically synchronizes its clock with the controller that has NTP enabled. If neither controller has NTP enabled, the controllers periodically synchronize their clocks with each other.

Note: This command is controller-specific. It is not necessary to configure NTP on both controllers; however, doing so improves the array's ability to stay synchronized during hardware or communication failures.

Important: If you configure NTP using a fully qualified domain name, you must also configure DNS on those controller(s) for the operation to succeed. See " Set controller DNS settings " on page 91 for more information.

Syntax

```
set controller(a|b) NTPServers=(disabled|auto|(Address1 [keyIdentifier=integerLiteral() keyType=stringLiteral()
passPhrase=stringLiteral()] [Address2 [keyIdentifier=integerLiteral() keyType=stringLiteral() passPhrase=stringLiteral()]]))
```

Parameters

Parameter	Description
controller	The controller for which you want to change the NTP settings. Valid controller identifiers are a or b .
NTPServers	This parameter configures the NTP servers for the controller. • Specify **disabled** to turn off NTP support. • Specify **auto** to use the NTP server addresses provided by a DHCP server. **Note:** This option should be used only if at least one management port on the controller is set to get interface parameters via DHCP, and at least one NTP server is configured on the DHCP server. • Otherwise, specify a whitespace separated list of one or two NTP servers. The addresses may be a domain name, IPv4 address, or IPv6 address. If specifying more than one address, the address types do not need to match. If more than one address is specified, they will be used in the order they are specified (first is primary, second is backup). **Note:** Surround the NTP server name with quotes, as shown in the Examples section.
Address	"DomainName"|IPv4Address|IPv6Address **Note:** If a domain name is specified, a DNS server must also be configured to allow the controller to resolve the server IP address.
keyIdentifier **keyType** **passPhrase**	Optionally, these parameters provide the key credentials for enabling NTP authentication: • **key Identifier** is an integer from 0 to 65535. • **keyType** is one of the following: none, sha1, sha224, sha256, sha384 or sha512. • **passPhrase** is either a hex digit (0-9, with a-f allowed), which is exactly 40 digits long entered as a stringLiteral, or an alphanumeric character string up to 20 bytes long.

Examples

```
set controller[a] NTPServers=disabled;
set controller[a] NTPServers=auto;
set controller[a] NTPServers=("0.pool.ntp.org" keyIdentifier=3 keyType="sha1" passPhrase="SomePassword1"
"1.us.pool.ntp.org" keyIdentifier=3 keyType="sha1" passPhrase=" SomePassword1");
set controller[b] NTPServers=(192.168.1.105 keyIdentifier=3 keyType="sha1" passPhrase=" SomePassword1"
"1.us.pool.ntp.org");
set controller[b] NTPServers=(set controller[b] NTPServers=(2001:0db8:85a3:0000:0000:8a2e:0370:7334
keyIdentifier=3 keyType="sha1" passPhrase=" SomePassword1");
```

Set controller service action allowed indicator

The `set controller` command turns on or turns off the Service Action Allowed indicator light on a controller in a controller tray or a controller-drive tray.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

If the storage array does not support the Service Action Allowed indicator light feature, this command returns an error. If the storage array supports the command but is unable to turn on or turn off the indicator light, this command returns an error. (To turn on or turn off the Service Action Allowed indicator light on the power-fan canister or the interconnect-battery canister, use the `set tray serviceAllowedIndicator` command.)

Note: The DE2000H, DE4000H, and DE4000F controller tray has a single Attention indicator that will illuminate only when 1) there is a failure, and 2) the component that failed can be safely removed.

Syntax

```
set controller [(a| b)]
serviceAllowedIndicator=(on | off)
```

Parameters

Parameter	Description
controller	The controller that has the Service Action Allowed indicator light that you want to turn on or turn off. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . Enclose the controller identifier in square brackets ([ ]). If you do not specify a controller, the controller firmware returns a syntax error.
serviceAllowedIndicator	The setting to turn on or turn off the Service Action Allowed indicator light. To turn on the Service Action Allowed indicator light, set this parameter to on . To turn off the Service Action Allowed indicator light, set this parameter to off .

Set drive channel status

The `set driveChannel` command defines how the drive channel performs.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Syntax

```
set driveChannel [(1 | 2 | 3 | 4 | 5 | 6 | 7 | 8)]
status=(optimal | degraded)
```

Parameters

Parameter	Description
driveChannel	The identifier number of the drive channel for which you want to set the status. Valid drive channel values are 1 , 2 , 3 , 4 , 5 , 6 , 7 , or 8 . Enclose the drive channel number in square brackets ([ ]).
status	The condition of the drive channel. You can set the drive channel status to optimal or degraded .

Notes

Use the optimal option to move a degraded drive channel back to the Optimal state. Use the degraded option when the drive channel is experiencing problems, and the storage array requires additional time for data transfers.

Set host channel

The set hostChannel command defines the loop ID for the host channel.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set hostChannel [hostChannelNumber]
preferredID=portID;
```

Parameters

Parameter	Description
hostChannel	The identifier number of the host channel for which you want to set the loop ID. Enclose the host channel identifier number in square brackets ([ ]). Use a host channel value that is appropriate for your particular controller model. A controller tray might support one host channel or as many as eight host channels. Valid host channel values are a1 , a2 , a3 , a4 , a5 , a6 , a7 , a8 , b1 , b2 , b3 , b4 , b5 , b6 , b7 , or b8 .
preferredID	The port identifier for the specified host channel. Port ID values are 0 to 127 .

Show controller

The show controller command returns information about a controller.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

For each controller in a storage array, this command returns the following information:

- The status (Online or Offline)
- The current firmware and NVSRAM configuration
- The pending firmware configuration and NVSRAM configuration (if any)
- The board ID
- The product ID
- The product revision
- The serial number
- The date of manufacture
- The cache size or the processor size
- The date and the time to which the controller is set
- The associated volumes (including the preferred owner)
- The Ethernet port
- The physical disk interface
- The host interface, which applies only to Fibre Channel host interfaces

Syntax

```
show (allControllers | controller [(a|b)])
 [summary]
```

Parameters

Parameter	Description
allControllers	The setting to return information about both controllers in the storage array.
controller	The setting to return information about a specific controller in the storage array. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . Enclose the controller identifier in square brackets ([ ]).
summary	The setting to return a concise list of information about both controllers in the storage array.

Notes

The following list is an example of the information that is returned by the `show controller` command. This example only shows how the information is presented and should not be considered to represent best practice for a storage array configuration.

```
Controller in slot A

   Status: Online
   Current configuration
      Firmware version: 96.10.21.00
         Appware version: 96.10.21.00
         Bootware version: 96.10.21.00
      NVSRAM version: N4884-610800-001
   Pending configuration
      Firmware version: Not applicable
         Appware version: Not applicable
         Bootware version: Not applicable
      NVSRAM version: Not applicable
```

```
    Transferred on: Not applicable
Board ID: 4884
Product ID: INF-01-00
Product revision: 9610
Serial number: 1T14148766
Date of manufacture: October 14, 2006
Cache/processor size (MB): 1024/128
Date/Time: Wed Feb 18 13:55:53 MST 2008
Associated Volumes (* = Preferred Owner):
    1*, 2*, CTL 0 Mirror Repository*, Mirror Repository 1*,
    JCG_Remote_MirrorMenuTests*
Ethernet port: 1
    MAC address: 00:a0:b8:0c:c3:f5
    Host name: ausctlr9
    Network configuration: Static
    IP address: 172.22.4.249
    Subnet mask: 255.255.255.0
    Gateway: 172.22.4.1
    Remote login: Enabled
Drive interface: Fibre
    Channel: 1
    Current ID: 125/0x1
    Maximum data rate: 2 Gbps
    Current data rate: 1 Gbps
    Data rate control: Switch
    Link status: Up
Drive interface: Fibre
    Channel: 2
    Current ID: 125/0x1
    Maximum data rate: 2 Gbps
    Current data rate: 1 Gbps
    Data rate control: Switch
    Link status: Up
Drive interface: Fibre
    Channel: 3
    Current ID: 125/0x1
    Maximum data rate: 2 Gbps
    Current data rate: 1 Gbps
    Data rate control: Switch
    Link status: Up
Drive interface: Fibre
    Channel: 4
    Current ID: 125/0x1
    Maximum data rate: 2 Gbps
    Current data rate: 1 Gbps
    Data rate control: Switch
    Link status: Up
Host interface: Fibre
    Port: 1
    Current ID: Not applicable/0xFFFFFFFF
    Preferred ID: 126/0x0
    NL-Port ID: 0x011100
    Maximum data rate: 2 Gbps
    Current data rate: 1 Gbps
    Data rate control: Switch
    Link status: Up
    Topology: Fabric Attach
    World-wide port name: 20:2c:00:a0:b8:0c:c3:f6
    World-wide node name: 20:2c:00:a0:b8:0c:c3:f5
    Part type: HPFC-5200      revision 10
Host interface: Fibre
```

```
Port: 2
Current ID: Not applicable/0xFFFFFFFF
Preferred ID: 126/0x0
NL-Port ID: 0x011100
Maximum data rate: 2 Gbps
Current data rate: 1 Gbps
Data rate control: Switch
Link status: Up
Topology: Fabric Attach
World-wide port name: 20:2c:00:a0:b8:0c:c3:f7
World-wide node name: 20:2c:00:a0:b8:0c:c3:f5
Part type: HPFC-5200     revision 10
```

When you use the **summary** parameter, the command returns the list of information without the drive channel information and the host channel information.

The `show storageArray` command also returns detailed information about the controller.

Show controller diagnostic status

The `show controller` command returns the status of controller diagnostics started by the `start controller diagnostic` command.

If the diagnostics have finished, the entire results of the diagnostic tests are shown. If the diagnostic tests have not finished, only the results of the tests that are finished are shown. The results of the test are shown on the terminal, or you can write the results to a file.

Syntax

`show controller [(a| b)] diagnosticStatus [file=`*filename*`]`

Parameters

Parameter	Description
controller	The setting to return information about a specific controller in the storage array. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . Enclose the controller identifier in square brackets ([ ]).
file	The name of the file that contains the results of the diagnostic tests. This command does not automatically append a file extension to the file name. You must add an extension when you enter the file name.

Show controller NVSRAM

The `show controller NVSRAM` command returns information about NVSRAM byte values.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

This command returns a list of the NVSRAM byte values for the specified host type. If you do not enter the optional parameters, this command returns a list of all of the NVSRAM byte values.

Syntax

```
show (allControllers | controller [(a|b)])
NVSRAM [hostType=hostTypeIndexLabel | host="hostName"]
```

Parameters

Parameter	Description
allControllers	The setting to return information about both controllers in the storage array.
controller	The setting to return information about a specific controller in the storage array. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . Enclose the controller identifier in square brackets ([ ]).
hostType	The index label or number of the host type. Use the `show storageArray hostTypeTable` command to generate a list of available host type identifiers.
host	The name of the host that is connected to the controllers. Enclose the host name in double quotation marks (" ").

Notes

Use the `show controller NVSRAM` command to show parts of or all of the NVSRAM before using the `set controller` command to change the NVSRAM values. Before making any changes to the NVSRAM, contact technical support to learn what regions of the NVSRAM you can modify.

Show drive channel statistics

The `show driveChannel stats` command shows the cumulative data transfer for the drive channel and error information.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

If the controller has automatically degraded a drive channel, this command also shows interval statistics. When you use this command, you can show information about one specific drive channel, several drive channels, or all drive channels.

Syntax

```
show (driveChannel [(1 | 2 | 3 | 4 | 5 | 6 | 7 | 8)] |
   driveChannels [1 2 3 4 5 6 7 8] |
   allDriveChannels) stats
```

Parameters

Parameter	Description
driveChannel	The identifier number of the drive channel for which you want to show information. Valid drive channel values are 1 , 2 , 3 , 4 , 5 , 6 , 7 , or 8 . Enclose the drive channel in square brackets ([ ]). Use this parameter when you want to show the statistics for only one drive channel.
driveChannels	The identifier numbers of several drive channels for which you want to show information. Valid drive channel values are 1 , 2 , 3 , 4 , 5 , 6 , 7 , or 8 . Enclose the drive channels in square brackets ([ ]) with the drive channel value separated with a space. Use this parameter when you want to show the statistics for more than one drive channel.
allDriveChannels	The identifier that selects all of the drive channels.

Notes

None.

Start controller trace

The `start controller` command starts an operation that saves debug trace information to a compressed file.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

The debug trace information can be used by technical support to help analyze how well a storage array is running.

Syntax

```
start controller [(a
 | b
 | both)] trace
dataType=(current | flushed | currentFlushed | all)
forceFlush=(TRUE | FALSE)
file="fileName"
```

Parameters

Parameter	Description
controller	The controller for which you want to collect the trace debug information. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . You can also simultaneously collect debug for both controllers by entering both . Enclose the controller identifier in square brackets ([ ]). If you do not specify a controller, the storage management software returns a syntax error.
dataType	The type of data that you want to collect: • current – Retrieves the current DQ traces • flushed – Retrieves all flushed DQ traces • currentFlushed – Retrieves both the current DQ trace and the flushed DQ trace • all – Retrieves the current DQ trace, flushed DQ trace, and all platform DQ traces **NOTE** – If **dataType=flushed** and **forceFlush=True** , an error message is returned indicating that only active traces can be flushed to the buffer on retrieval.
forceFlush	The setting to move the DQ information in the current buffer to the flushed buffer when the DQ trace information defined by the **dataType** parameter is retrieved. To enable force flush, set this parameter to TRUE . To disable force flush, set this parameter to FALSE . **NOTE** – If **dataType=flushed** and **forceFlush=True** , an error message is returned indicating that only active traces can be flushed to the buffer on retrieval.
file	The file path and the file name to which you want to save the DQ trace information. Enclose the file name in double quotation marks (" "). Refer to the Notes section for information about naming the files.

Notes

The DQ trace information is written to a compressed file with an extension of .zip. The file name is a combination of a user-defined file name and the storage array identifier (SAID). A constant of "dq" is also added to the file name. The complete file name has this form:

user_defined_file_name

```
-SAID-dq.zip
```

The compressed file contains the information listed in this table.

File Name	Directory	Comments
user_provided_file_name-SAID-A.dq	SAID/timestamp/	The DQ trace data retrieved from controller A.
user_provided_file_name-SAID-B.dq	SAID/timestamp/	The DQ trace data retrieved from controller B.
user_provided_file_name-SAID-trace_description.xm	SAID/timestamp/	The description file in an xml format that describes the DQ file attributes for future data mining.

Start drive channel fault isolation diagnostics

The `start driveChannel faultDiagnostics` command runs the drive channel fault isolation diagnostics and stores the results.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Note: With firmware version 8.10, the `start driveChannel faultDiagnostics` command is deprecated.

Syntax

```
start driveChannel [(1 | 2 | 3 | 4 | 5 | 6 | 7 | 8)]
controller [(a|b)] faultDiagnostics
testDevices=[all |
controller=(a|b) |
esms=[trayID1 (left | right), ... , trayIDN (left | right)] |
 drives[trayID1,[drawerID1,]slotID1
... trayIDn,[drawerIDn,]slotIDn]
|[dataPattern=(fixed | pseudoRandom) |
patternNumber=[(0xhexadecimal | number)] |
maxErrorCount=integer |
testIterations=integer |
timeout=timeInterval]
```

Parameters

Parameter	Description
driveChannel	The identifier number of the drive channel that you want to locate . Valid values for the identifier number for the drive channel are 1 , 2 , 3 , 4 , 5 , 6 , 7 , or 8 . Enclose the drive channel identifier number in square brackets ([ ]).
controller	The identifier letter of the controller that you want to test. Valid controller identifier values are a or b , where a is the controller in slot A , and b is the controller in slot B . Enclose the controller identifier in square brackets ([ ]).

Parameter	Description
testDevices	The identifiers of the devices (controllers, environmental services module [ESMs], or drives) that you want to test. You can specify all or enter the specific identifiers for the devices that you want to diagnose. The **controller** identifiers are a or b , where a is the RAID controller module in slot A , and b is the RAID controller module in slot B . The **esms** identifiers are tray ID and left or right, where tray ID is a value from 0 through 99, and left or right are determined when viewing the drive tray from the rear. The **drive** identifiers include a tray identifier, a drawer identifier when the tray has drawers, and a slot identifier. For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).
dataPattern	The method of repeatability that you want to test.
patternNumber	The hexadecimal data pattern that you want to use to run the test. This number can be any hexadecimal number between 0000 to FFFF . You must place 0x in front to indicate a hexadecimal number.
maxErrorCount	The number of errors that you want to accept before terminating the test.
testIterations	The number of times that you want to repeat the test.
timeout	The length of time in minutes that you want to run the test.

Notes

You can enter more than one type of device to test, and you can enter more than one type of test to run.

Use the **save driveChannel faultDiagnostics** command and the **stop driveChannel faultDiagnostics** command with the **start driveChannel faultDiagnostics** command. These commands are needed to save diagnostic test results to a file and to stop the diagnostic test.

Examples of valid **patternNumber** entries are 0xA5A5 , 0x3C3C , 8787 , and 1234 .

You also can stop this command at any time by pressing **Ctrl+C** .

Start drive channel locate

The `start driveChannel locate` command identifies the drive trays that are connected to a specific drive channel by turning on the indicator lights for the drive tray that is connected to the drive channel.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Use the `stop driveChannel locate` command to turn off the indicator lights on the drive tray.

Syntax

```
start driveChannel [(1 | 2 | 3 | 4 | 5 | 6 | 7 | 8)] locate
```

Parameter

Parameter	Description
driveChannel	The identifier number of the drive channel that you want to locate . Valid values for the identifier number for the drive channel are 1 , 2 , 3 , 4 , 5 , 6 , 7 , or 8 . Enclose the drive channel identifier number in square brackets ([ ]).

Start iSCSI DHCP refresh

The `start controller iscsiHostPort dhcpRefresh` command initiates a refresh of the DHCP parameters for the iSCSI interface.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

If the configuration method for the interface is not set to DHCP, the procedure returns an error.

Syntax

```
start controller [(a|b)] iscsiHostPort [portLabel] dhcpRefresh
```

Parameter

Parameter	Description
controller	The identifier letter of the controller that has the iSCSI host ports. Valid controller identifier values are a or b where a is the controller in slot A , and b is the controller in slot B .
iscsiHostPort	The host port label or the number of the iSCSI host port for which you want to refresh the DHCP parameters. See the following for more information: " Identifying an iSCSI host port label " on page 104

Identifying an iSCSI host port label

You must specify a label for the host port. Follow these steps to specify the host port label:

1. If you do not know the port label for the iSCSI host port, run the `show controller` command.
2. In the Host interface section of the results, locate the host port you want to select.

   Note: The port label is the complete value returned for the **Port** field.
3. Enclose the entire value of the port label in both quotes and square brackets: [" portLabel "]. For example, if the port label is `Ch 2` , specify the iSCSI host port as follows:

```
iscsiHostPort[\"ch 2\"]
```

Note: If you are using a Windows command line and the label contains a pipe (|), the character should be escaped (using ^); otherwise, it will be interpreted as a command. For example, if the port label is `e0b|0b` , specify the iSCSI host port as follows:

```
iscsiHostPort[\"e0b^|0b\"]
```

Notes

This operation ends the iSCSI connections for the portal and temporarily brings down the portal.

Stop drive channel fault isolation diagnostics

The `stop driveChannel faultDiagnostics` command stops the drive channel fault isolation diagnostics, which stops the `start drive channel fault isolation diagnostics` command before it completes.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Note: With firmware version 8.10, the `stop driveChannel faultDiagnostics` command is deprecated.

Syntax

```
stop driveChannel faultDiagnostics
```

Parameters

None.

Notes

Use the **start driveChannel faultDiagnostics** command and the **save driveChannel faultDiagnostics** command with the **stop driveChannel faultDiagnostics** command. These commands are needed to start the diagnostic test and save diagnostic test results to a file.

You also can stop the **start driveChannel faultDiagnostics** command at any time by pressing **Ctrl+C** .

Stop drive channel locate

The `stop driveChannel locate` command turns off the indicator lights on the drive trays that were turned on by the `start driveChannel locate` command.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
stop driveChannel locate
```

Parameters

None.

Controller health image commands

Save storage array controller health image

The `save storageArray controllerHealthImage` command saves a controller health image to a specified file on a host, for storage arrays that support the controller health image feature.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

If the storage array does not support the controller health image feature, the command returns an error.

Syntax

```
save storageArray controllerHealthImage file="filename"
```

Parameter

Parameter	Description
file	The file path and the file name to which you save the controller health image. Enclose the file name in double quotation marks (" "). For example: `file="C:\Array Backups\DBMbackup_03302010.core"`

Notes

A controller health image file might be one to two gigabytes in size, and take several minutes to save. In addition to saving the controller health image itself, this command generates an XML descriptor file based on the controller health image metadata. This descriptor file is saved in ZIP file format to the same path as the controller health image. The following example show the XML format for the descriptor file.

```
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
- <DPLcontrollerHealthImageInfo>
<dplcontrollerHealthImageTag>sometag#</dplcontrollerHealthImageTag>
<captureTime>12/22/10 3:58:53 PM IST</captureTime>
- <StorageArrayData>
<ArraySAID>600a0b80006e006a000000004c65efc1</ArraySAID>
<ManagementApiVersion>devmgr.v1083api01.Manager</ManagementApiVersion>
<fwVersion>07.83.01.00</fwVersion>
<platformType>7091</platformType>
</StorageArrayData>
<fullcontrollerHealthImageCtlr>controllerserialNumber1
     </fullcontrollerHealthImageCtlr>
<fullcontrollerHealthImageSize>fullCaptureSize</fullcontrollerHealthImageSize>
<altcontrollerHealthImageCtlr>controllerserialNumber2</altcontrollerHealthImage
     Ctlr>
```

```
<altcontrollerHealthImageSize>altCaptureSize</altcontrollerHealthImageSize>
<triggerReason>Exception</triggerReason>-<DPLcontrollerHealthImageDetail>
<dplcontrollerHealthImageReason>DPLcontrollerHealthImageReason
     </dplcontrollerHealthImageReason>
- <fwLocation >
<filename>filename</filename>
<lineNumber>line#</lineNumber>
</fwLocation >
<panicReason>panicString</panicReason>
</DPLcontrollerHealthImageDetail>
</DPLcontrollerHealthImageInfo>
```

When you retrieve a controller health image from the controller cache to a host, a flag is set on the controller to indicate that the controller health image does not need to be retrieved. This setting persists for 48 hours. If a new controller health image occurs during that period, the new controller health image is saved to the controller cache and overwrites any previous controller health image data in cache.

Set storage array controller health image allow overwrite

The `set storageArray controllerHealthImageAllowOverWrite` command sets a flag on a controller to allow a new controller health image to overwrite an existing controller health image on storage arrays that support the controller health image feature.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

If the storage array does not support the controller health image feature, the command returns an error.

Syntax

```
set storageArray controllerHealthImageAllowOverWrite
```

Parameters

None.

Notes

When the controller health image is retrieved, the `allow overwrite` flag is set. If the controller health image is not retrieved, the image expires in 48 hours, after which the `allow overwrite` flag is set. When you use the `set storageArray controllerHealthImageAllowOverWrite` command to set the `allow overwrite` flag, the 48-hour expiration is waived as if the image had been retrieved.

Show storage array controller health image

The `show storageArray controllerHealthImage` command shows details of the controller health image on the controller cache, if a controller health image is available, on storage arrays that support the controller health image.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Context

If the storage array does not support the controller health image feature, this command returns an error.

Syntax

```
show storageArray controllerHealthImage
```

Parameters

None.

Start storage array controller health image

The `start storageArray controllerHealthImage controller` command produces a storage array controller health image on storage arrays that support the controller health image feature.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Important: Use this command only under the direction of technical support.

If the storage array does not support the controller health image feature, the command returns an error.

Syntax

```
start storageArray controllerHealthImage controller [(a|b)]
```

Parameters

Parameter	Description
controller	This parameter specifies the controller from which to produce the controller health image. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . Enclose the controller identifier in square brackets ([ ]). If you do not specify a controller, the storage management software returns a syntax error.

Notes

This command forces the selected controller to dump its core data to cache. Use the `save storageArray controllerHealthImage` command to save a copy of the cache data to a host file.

Controller host port configuration commands

Create host port

The `create hostPort` command creates a new host port identification on a host bus adapter (HBA).

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

The host port identification is a software value that represents the physical HBA host port to the controller. Without the correct host port identification, the controller cannot receive instructions or data from the host port.

Syntax

```
create hostPort identifier=("wwID")
userLabel="portLabel"
[host="hostName"]
[interfaceType=(FC | SAS)]
```

Parameters

Parameter	Description
identifier	The 8-byte World Wide Identifier (WWID) or the 16-byte group identifier (GID) of the HBA or HCA host port. Enclose the WWID or the GID in double quotation marks (" ").
userLabel	The name that you want to give to the new HBA host port. Enclose the host port label in double quotation marks (" ").
host	The name of the host for which you are defining an HBA host port. Enclose the host name in double quotation marks (" ").
interfaceType	The identifier of the type of interface for the host port. The choices for the types of host port interfaces are: • FC – Fibre Channel • SAS – Serial-Attached SCSI An FC or a SAS selection requires an 8-byte WWID. If you do not specify the type of interface, FC is used as the default interface for the host port.

Notes

An HBA host port is a physical connection on a host bus adapter that resides in a host computer. An HBA host port provides host access to the volumes in a storage array. If the HBA has only one physical connection (one host port), the terms host port and host bus adapter are synonymous.

You can use any combination of alphanumeric characters, hyphens, and underscores for the names. Names can have a maximum of 30 characters.

Create initiator

The `create initiator` command creates the initiator object.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Note: This command is only applicable to iSCSI, NVMe over RoCE, and NVMe over Fibre Channel.

Syntax

```
create initiator identifier="initiatorQualifiedName" userLabel="initiatorName" host="hostName"
interfaceType=(iscsi | nvmeof) [chapSecret="securityKey"]
```

Parameters

Parameter	Description
identifier	Allows you to specify the identifier qualified name (such as iqn or nqn) to create an initiator . Enclose the identifier in double quotation marks (" ").
userLabel	Allows you to specify a user label for the initiator. Enclose the name in double quotation marks (" ").
host	Allows you to specify the host name where the initiator is installed. Enclose the name in double quotation marks (" ").
interfaceType	Allows you to specify which interface type the initiator is for. Valid choices are iscsi and nvmeof. The nvmeof option is for NVMe over RoCE or NVMe over Fibre Channel.
chapSecret	Allows you to enter the security key that you want to use to authenticate a peer connection. Enclose the security key in double quotation marks (" "). This parameter is applicable only to iSCSI host interface type.

Delete initiator

The `delete initiator` command deletes the initiator object.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Important: This command replaces the deprecated `delete iscsiInitiator` command.

Note: This command is applicable only to iSCSI, NVMe over RoCE, and NVMe over Fibre Channel.

Syntax

```
delete initiator (["initiatorName"] | <"initiatorQualifiedName">)
```

Parameters

Parameter	Description
initiator	Allows you to specify the initiator identifier for which you want to delete. Enclose the name in double quotation marks (" "). You also must enclose the name in square brackets ([ ]) if the value is a user label or angle brackets (< >) if the value is a qualified name (for example, iqn).

Set initiator

The `set initiator` command updates the initiator object.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Note: This command is applicable only to iSCSI, NVMe over RoCE, and NVMe over Fibre Channel.

Syntax

```
set initiator (["initiatorName"] | <"initiatorQualifiedName">) ([userLabel="newInitiatorName"] |
[host="newHostName"] | [chapSecret="newSecurityKey"])
```

Parameters

Parameter	Description
initiator	Allows you to specify the initiator identifier for which you want to set properties. Enclose the name in double quotation marks (" "). You also must enclose the name in square brackets ([ ]) if the value is a user label or angle brackets (< >) if the value is a qualified name (e.g., iqn).
userLabel	Allows you to enter a new user label for the initiator object. Enclose the new user label in double quotation marks (" ").
host	Allows you to enter a new host to which the host port is connected. Enclose the host name in double quotation marks (" ").
chapSecret	Allows you to enter a new security key that you want to use to authenticate a peer connection. Enclose the security key in double quotation marks (" "). This parameter is only applicable to **iSCSI** host interface types.

Reset storage array host port statistics baseline

The `reset storageArray hostPortStatisticsBaseline` command resets the storage array host port statistics baseline.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Syntax

```
reset storageArray hostPortStatisticsBaseline type=(ISCSI)
```

Parameters

Parameter	Description
type	Allows you to indicate which statistics type to collect. Valid choices are: `ISCSI` .

Save storage array host port statistics

The `save storageArray hostPortStatistics` command saves the storage array host port statistics.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Security Admin role.

Syntax

```
save storageArray hostPortStatistics [(raw | baseline)] type=(ISCSI) file="filename"
```

Parameters

Parameter	Description
raw	Allows you to retrieve the collected statistics since start-of-day. Enclose the parameter in square brackets ([ ]).
baseline	Allows you to retrieve the collected statistics from the time the controllers' baselines were reset to zero. Enclose the parameter in square brackets ([ ]).
type	Allows you to indicate which statistics type to collect. Valid choice is: `ISCSI`.
file	Allows you to specify the file path and filename to save the statistics. Enclose the file name in double quotation marks (" "). Use any file name with the `.csv` extension.

Type	Ethernet MAC, Ethernet TCP/IP, Local Initiator (Protocol), DCBX Operational State, LLDP TLV, DCBX TLV	Target (Protocol)
iscsi	X	X

Set controller host port properties

The `set controller hostPort` command changes the network properties for the following types of host ports: iSCSI and NVMe over RoCE. Property changes include IPv4 and IPv6 properties, port speed, and maximum frame payload.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Syntax

```
set controller [(a|b)] hostPort ["portLabel"[, "physical"|"virtual"]]
    (IPV4Address=(0-255).(0-255).(0-255).(0-255) |
    IPv6LocalAddress=(0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF) |
    IPv6RoutableAddress=(0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF): (0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF) |
    IPv6RouterAddress=(0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF): (0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF) |
    enableIPv4=(TRUE | FALSE) |
    enableIPv6=(TRUE | FALSE) |
    enableIPv4Vlan=(TRUE | FALSE) |
    enableIPv6Vlan=(TRUE | FALSE) |
    enableIPv4Priority=(TRUE | FALSE) |
    enableIPv6Priority=(TRUE | FALSE) |
    IPv4ConfigurationMethod=(static | dhcp) |
    IPv6ConfigurationMethod=(static | auto) |
    IPv4GatewayIP=(0-255).(0-255).(0-255).(0-255) |
    IPv6HopLimit=[0-255] |
    IPv6NdDetectDuplicateAddress=[0-255] |
    IPv6NdReachableTime=[0-65535] |
    IPv6NdRetransmitTime=[0-65535] |
    IPv6NdTimeOut=[0-65535] |
    IPv4Priority=[0-7] |
    IPv6Priority=[0-7] |
    IPv4SubnetMask=(0-255).(0-255).(0-255).(0-255) |
    IPv4VlanId=[1-4094] |
    IPv6VlanId=[1-4094] |
    maxFramePayload=[1500-9000] |
    tcpListeningPort=(3260 | [49152-65535]) |
    portSpeed=(autoNegotiate | 10 | 25 | 40 | 50 | 100))
```

Parameters

Parameter	Description
controller	Allows you to specify the controller for which you want to define properties.
hostPort	Allows you to specify the host port label for which you want to define properties.
IPV4Address	Allows you to enter the address in this format: (0-255).(0-255).(0-255).(0-255).
IPV6LocalAddress	Allows you to enter the address in this format: (0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF): (0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF).
IPv6RoutableAddress	Allows you to enter the address in this format: (0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF): (0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF).
IPV6RouterAddress	Allows you to enter the address in this format: (0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF): (0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF).
enableIPV4	Allows you to enable IPv4.
enableIPV6	Allows you to enable IPv6. The IPv6 address space is 128 bits. It is represented by eight 16-bit hexadecimal blocks separated by colons.
enableIPv4Vlan	Allows you to enable IPv4 VLAN. A VLAN is a logical network that behaves like it is physically separate from other physical and virtual local area networks (LANs) supported by the same switches, the same routers, or both.
enableIPv6Vlan	Allows you to enable IPv6 VLAN. A VLAN is a logical network that behaves like it is physically separate from other physical and virtual local area networks (LANs) supported by the same switches, the same routers, or both.

Parameter	Description
enableIPv4Priority	Allows you to enable the parameter that determines the priority of accessing the network. In a shared local area network (LAN) environment, such as Ethernet, many stations might contend for access to the network. Access is on a first-come, first-served basis. Two stations might try to access the network at the same time, which causes both stations to back off and wait before trying again. This process is minimized for switched Ethernet, where only one station is connected to a switch port.
enableIPv6Priority	Allows you to enable the parameter that determines the priority of accessing the network. In a shared local area network (LAN) environment, such as Ethernet, many stations might contend for access to the network. Access is on a first-come, first-served basis. Two stations might try to access the network at the same time, which causes both stations to back off and wait before trying again. This process is minimized for switched Ethernet, where only one station is connected to a switch port.
IPv4ConfigurationMethod	Allows you to set IPv4 static or DHCP addressing.
IPv6ConfigurationMethod	Allows you to set IPv6 static or DHCP addressing.
IPv4GatewayIP	Allows you to enter the gateway address in this format: (0-255).(0-255).(0-255).(0-255).
IPv6HopLimit	Allows you to configure the maximum number of hops an IPv6 packet can traverse. The default value is 64.
IPv6NdDetectDuplicateAd-dress	Allows you to set the number of neighbor-solicitation messages to send in trying to determine IP address uniqueness.
IPv6NdReachableTime	Allows you to set the amount of time, in milliseconds, that a remote IPv6 node is considered reachable. The default value is 30000 milliseconds.
IPv6NdRetransmitTime	Allows you to set the amount of time, in milliseconds, to continue to retransmit a packet to an IPv6 node. The default value is 1000 milliseconds.
IPv6NdTimeOut	Allows you to set the timeout value, in milliseconds, for an IPv6 node. The default value is 30000 milliseconds.
IPv4Priority	Allows you to set the priority assignment for IPv4 packets.
IPv6Priority	Allows you to set the priority assignment for IPv6 packets.
IPv4SubnetMask	Allows you to enter the subnet mask address in this format: (0-255).(0-255).(0-255).(0-255).
IPv4VlanId	Allows you to set the IPv4 VLAN id.
IPv6VlanId	Allows you to set the IPv6 VLAN id.
maxFramePayload	Allows you to set the maximum size of a packet or frame that is sent in a network. The payload portion of a standard Ethernet frame is set to 1500, and a jumbo Ethernet frame is set to 9000. When using jumbo frames, all the devices that are in the network path should be able to handle the larger frame size. The default value is 1500 bytes per frame. **Note:** To ensure best performance in an NVMe over RoCE environment, configure a frame size of 4200.

Parameter	Description
tcpListeningPort	Allows you to set the TCP port number that is used to listen for iSCSI logins from initiators. The default port is 3260.
portSpeed	Allows you to set the speed, in megabits per second (Mb/s), for which the port should be communicating. **Note:** This parameter is only supported with a 25 Gbps iSCSI host interface card. For a 25 Gbps iSCSI host interface card, changing the speed of one port changes the speed of all four ports on the card. The allowable options in this case are 10 or 25.

Parameter support by host port type

Parameter support varies by host port type (iSCSI or NVMe over RoCE), as described in the following table:

Parameter	iSCSI	NVMe over RoCE
IPV4Address	Yes	Yes
IPV6LocalAddress	Yes	Yes
IPv6RoutableAddress	Yes	Yes
IPV6RouterAddress	Yes	Yes
enableIPV4	Yes	Yes
enableIPV6	Yes	Yes
enableIPv4Vlan	Yes	No
enableIPv6Vlan	Yes	No
enableIPv4Priority	Yes	No
enableIPv6Priority	Yes	No
IPv4ConfigurationMethod	Yes	Yes
IPv6ConfigurationMethod	Yes	Yes
IPv4GatewayIP	Yes	Yes
IPv6HopLimit	Yes	
IPv6NdDetectDuplicateAddress	Yes	
IPv6NdReachableTime	Yes	
IPv6NdRetransmitTime	Yes	
IPv6NdTimeOut	Yes	
IPv4Priority	Yes	No
IPv6Priority	Yes	No
IPv4SubnetMask	Yes	Yes
IPv4VlanId	Yes	No
IPv6VlanId	Yes	No
maxFramePayload	Yes	Yes
tcpListeningPort	Yes	
portSpeed	Yes	Yes

Set target properties

The `set target` command changes the properties for an iSCSI target, including authentication method and alias name.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Syntax

```
set target (["targetAliasName"] | <"targetQualifiedName">) (authenticationMethod=(none | chap chapSecret="newSecurityKey") | tar
```

Parameters

Parameter	Description
target	Allows you to specify which target you want to set. You can either specify the target's alias name or qualified name (e.g., iqn). Enclose the target identifier in double quotations marks (" "). You also must enclose the identifier in square brackets ([ ]) if it is an alias or angle brackets (< >) if it is a qualified name.
authenticationMethod	Allows you to set the means of authenticating your session. Valid choices are: `none` or `chap` .
chapSecret	Allows you to enter the security key to authenticate a peer connection. This is applicable only when `authenticationMethod` is set to `chap` .
targetAlias	Allows you to specify the new alias name for the target. Enclose the name in double quotation marks (" ").

Set iSCSI host port networking properties

The `set controller iscsiHostPort` command changes the network properties for a host port, including IPv4 and IPv6 properties, port speed, and maximum frame payload.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Important: This command is deprecated and is replaced by the command.

Syntax

```
set controller [(a|b)]
 iscsiHostPort [portLabel]

([IPv4Address=(0-255).(0-255).(0-255).(0-255) ]|
[IPv6LocalAddress=(0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF): (0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF)] |
[IPv6RoutableAddress=(0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF): (0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF) ]|
[IPv6RouterAddress=(0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF): (0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF) ]|
[enableIPv4=(TRUE | FALSE) | enableIPv6=(TRUE | FALSE)] |
[enableIPv4Vlan=(TRUE | FALSE) | enableIPv6Vlan=(TRUE | FALSE)] |
[enableIPv4Priority=(TRUE | FALSE) | enableIPv6Priority=(TRUE | FALSE) ]|
```

```
[IPv4ConfigurationMethod=(static | dhcp) ]|
[IPv6ConfigurationMethod=(static | auto)] |
[IPv4GatewayIP=(TRUE | FALSE)] |
[IPv6HopLimit=[0-255] ]|
[IPv6NdDetectDuplicateAddress=[0-256] ]|
[IPv6NdReachableTime=[0-65535] ]|
[IPv6NdRetransmitTime=[0-65535]] |
[IPv6NdTimeOut=[0-65535] ]|
[IPv4Priority=[0-7] | IPv6Priority=[0-7] ]|
[IPv4SubnetMask=(0-255).(0-255).(0-255).(0-255)] |
[IPv4VlanId=[1-4094] | IPv6VlanId=[1-4094]] |
[maxFramePayload=[frameSize]] |
[tcpListeningPort=[3260, 49152-65536] ]|
[portSpeed=[(10 | 25)])
```

Parameters

Parameter	Description
enableIPV4	Available options are: • TRUE • FALSE
enableIPV4Priority	Select this option to enable the parameter that determines the priority of accessing the network. Use the slider to select a priority between 1 and 7. In a shared local area network (LAN) environment, such as Ethernet, many stations might contend for access to the network. Access is on a first-come, first-served basis. Two stations might try to access the network at the same time, which causes both stations to back off and wait before trying again. This process is minimized for switched Ethernet, where only one station is connected to a switch port. Available options are: • TRUE • FALSE **Note:** This parameter is not supported in an NVMe over RoCE environment.
enableIPV4Vlan	A VLAN is a logical network that behaves like it is physically separate from other physical and virtual local area networks (LANs) supported by the same switches, the same routers, or both. Available options are: • TRUE • FALSE **Note:** This parameter is not supported in an NVMe over RoCE environment.
enableIPV6	The IPv6 address space is 128 bits. It is represented by eight 16-bit hexadecimal blocks separated by colons. Available options are: • TRUE • FALSE

Parameter	Description
enableIPV6Priority	Select this option to enable the parameter that determines the priority of accessing the network. Use the slider to select a priority between 1 and 7. In a shared local area network (LAN) environment, such as Ethernet, many stations might contend for access to the network. Access is on a first-come, first-served basis. Two stations might try to access the network at the same time, which causes both stations to back off and wait before trying again. This process is minimized for switched Ethernet, where only one station is connected to a switch port. Available options are: • TRUE • FALSE **Note:** This parameter is not supported in an NVMe over RoCE environment.
enableIPV6Vlan	A VLAN is a logical network that behaves like it is physically separate from other physical and virtual local area networks (LANs) supported by the same switches, the same routers, or both. Available options are: • TRUE • FALSE **Note:** This parameter is not supported in an NVMe over RoCE environment.
IPV4Address	Enter the address in this format: (0-255).(0-255).(0-255).(0-255)
IPV4ConfigurationMethod	Available options are: • static • dhcp
IPV4GatewayIP	Available options are: • TRUE • FALSE
IPV4Priority	Enter a value between 0 and 7. **Note:** This parameter is not supported in an NVMe over RoCE environment.
IPV4SubnetMask	Enter the subnet mask in this format: (0-255).(0-255).(0-255).(0-255)
IPV4VlanId	Enter a value between 1 and 4094. **Note:** This parameter is not supported in an NVMe over RoCE environment.
IPV6ConfigurationMethod	Available options are: • static • auto
IPV6HopLimit	This option configures the maximum number of hops an IPv6 packet can traverse. The default value is 64 .
IPV6LocalAddress	Enter the address is this format: (0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF): (0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF)
IPV6NdDetectDuplicateAddress	Enter a value between 0 and 256.

Parameter	Description
IPV6NdReachableTime	This option configures the amount of time that a remote IPv6 mode is considered reachable. Specify a value, in milliseconds, between 0 - 65535. The default value is 30000 milliseconds.
IPV6NdRetransmitTime	This option configures the amount of time to continue to retransmit a packet to an IPv6 node. Specify a value, in milliseconds, between 0 - 65535. The default value is 1000 milliseconds.
IPV6NdTimeOut	This option configures the timeout value for an IPv6 node. Specify a value, in milliseconds, between 0 - 65535. The default value is 30000 milliseconds.
IPV6Priority	Enter a value between 0 and 7. **Note:** This parameter is not supported in an NVMe over RoCE environment.
IPV6RoutableAddress	Enter the address is this format: (0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF): (0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF)
IPV6RouterAddress	Enter the address is this format: (0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF): (0-FFFF):(0-FFFF):(0-FFFF):(0-FFFF)
IPV6VlanId	Enter a value between 1 and 4094. **Note:** This parameter is not supported in an NVMe over RoCE environment.
maxFramePayload	The maxFramePayload option is shared between IPv4 and IPv6 and is the largest packet or frame that can be sent in a network. The payload portion of a standard Ethernet frame is set to 1500 , and a jumbo Ethernet frame is set to 9000 . When using jumbo frames, all of the devices that are in the network path should be capable of handling the larger frame size. The default value is 1500 bytes per frame. You must enter a value between 1500 and 9000.
portSpeed	Available options are: • 10 • 25 **Note:** This option is only valid for the 25Gb/s Ethernet host interface card. Changing the speed of one port changes the speed of all four ports on the card. **Note:** Values for the portSpeed option of the **iscsiHostPort** parameter are in megabits per second (Mb/s).
tcpListeningPort	The listening port is the TCP port number that the controller uses to listen for iSCSI logins from host iSCSI initiators. The default listening port is 3260. You must enter 3260 or a value between 49152 and 65535.

Identifying an iSCSI host port label

You must specify a label for the host port. Follow these steps to specify the host port label:

1. If you do not know the port label for the iSCSI host port, run the `show controller` command.

2. In the Host interface section of the results, locate the host port you want to select.

   Note: The port label is the complete value returned for the **Port** field.

3. Enclose the entire value of the port label in both quotes and square brackets: [" `portLabel` "]. For example, if the port label is `Ch 2` , specify the iSCSI host port as follows:

```
iscsiHostPort[\"ch 2\"]
```

Note: If you are using a Windows command line and the label contains a pipe (|), the character should be escaped (using ^); otherwise, it will be interpreted as a command. For example, if the port label is `e0b|0b` , specify the iSCSI host port as follows:

```
iscsiHostPort[\"e0b^|0b\"]
```

Set iSCSI initiator

The `set iscsiInitiator` command sets the attributes for an iSCSI initiator.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Important: This command is deprecated and is replaced by the command.

Syntax

```
set iscsiInitiator (["initiatorUserLabel"] | <"iscsiInitiatorName">)
(userLabel="newName" |
host="newHostName" |
chapSecret="newSecurityKey")
```

Parameters

Parameter	Description
initiatorUserLabel	The iscsi Initiator user label of the iSCSI initiator for which you want to set attributes. Enclose the iSCSI initiator user label in double quotation marks (" ") inside square brackets ([ ]). **Note:** Begin the initiator user label with the host name to which the host port is connected. Because there can be more than one host port identifier on a host, use a unique suffix for the host port ID. If the host name is `ICTM1590S02H1` the initiator label appears as follows: `set iscsiInitiator ["ICTM1590S02H1_AA"]`
iscsiInitiatorName	The name of the initiator for which you want to set attributes. Enclose the **iscsiInitiatorName** in double quotation marks (" ") inside angle brackets (< >). **Note:** The **iscsiInitiatorName** is the iSCSI Qualified Name (iqn). An example: `set iscsiInitiator <"iqn.2016-11.com.vmware.iscsi:ictm1509s02h1">`

Parameter	Description
userLabel	The new user label that you want to use for the iSCSI initiator. Enclose the new user label in double quotation marks (" "). **Note:** A best practice is to begin the initiator user label with the host name to which the host port is connected. Because there can be more than one host port identifier on a host, use a unique suffix for the host port ID. If the host name is `ICTM1590S02H1` then an example of the initiator user label is shown below: `set iscsiInitiator ["ICTM1590S02H1_AA"]`
host	The name of the new host to which the host port is connected. Enclose the host name in double quotation marks (" "). An example is shown below: `["ICTM1590S02H2"]`
chapSecret	The security key that you want to use to authenticate a peer connection. Enclose the security key in double quotation marks (" ").

Notes

You can use any combination of alphanumeric characters, hyphens, and underscores for the names. Names can have a maximum of 30 characters.

Challenge Handshake Authentication Protocol (CHAP) is a protocol that authenticates the peer of a connection. CHAP is based upon the peers sharing a *secret* . A secret is a security key that is similar to a password.

Use the **chapSecret** parameter to set up the security keys for initiators that require a mutual authentication. The CHAP secret must be between 12 characters and 57 characters. This table lists the valid characters.

Space	!	"	#	$	%	&	'	(	)	*	+
,	-	.	/	0	1	2	3	4	5	6	7
8	9	:	;	<	=	>	?	@	A	B	C
D	E	F	G	H	I	J	K	L	M	N	O
P	Q	R	S	T	U	V	W	X	Y	Z	[
\	]	^	_	'	a	b	c	d	e	f	g
h	i	j	k	l	m	n	o	p	q	r	s
t	u	v	w	x	y	z	{			}	~	

Show storage array unconfigured iSCSI initiators

The `show storageArray unconfiguredIscsiInitiators` command returns a list of initiators that have been detected by the storage array but are not yet configured into the storage array topology.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

This command is deprecated. The command that replaces it is .

Syntax

```
show storageArray unconfiguredIscsiInitiators
```

Parameters

None.

Show unconfigured initiators

The `show storageArray unconfiguredInitiators` command returns a list of initiators that have been detected by the storage array but are not yet configured into the storage array topology.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Syntax

```
show storageArray unconfiguredInitiators
```

Parameters

None.

Drive commands

Download drive firmware

The `download drive firmware` command downloads a firmware image to a drive.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Context

Attention: Possible damage to the storage array configuration – Downloading drive firmware incorrectly can result in damage to the drives or a loss of data access.

This command is intended for downloading a firmware image to only one drive model at a time. If you use this command in a script, make sure that you use this command only once. If you use this command more than once, the operation can fail. You can download firmware images to all of the drives in a storage array at one time by using the `download storageArray driveFirmware` command.

Syntax

```
download (drive [trayID,[drawerID,]slotID  ] | drives[  trayID1,[drawerID1,]slotID1 ... trayIDn,[drawerIDn,]slotIDn  ] )
 [online|offline] firmware file="filename"
```

Parameters

Parameter	Description
drive or **drives**	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).
online or **offline**	Select **online** to perform an online drive firmware download, otherwise select **offline** . The default value is **offline** .
file	The file path and the file name of the file that contains the firmware image. Enclose the file path and the file name of the firmware image in double quotation marks (" "). For example: `file="C:\Program Files\CLI\dnld\drvfrm.dlp"` Valid file names have a *.dlp* extension.
firmware	Indicates to download controller firmware.

Notes

Before trying to download drive firmware, take these precautions:

- Unless you are using the **online** parameter, stop all I/O activity to the storage array before you download the firmware image. The `download drive firmware` command without the **online** parameter blocks all I/O activity until the download finishes or fails; however, as a precaution, make sure that all I/O activity that might affect the drive is stopped.

- Make sure that the firmware image file is compatible with the drive tray. If you download a firmware image file that is not compatible with the drive tray that you have selected, the drive tray might become unusable.

- Do not make any configuration changes to the storage array while you download drive firmware. Trying to make a configuration change can cause the firmware download to fail and make the selected drives unusable.

- For online drive firmware update requests issued using this command, the controller will remove RAID 0 volume group drives from the list of drives to which new firmware is downloaded. Individual drive return status will be set to `Never Attempted With Reason` .

When you download the firmware to the drives, you must provide the full path and file name to the firmware image that is stored on your system.

You can use `download drive` command to test the firmware on one drive before you install the firmware on all of the drives in a storage array. The download returns one of these statuses:

- Successful
- Unsuccessful With Reason
- Never Attempted With Reason

The **drive** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-

capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0 , and specify the ID of the slot in which a drive resides.

Recover disabled drive ports

The `recover disabled drivePorts` command recovers disabled drive ports.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
recover disabled drivePorts;
```

Examples

```
recover disabled drivePorts;
```

Replace drive

The `replace drive replacementDrive` command replaces a drive in a volume group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Replacing a drive in a volume group redefines the composition of a volume group. You can use this command to replace a drive with either an unassigned drive or a fully integrated hot spare.

Syntax

```
replace (drive [trayID,[drawerID,]slotID] | drives[trayID1,[drawerID1,]slotID1 … trayIDn,[drawerIDn,]slotIDn] | <"wwID">)
replacementDrive=trayID,drawerID,slotID
[copyDrive][failDrive]
```

Parameters

Parameter	Description
drive	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).
drive	The World Wide Identifier (WWID) of the drive that you want to replace. Enclose the WWID in double quotation marks (" ") inside angle brackets (< >).
replacementDrive	The location of the drive that you want to use for a replacement. For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . Slot ID values are 1 to 24 .

Notes

The **drive** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0 , and specify the ID of the slot in which a drive resides.

Revive drive

The `revive drive` command forces the specified drive to the Optimal state.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Context

Attention: Possible loss of data access – Correct use of this command depends on the data configuration on all of the drives in the volume group. Never try to revive a drive unless you are supervised by technical support.

Syntax

`revive drive` [*trayID,[drawerID,]slotID*]

Parameter

Parameter	Description
drive	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).

Notes

The **drive** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0 , and specify the ID of the slot in which a drive resides.

Save drive channel fault isolation diagnostic status

The `save driveChannel faultDiagnostics file` command saves the drive channel fault isolation diagnostic data that is returned from the `start driveChannel faultDiagnostics` command.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Note: With firmware version 8.10, the `save driveChannel faultDiagnostics` command is deprecated.

You can save the diagnostic data to a file as standard text or as XML.

Syntax

```
save driveChannel faultDiagnostics file="filename"
```

Parameter

Parameter	Description
file	The file path and the file name to which you want to save the results of the fault isolation diagnostics test on the drive channel. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\sup\fltdiag.txt"` This command does not automatically append a file extension to the saved file. You must specify a file extension when entering the file name.

Notes

A file extension is not automatically appended to the saved file. You must specify the applicable format file extension for the file. If you specify a file extension of `.txt` , the output will be in a text file format. If you specify a file extension of `.xml` , the output will be in an XML file format.

Save drive log

The `save allDrives logFile` command saves the drive logs to a file.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Drive log data is maintained by the storage array for each drive.

Attention: Do not run this command unless you are instructed to do so by technical support.

Syntax

```
save allDrives logFile="filename"
```

Parameter

Parameter	Description
logFile	The file path and the file name to which you want to save the drive logs. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\drive01.zip"` **Important:** This command does not automatically append a file extension to the saved file. You must specify the .zip file extension when entering the file name.

Set drive hot spare

The `set drive hotSpare` command assigns or de-assigns one or more drives as a hot spare.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set (drive [trayID,[drawerID,]slotID ] | drives[ trayID1,[drawerID1,]slotID1 ... trayIDn,[drawerIDn,]slotIDn ] )
hotSpare=(TRUE | FALSE)
```

Parameters

Parameter	Description
drive or **drives**	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 .
	All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0.
	Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).
hotSpare	The setting to assign the drive as the hot spare. To assign the drive as the hot spare, set this parameter to TRUE . To remove a hot spare assignment from a drive, set this parameter to FALSE .

Notes

The **drive** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0 , and specify the ID of the slot in which a drive resides.

Set drive service action allowed indicator

The `set drive serviceAllowedIndicator` command turns on or turns off the Service Action Allowed indicator light on a drive or drives in drive trays that support the Service Action Allowed indicator light feature.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

If the storage array does not support the Service Action Allowed indicator light feature, this command returns an error. If the storage array supports the command, but is unable to turn on or turn off the indicator light, this command returns an error.

Syntax

```
set (drive [trayID,[drawerID,]slotID  ] | drives[  trayID1,[drawerID1,]slotID1  ... trayIDn,[drawerIDn,]slotIDn  ] )
serviceAllowedIndicator=(on | off)
```

Parameters

Parameter	Description
drive or **drives**	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).
serviceAllowedIndicator	The setting to turn on or turn off the Service Action Allowed indicator light. To turn on the Service Action Allowed indicator light, set this parameter to on . To turn off the Service Action Allowed indicator light, set this parameter to off .

Notes

The **drive** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0 , and specify the ID of the slot in which a drive resides.

Set drive state

The `set drive operationalState` command sets a drive to the Failed state.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

To return a drive to the Optimal state, use the `revive drive` command.

Syntax

```
set drive [trayID,[drawerID,]slotID] operationalState=failed [copyDrive]
```

Parameter

Parameter	Description
drive	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0or 1, depending on the tray model. Drive trays compatible with DE2000H/ DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).

Notes

The **drive** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0 , and specify the ID of the slot in which a drive resides.

Set FIPS drive security identifier

The `set drive securityID` command is used to reset a FIPS drive back to the original manufacturer settings.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

Attention: This command resets a FIPS drive back to the original manufacturer settings and erases all existing drive data. This operation is completely irreversible. This may be necessary if the drive is locked due to an invalid or missing security key file or unknown pass phrase. All existing drive data will be erased.

To erase an FDE drive, use the `start secureErase` command.

Syntax

```
set drive [trayID,[drawerID,]slotID] securityID="string"
```

Parameters

Parameter	Description
drive	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).
securityID	The security ID of the drive to erase, in string form. This string can have a maximum of 32 characters. The form of the security ID will vary by manufacturer. **Note:** To find the security ID, remove the drive and read the security ID on the canister label.

Notes

The **drive** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0 , and specify the ID of the slot in which a drive resides.

Example

```
set drive [1,31,4] securityID="V2zdvLTdGWdWyTALGHns";
```

Set foreign drive to native

The `set drive nativeState` command adds the missing (foreign) drives back into their original volume group and to make them part of the volume group in the new storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

A drive is considered to be native when it is a part of a volume group in a storage array. A drive is considered to be foreign when it does not belong to a volume group in a storage array or when it fails to be imported with the drives of a volume group that are transferred to a new storage array. The latter failure creates an incomplete volume group on the new storage array.

Use this operation for emergency recovery only: when one or more drives need to be changed from a foreign drive status and returned to a native status within their original volume group.

Attention: Possible data corruption or data loss – Using this command for reasons other than what is stated previously might result in data loss without notification.

Syntax

```
set ( drive=(trayID,[drawerID,]slotID ) | drives=( trayID1,[drawerID1,]slotID1 ... trayIDn,[drawerIDn,]slotIDn  )  |
allDrives) nativeState
```

Parameters

Parameter	Description
drive or **drives**	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).
allDrives	The setting to select all of the drives.

Notes

The **drive** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0 , and specify the ID of the slot in which a drive resides.

Show drive

The `show allDrives` command returns information about the drives in the storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

For each drive in the storage array, this command returns the following information:

- The total number of drives
- The type of drive (SAS only)
- Information about the basic drive:
    - The tray location and the slot location
    - The status
    - The capacity
    - The data transfer rate
    - The product ID
    - The firmware level

- Information about wear life of SSD drives (this information is not shown if the array does not contain SSD drives):
  - The average erase count.
  - The spare blocks remaining.
  - The percent endurance used. The percent endurance used is the amount of data written to the SSD drives to date divided by the total theoretical write limit for the drives.
- Information about the drive channel:
  - The tray location and the slot location
  - The preferred channel
  - The redundant channel
- Hot spare coverage
- Details for each drive

Depending on the size of your storage array, this information can be several pages long. In addition, the drive information is returned for the `show storageArray profile` command.

Syntax

```
show ((allDrives
[driveMediaType=(HDD | SSD | unknown | allMedia)] |
[driveType=(SAS)]) |
(drive [trayID,[drawerID,]slotID   ] | drives[   trayID1,[drawerID1,]slotID1  ...  trayIDn,[drawerIDn,]slotIDn   ] ))
summary
```

Parameters

Parameter	Description
allDrives	The setting to return information about all of the drives in the storage array.
driveMediaType	The type of drive media for which you want to retrieve information. The following values are valid types of drive media: • SSD – Use this option when you have solid state drives in the drive tray. • unknown – Use this option if you are not sure what types of drive media are in the drive tray. • allMedia – Use this option when you want to use all types of drive media that are in the drive tray.
driveType	The type of drive for which you want to retrieve information. You cannot mix drive types. Valid drive type is: SAS
drive or **drives**	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).
summary	The setting to return the status, the capacity, the data transfer rate, the product ID, and the firmware version for the specified drives.

Notes

To determine information about the type and location of all of the drives in the storage array, use the **allDrives** parameter.

To determine the information about the SAS drives in the storage array, use the **driveType** parameter.

To determine the type of drive in a specific location, use the **drive** parameter, and enter the tray ID and the slot ID for the drive.

The **drive** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0 , and specify the ID of the slot in which a drive resides.

Show drive download progress

The `show allDrives downloadProgress` command returns the status of firmware downloads for the drives that are targeted by the `download drive firmware` command or the `download storageArray driveFirmware` command.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
show allDrives downloadProgress
```

Parameters

None.

Notes

When all of the firmware downloads have successfully completed, this command returns good status. If any firmware downloads fail, this command shows the firmware download status of each drive that was targeted. This command returns the statuses shown in this table.

Status	Definition
Successful	The downloads completed without errors.
Not Attempted	The downloads did not start.
Partial Download	The downloads are in progress.
Failed	The downloads completed with errors.

Show drive performance statistics

The `show allDrives performanceStats` command returns information about drive performance.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

For each drive in the storage array, this command returns the following information:

- The storage array containing the drive or drives
- The current I/O latency
- The maximum I/O latency
- The minimum I/O latency
- The average I/O latency

Syntax

```
show (allDrives |drive [trayID,[drawerID,]slotID  ] | drives[   trayID1,[drawerID1,]slotID1 ... trayIDn,[drawerIDn,]slotIDn  ] ) performan
```

Parameters

Parameter	Description
allDrives	The setting to return information about all of the drives in the storage array.
drive or **drives**	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 .
	All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0.
	Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).

Notes

The **drive** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0 , and specify the ID of the slot in which a drive resides.

The `show drive performanceStats` command returns drive performance statistics as shown in this example:

```
"Performance Monitor Statistics for Storage Array: remote_pp -
Date/Time:
 10/23/12 3:47:27 PM -
Polling interval in seconds: 5"

"Objects","Current
 IO Latency","Maximum IO Latency","Minimum IO Latency",
"Average IO Latency"
```

```
"Capture Iteration: 1","","","",""
"Date/Time: 10/23/12 3:47:27 PM","",""
,"",""
"Drive Tray 0, Slot 1","0.0","0.0","0.0","0.0"
```

Show replaceable drives

The `show replaceableDrives` command shows all replaceable drives in a storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

For each replaceable drive in the storage array, this command returns the following information:

- The tray location and the slot location
- The volume group name to which the drive belongs
- The World Wide Name (WWN)
- The status of the drive

Syntax

```
show replaceableDrives
```

Example output

```
Replaceable drive at Tray 0, Slot 3
               Volume group: 2

     World-wide name: 5000c50028785aff0000000000000000
               Status:
 Removed
Replaceable drive at Tray 0, Slot 23
               Volume group: 2

               World-wide name: 5000c500095d46df0000000000000000

     Status: Removed
Replaceable drive at Tray 0, Slot 24

 Volume group: 2
               World-wide name:
 5000c500287854d70000000000000000
               Status: Removed
```

Start drive channel fault isolation diagnostics

The `start driveChannel faultDiagnostics` command runs the drive channel fault isolation diagnostics and stores the results.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Note: With firmware version 8.10, the `start driveChannel faultDiagnostics` command is deprecated.

Syntax

```
start driveChannel [(1 | 2 | 3 | 4 | 5 | 6 | 7 | 8)]
controller [(a|b)] faultDiagnostics
testDevices=[all |
controller=(a|b) |
esms=[trayID1 (left | right), ... , trayIDN (left | right)] |
  drives[trayID1,[drawerID1,]slotID1
... trayIDn,[drawerIDn,]slotIDn]
|[dataPattern=(fixed | pseudoRandom) |
patternNumber=[(0xhexadecimal | number)] |
maxErrorCount=integer |
testIterations=integer |
timeout=timeInterval]
```

Parameters

Parameter	Description
driveChannel	The identifier number of the drive channel that you want to locate . Valid values for the identifier number for the drive channel are 1 , 2 , 3 , 4 , 5 , 6 , 7 , or 8 . Enclose the drive channel identifier number in square brackets ([ ]).
controller	The identifier letter of the controller that you want to test. Valid controller identifier values are a or b , where a is the controller in slot A , and b is the controller in slot B . Enclose the controller identifier in square brackets ([ ]).
testDevices	The identifiers of the devices (controllers, environmental services module [ESMs], or drives) that you want to test. You can specify all or enter the specific identifiers for the devices that you want to diagnose. The **controller** identifiers are a or b , where a is the RAID controller module in slot A , and b is the RAID controller module in slot B .
	The **esms** identifiers are tray ID and left or right, where tray ID is a value from 0 through 99, and left or right are determined when viewing the drive tray from the rear.
	The **drive** identifiers include a tray identifier, a drawer identifier when the tray has drawers, and a slot identifier.
	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 .
	All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0.
	Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).
dataPattern	The method of repeatability that you want to test.

Parameter	Description
patternNumber	The hexadecimal data pattern that you want to use to run the test. This number can be any hexadecimal number between 0000 to FFFF . You must place 0x in front to indicate a hexadecimal number.
maxErrorCount	The number of errors that you want to accept before terminating the test.
testIterations	The number of times that you want to repeat the test.
timeout	The length of time in minutes that you want to run the test.

Notes

You can enter more than one type of device to test, and you can enter more than one type of test to run.

Use the **save driveChannel faultDiagnostics** command and the **stop driveChannel faultDiagnostics** command with the **start driveChannel faultDiagnostics** command. These commands are needed to save diagnostic test results to a file and to stop the diagnostic test.

Examples of valid **patternNumber** entries are 0xA5A5 , 0x3C3C , 8787 , and 1234 .

You also can stop this command at any time by pressing **Ctrl+C** .

Start drive initialize

The `start drive initialize` command starts a drive initialization.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Attention: Possible damage to the storage array configuration – As soon as you enter this command, all user data is destroyed.

Syntax

```
start drive [trayID,[drawerID,]slotID] initialize
```

Parameter

Parameter	Description
drive	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 .
	All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0.
	Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).

Notes

The **drive** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0 , and specify the ID of the slot in which a drive resides.

Start drive locate

The `start drive locate` command locates a drive by turning on an indicator light on the drive.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Run the `stop drive locate` command to turn off the indicator light on the drive.

Syntax

`start drive [`*trayID,[drawerID,]slotID*`] locate`

Parameter

Parameter	Description
drive	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 .
	All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0.
	Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).

Notes

The **drive** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0 , and specify the ID of the slot in which a drive resides.

Start drive reconstruction

The `start drive reconstruct` command starts reconstructing a drive.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
start drive [trayID,[drawerID,]slotID] reconstruct
```

Parameter

Parameter	Description
drive	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 .
	All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0.
	Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).

Notes

The **drive** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0 , and specify the ID of the slot in which a drive resides.

Start FDE secure drive erase

The `start secureErase drive` command erases all of the data from one or more full disk encryption (FDE) drives so that they can be reused as FDE drives.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

Run this command only when the FDE drives are no longer part of a secure volume group or disk pool, or when the security key is unknown.

Note: To erase a FIPS drive when the drive is locked and the security key to unlock it is unavailable, use the `set drive securityID` command.

Syntax

```
start secureErase (drive [trayID,[drawerID,]slotID  ] | drives[  trayID1,[drawerID1,]slotID1  ...  trayIDn,[drawerIDn,]slotIDn  ] )
```

Parameters

Parameter	Description
drive or **drives**	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]). **Attention:** The drives list cannot contain all of the drives in the storage array, or the command will be rejected. To secure erase all drives, run this command twice, specifying the drive list in two separate groups.

Notes

The controller firmware creates a lock that restricts access to the FDE drives. FDE drives have a state called Security Capable. When you create a security key, the state is set to Security Enabled, which restricts access to all FDE drives that exist within the storage array.

Stop drive channel fault isolation diagnostics

The `stop driveChannel faultDiagnostics` command stops the drive channel fault isolation diagnostics, which stops the `start drive channel fault isolation diagnostics` command before it completes.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Note: With firmware version 8.10, the `stop driveChannel faultDiagnostics` command is deprecated.

Syntax

```
stop driveChannel faultDiagnostics
```

Parameters

None.

Notes

Use the **start driveChannel faultDiagnostics** command and the **save driveChannel faultDiagnostics** command with the **stop driveChannel faultDiagnostics** command. These commands are needed to start the diagnostic test and save diagnostic test results to a file.

You also can stop the **start driveChannel faultDiagnostics** command at any time by pressing **Ctrl+C** .

Stop drive locate

The `stop drive locate` command turns off the indicator light on the drive that was turned on by the `start drive locate` command.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
stop drive locate
```

Parameters

None.

Feature management commands

Disable storage array feature

The `disable storageArray` command disables a storage array feature.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Run the `show storageArray` command to show a list of the feature identifiers for all enabled features in the storage array.

Syntax

```
disable storageArray (featurePack | feature=featureAttributeList)
```

The *featureAttributeList* can be one or more of these attribute values. If you enter more than one attribute value, separate the values with a space.

- **driveSecurity**

Parameters

None.

Enable storage array feature

The `enable storageArray feature file` command enables a feature for a permanent upgrade to the storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Context

This command performs one of these actions:

- Enables a feature key for a permanent upgrade of a feature
- Enables a feature key for a permanent upgrade of a feature pack

A feature pack is a predefined set of several features, such as Snapshot Upgrade and Synchronous Mirroring. These features are combined for the convenience of the users. When users install a feature pack, all of the features in the feature pack are installed at one time.

Each feature is managed by a license key that is generated for a specific feature or feature pack and a specific storage array. The license key is delivered as a file that you run to apply the license for the feature.

To determine which features are loaded on the storage array run the `show storageArray features` command. The `show storageArray features` command lists all of the features installed on the storage array, which features can be evaluated for a trial period, which features are enabled, and which features are disabled.

Syntax to enable a feature key

```
enable storageArray feature file="filename"
```

The **file** parameter identifies the file path and the file name of a valid feature key file. Enclose the file path and the file name in double quotation marks (" "). For example:

```
file="C:\Program Files\CLI\dnld\ftrkey.key"
```

Valid file names for feature key files end with a `.key` extension.

You will need a feature key file for each feature that you want to enable.

Syntax to enable a feature pack

```
enable storageArray featurePack file="filename"
```

The **file** parameter identifies the file path and the file name of a valid feature pack file. Enclose the file path and the file name in double quotation marks (" "). For example:

```
file="C:\Program Files\CLI\dnld\ftrpk.key"
```

Valid file names for feature key files end with a `.key` extension.

Syntax to enable a feature key

```
enable storageArray feature file="filename"
```

The **file** parameter identifies the file path and the file name of a valid feature key file. Enclose the file path and the file name in double quotation marks (" "). For example:

```
file="C:\Program Files\CLI\dnld\ftrkey.key"
```

Valid file names for feature key files end with a `.key` extension.

You will need a feature key file for each feature that you want to enable.

Set storage array to enable or disable automatic load balancing

The `set storageArray autoLoadBalancingEnable` command enables or disables the Automatic Load Balancing feature.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set storageArray autoLoadBalancingEnable=(TRUE | FALSE)
```

Parameter

Parameter	Description
storageArray	Indicates that this parameter works on a storage array.
autoLoadBalancingEnable	This parameter turns on or turns off Automatic Load Balancing on the controller. Set the parameter to TRUE to turn on Automatic Load Balancing. Set the parameter to FALSE to turn off Automatic Load Balancing.

What is Automatic Load Balancing?

The Automatic Load Balancing feature provides improved I/O resource management by reacting dynamically to load changes over time and automatically adjusting volume controller ownership to correct any load imbalance issues when workloads shift across the controllers.

The workload of each controller is continually monitored and, with cooperation from the multipath drivers installed on the hosts, can be automatically brought into balance whenever necessary. When workload is automatically re-balanced across the controllers, the storage administrator is relieved of the burden of manually adjusting volume controller ownership to accommodate load changes on the storage array.

When Automatic Load Balancing is enabled, it performs the following functions:

- Automatically monitors and balances controller resource utilization.
- Automatically adjusts volume controller ownership when needed, thereby optimizing I/O bandwidth between the hosts and the storage array.

Enabling and disabling Automatic Load Balancing

Automatic Load Balancing is enabled by default on all storage arrays that ship with ThinkSystem SAN OS (controller software) 11.50 or later. Linux, Windows, and VMware multipath drivers can use the Automatic Load Balancing feature.

You might want to disable Automatic Load Balancing on your storage array for the following reasons:

- You do not want to automatically change a particular volume's controller ownership to balance workload.

- You are operating in a highly tuned environment where load distribution is purposefully set up to achieve a specific distribution between the controllers.

In ThinkSystem Storage Manager , select the **Storage Array ➜ Configuration ➜ Automatic Load Balancing** menu option to enable or disable the Automatic Load Balancing feature for an individual storage array.

In ThinkSystem System Manager , select **Settings ➜ System** , scroll down to the Additional Settings section, click the **Enable/Disable Automatic Load Balancing** link, and select the **Enable/Disable automatic load balancing** checkbox to enable or disable the feature for an individual storage array.

Examples

```
SMcli -n Array1 -c "set storageArray autoLoadBalancingEnable=true;"

SMcli completed successfully.
```

Note: An active "Drive Lost Primary Path" condition will result in the Automatic Load Balancing incapable of balancing workloads. This condition must be inactive to ensure workloads are balanced through the Automatic Load Balancing feature.

Show storage array

The `show storageArray` command returns configuration information about the storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Context

The parameters return lists of values for the components and features in the storage array. You can enter the command with a single parameter or more than one parameter. If you enter the command without any parameters, the entire storage array profile is shown (which is the same information as if you entered the **profile** parameter).

Syntax

```
show storageArray
[autoSupport| autoSupportConfig | profile |
batteryAge | connections | defaultHostType | healthStatus |
hostTypeTable | hotSpareCoverage | features | time |
volumeDistribution | longRunningOperations | summary | preferredVolumeOwners |
iscsiNegotiationDefaults | unconfiguredIscsiInitiators | autoLoadBalancingEnable |
cacheMirrorDataAssuranceCheckEnable | hostConnectivityReporting]
```

Parameters

Parameter	Description
autoLoadBalancingEnable	The parameter to return the enablement status of the Automatic Load Balancing feature. **Note:** When the Automatic Load Balancing feature is enabled, the Host Connectivity Reporting feature will also be enabled.
autoSupport	**Note:** This parameter is only valid for DE2000H, DE4000H, DE4000F, DE6000H, and DE6000F storage arrays running with an `https` client type. For DE2000H, DE4000H, DE4000F, DE6000H, and DE6000F storage arrays running with a client type, use the **autoSupportConfig** parameter.
autoSupportConfig	The parameter to return information about the current state of the operation to automatically collect support data. The following information is returned: • Whether the operation is enabled or disabled • The location of the folder where the support data file is located **Note:** This parameter is only valid for DE2000H, DE4000H, DE4000F, DE6000H, and DE6000Fstorage arrays running with a `symbol` client type. For DE2000H, DE4000H, DE4000F, DE6000H, and DE6000F storage arrays running with an `https` client type, use the **autoSupport** parameter.
batteryAge	The parameter to show the status, the age of the battery in days, and the number of days until the battery needs to be replaced. The information for both batteries is shown.
cacheMirrorDataAssuranceCheckEnable	The parameter to returns the enablement status of the cache mirror data assurance feature.
connections	The parameter to show a list of where the drive channel ports are located and where the drive channels are connected.
defaultHostType	The parameter to show the default host type and the host type index.
features	The parameter to show the feature configuration of the storage array.
healthStatus	The parameter to show the health, logical properties, and physical component properties of the storage array.
hostConnectivityReporting	The parameter to return the enablement status of the host connectivity reporting feature.
hostTypeTable	The parameter to show a table of all of the host types that are known to the controller. Each row in the table shows a host type index and the platform that the host type index represents.
hotSpareCoverage	The parameter to show information about which volumes of the storage array have hot spare coverage and which volumes do not.
iscsiNegotiationDefaults	The parameter to return information about connection-level settings that are subject to initiator-target negotiation.

Parameter	Description
longRunningOperations	The parameter to show the long running operations for each volume group and each volume in the storage array. The **longRunningOperation** parameter returns this information: • Name of the volume group or volume • Long running operation • Status • % complete • Time left
preferredVolumeOwners	The parameter to show the preferred controller owner for each volume in the storage array.

profile	The parameter to show all of the properties of the logical components and the physical components that comprise the storage array. The information appears in several screens.
	 Note: The profile parameter returns detailed information about the storage array. The information covers several screens on a display. You might need to increase the size of your display buffer to see all the information. Because this information is so detailed, you might want to save the output of this parameter to a file.
	
	 Use the following command to save the profile output to a file:
	
	 `c:\...\smX\client>smcli 123.45.67.88`
	 `123.45.67.89 -c "show storagearray profile;"`
	 `-o "c:\folder\storagearray`
	 `profile.txt"`

summary	The parameter to show a concise list of information about the storage array configuration.
time	The parameter to show the current time to which both controllers in the storage array are set.
unconfiguredIscsiInitiators	The parameter to return a list of initiators that have been detected by the storage array but are not yet configured into the storage array topology.
volumeDistribution	The parameter to show the current controller owner for each volume in the storage array.

Notes

The **profile** parameter shows detailed information about the storage array. The information appears on several screens on a display monitor. You might need to increase the size of your display buffer to see all of the information. Because this information is so detailed, you might want to save the output of this parameter to a file. To save the output to a file, run the `show storageArray` command that looks like this example.

```
-c "show storageArray profile;" -o "c:\\folder\\storageArrayProfile.txt"
```

The previous command syntax is for a host that is running a Windows operating system. The actual syntax varies depending on your operating system.

When you save information to a file, you can use the information as a record of your configuration and as an aid during recovery.

Note: While the storage array profile returns a large amount of data that is all clearly labeled, the additional wear life is reporting information for SSD drives in DE2000H, DE4000H, DE4000F, DE6000H, and DE6000F storage arrays. While previously the wear life reporting included information on average erase count and spare blocks remaining, it now includes the percent endurance used. The percent endurance used is the amount of data written to the SSD drives to date divided by the total theoretical write limit for the drives.

The **batteryAge** parameter returns information in this form.

```
Battery status: Optimal
    Age: 1 day(s)
    Days until replacement: 718 day(s)
```

The newer controller trays do not support the **batteryAge** parameter.

The **defaultHostType** parameter returns information in this form.

```
Default host type: Linux (Host type index 6)
```

The **healthStatus** parameter returns information in this form.

```
Storage array health status = optimal.
```

The **hostTypeTable** parameter returns information in this form.

```
NVSRAM HOST TYPE INDEX DEFINITIONS
HOST TYPE                        ALUA/AVT STATUS        ASSOCIATED INDEXS
Factory Default                  Enabled                0
Linux DM-MP(Kernel 3.10 or later) Enabled                28(Default)
Linux DM-MP(Kernel 3.9 or earlier) Enabled               7
SVC                              Enabled                18
VMWare                           Enabled                10
Windows                          Enabled                1
Windows Clustered                Enabled                8
```

The **hotSpareCoverage** parameter returns information in this form.

```
The following volume groups are not protected: 2, 1
Total hot spare drives: 0
    Standby: 0
    In use: 0
```

The **features** parameter returns information that shows which features are enabled, disabled, evaluation, and available to be installed. This command returns the feature information in a format similar to this:

```
PREMIUM FEATURE           STATUS

asyncMirror               Trial available
syncMirror                Trial available/Deactivated
thinProvisioning          Trial available
driveSlotLimit            Enabled (12 of 192 used)
snapImage                  Enabled (0 of 512 used) - Trial version expires m/d/y
snapshot                   Enabled (1 of 4 used)
storagePartition          Enabled (0 of 2 used)
volumeCopy                 Enabled (1 of 511 used)
SSDSupport                 Disabled (0 of 192 used) - Feature Key required
driveSecurity              Disabled - Feature Key required
enterpriseSecurityKeyMgr  Disabled - Feature Key required
highPerformanceTier       Disabled - Feature Key required
```

The **time** parameter returns information in this form.

```
Controller in Slot A

Date/Time: Thu Jun 03 14:54:55 MDT 2004
Controller in Slot B

Date/Time: Thu Jun 03 14:54:55 MDT 2004
```

The **longRunningOperations** parameter returns information in this form:

```
LOGICAL DEVICES  OPERATION            STATUS         TIME REMAINING
Volume-2          Volume Disk Copy  10% COMPLETED  5 min
```
Right.

The information fields returned by the **longRunningOperations** parameter have these meanings:

- **NAME** is the name of a volume that is currently in a long running operation. The volume name must have the "Volume" as a prefix.
- **OPERATION** lists the operation being performed on the volume group or volume.
- **% COMPLETE** shows how much of the long running operation has been performed.
- **STATUS** can have one of these meanings:
  - Pending – The long running operation has not started but will start after the current operation is completed.
  - In Progress – The long running operation has started and will run until completed or stopped by user request.
- **TIME REMAINING** indicates the duration remaining to completing the current long running operation. The time is in an "hours minute" format. If less than an hour remains, only the minutes are shown. If less than a minute remains, the message "**less than a minute**" is shown.

The **volumeDistribution** parameter returns information in this form.

```
volume name: 10
     Current owner is controller in slot: A

volume name: CTL 0 Mirror Repository
     Current owner is controller in slot: A

volume name: Mirror Repository 1
     Current owner is controller in slot:A

volume name: 20
     Current owner is controller in slot:A

volume name: JCG_Remote_MirrorMenuTests
     Current owner is controller in slot:A
```

Input output controller (IOC) dump commands

Save input output controller (IOC) dump

The `save IOCLog` command saves the IOC dumps from the controllers in a storage array to a file on a host.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
save IOCLog [file="filename"]
```

Parameter

Parameter	Description
file	The file path and the file name to which you save the IOC dump. Enclose the file name in double quotation marks (" "). For example: `file="C:\Array Backups\IOCcoredump1.7z"` This command saves the data to a compressed file and adds the file extension .7z to the saved file. The default name of the file that contains the IOC-related data for controllers in the storage array uses the WWN of the storage array.

Notes

This command retrieves from both controllers the IOC dump log data and the IOC dump metadata. Using a 7zip file format, the retrieved data is archived and compressed into a single file with a file name of your choice. The 7zip archive file contains the following:

- filename+"IOCLog"+[A|B].gz – the IOC logs retrieved from controller A or controller B if available
- filename+"IOCLogInfo"+[A|B].txt – the IOC logs metadata info retrieved from controller A or controller B . If the IOC log data cannot be retrieved from a controller, the metadata .txt file will contain the error condition and reason.

The following are error conditions:

- The controller platform and HIC do not support IOC dump.
- The controllers have not collected IOC dump data.

The compressed logs are not in a human-readable format. You must return the logs to technical support to be evaluated.

Start input output controller (IOC) dump

The `start IOCLog` command produces a dump of the IOC log of data transmissions between a host and a controller.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Controllers are identified as " a " or " b ". Each controller can have up to four host channels; each channel is uniquely identified by a number from 1 through 4.

Syntax

```
start IOCLog [(a1 | a2 | a3 | a4 | b1 | b2 | b3 | b4)]
[overwrite=(TRUE | FALSE)]
```

Parameters

Parameter	Description
controller-channel identifiers	This parameter specifies the controller and host channel from which to produce the IOC dump. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . Host channels have numerical identifiers. Enclose the controller identifier and host channel identifier in square brackets ([ ]). Valid controller identifier and host channel values are a1 , a2 , a3 , a4 , b1 , b2 , b3 , b4 . If you do not specify a controller, the storage management software returns a syntax error.
overwrite	This parameter causes the new IOC log dump to overwrite an existing dump. To overwrite the existing dump, set this parameter to TRUE . The default value is FALSE .

Notes

This command generates a debug log from the IOC of the selected controller and stores the data in a compressed format in a persistent memory buffer on the controller. You can retrieve the data from the debug log using the `save IOCLog` command. The controller returns an error for these conditions:

- The controller platform and HIC do not support an IOC dump.
- The specified controller has an outstanding IOC dump and the overwrite parameter is false.
- The specified controller identifier or channel identifier are out of the valid range.

Misbehaving drive (MBD) commands

Replace drive

The `replace drive replacementDrive` command replaces a drive in a volume group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Replacing a drive in a volume group redefines the composition of a volume group. You can use this command to replace a drive with either an unassigned drive or a fully integrated hot spare.

Syntax

```
replace (drive [trayID,[drawerID,]slotID] | drives[trayID1,[drawerID1,]slotID1 … trayIDn,[drawerIDn,]slotIDn] | <"wwID">)
replacementDrive=trayID,drawerID,slotID
[copyDrive][failDrive]
```

Parameters

Parameter	Description
drive	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).
drive	The World Wide Identifier (WWID) of the drive that you want to replace. Enclose the WWID in double quotation marks (" ") inside angle brackets (< >).
replacementDrive	The location of the drive that you want to use for a replacement. For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . Slot ID values are 1 to 24 .

Notes

The **drive** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0 , and specify the ID of the slot in which a drive resides.

Reset drive

The `reset drive` command power cycles a drive in a volume group or a disk pool to aid in the recovery of a drive that is exhibiting inconsistent or non-optimal behavior.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

By power cycling a drive, you can clear some errors that cause inconsistent or non-optimal behavior. This avoids replacing a drive when it is experiencing only a transient, non-fatal error, and the drive can remain operational. Resetting a drive in this way reduces disruptions and avoids replacing a drive.

If the problem cannot be corrected by power cycling the drive, the data is copied from the drive and the drive is powered down for replacement.

Important: This command cannot be used for SSD drives manufactured by Pliant. Use the `show storageArray profile` command or the `show drive` command to display the manufacturer of the drive(s).

Syntax

```
reset drive([trayID,[drawerID,]slotID] | <"wwID">)
```

Parameters

Parameter	Description
drive	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).
drive	The World Wide Identifier (WWID) of the drive that you want to replace. Enclose the WWID in double quotation marks (" ") inside angle brackets (< >).

Notes

The **drive** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0 , and specify the ID of the slot in which a drive resides.

After power cycling the drive, the controller must verify the drive to be functional before it can be placed back into use. If the drive cannot be verified it is marked as a failed drive. Power cycling a failed drive requires global hot spare drives and full copy back to a replacement drive after it is brought into service.

Failed drives cannot be reset by a power cycle more than once in a 24 hour period, and in some cases cannot be reset more than once. Thresholds and counters for drive power cycles are kept in persistent storage, and are included in state capture data. Informational events are logged when a drive is power cycled.

Set drive state

The `set drive operationalState` command sets a drive to the Failed state.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

To return a drive to the Optimal state, use the `revive drive` command.

Syntax

```
set drive [trayID,[drawerID,]slotID] operationalState=failed [copyDrive]
```

Parameter

Parameter	Description
drive	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0or 1, depending on the tray model. Drive trays compatible with DE2000H/ DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).

Notes

The **drive** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0 , and specify the ID of the slot in which a drive resides.

Stop drive replace

The `stop drive replace` command stops a data copy operation that was started by either a `set drive` command or a `replace drive` command with the **copyDrive** user input.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
stop drive replace ([trayID,[drawerID,]slotID] | <"wwID">)
```

Parameters

Parameter	Description
drive	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).
drive	The World Wide Identifier (WWID) of the drive that you want to replace. Enclose the WWID in double quotation marks (" ") inside angle brackets (< >).

Notes

The **drive** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0 , and specify the ID of the slot in which a drive resides.

Offloaded data transfer (ODX)) commands

Enable or disable ODX

The `set storageArray odxEnabled` command turns on or turns off Offloaded Data Transfer (ODX) for a storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Context

The storage array comes with ODX turned on. Use this command to turn off ODX if you do not want to run ODX, or if ODX is causing issues with the storage array. The only storage array that is affected is the storage array on which the command is run.

Syntax

```
set storageArray odxEnabled=(TRUE | FALSE)
```

Parameter

Parameter	Description
odxEnabled	The setting to turn on or turn off ODX. To turn on ODX set this parameter to TRUE . To turn off ODX set this parameter to FALSE . The default setting is that ODX is turned on.

Notes

ODX provides a way to transfer data without using buffered read and buffered write operations and does not require direct host involvement with the data transfer operation. When ODX is not enabled, data is read from the source storage to the host, and then written to the target storage from the host. With ODX enabled, the data transfer operations are directly managed by the storage infrastructure. The data is moved directly from the source storage to the target storage without going through the host.

Enable or disable VAAI

The `set storageArray vaaiEnabled` command turns on or turns off VMware vStorage API Array Architecture (VAAI) for a storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

The storage array comes with VAAI turned on. Use this command to turn off VAAI if you do not want to run VAAI, or if VAAI is causing issues with the storage array. The only storage array that is affected is the storage array on which the command is run.

Syntax

```
set storageArray vaaiEnabled=(TRUE | FALSE)
```

Parameter

Parameter	Description
vaaiEnabled	The setting to turn on or turn off VAAI. To turn on VAAI set this parameter to TRUE . To turn off VAAI set this parameter to FALSE . The default setting is that VAAI is turned on.

Notes

Note: VAAI enables some storage tasks to be offloaded from the server hardware to a storage array. Offloading the storage tasks to a storage array increases host performance by reducing the tasks the host must perform.

Note: View the VAAI setting using the `show storageArray odxSetting` name.

Show storage array ODX setting

The `show storageArray odxsetting` command returns the current settings for Offloaded Data Transfer (ODX) and VMware vStorage API Array Architecture (VAAI) on the storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Context

The settings for this command can be one of the following:

- True – ODX and VAAI are turned on.
- False – ODX and VAAI are turned off.
- Inconsistent – The controllers do not have the same settings.
- Unknown – The setting for ODX or VAAI cannot be determined.

Syntax

```
show storageArray odxsetting
```

Parameters

None.

Notes

This command returns the ODX and VAAI information similar to this example.

```
Windows ODX Setting Status
odxEnabled  True | False | Inconsistent | Unknown

vaaiEnabled True | False | Inconsistent | Unknown
```

Repository volume analysis commands (Array configuration)

Check repository consistency

The `check repositoryConsistency` command produces a report based on analysis of the data in a specified object's underlying repository volume.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Syntax

```
check (snapGroup [snapGroupName] repositoryConsistency |
snapVolume [snapVolumeName] repositoryConsistency |
volume [volumeName] repositoryConsistency |
volumeCopy target [targetName] repositoryConsistency |
asyncMirrorGroup [asyncMirrorGroupName]
repositoryConsistency localVolume="localVolumeName"]
file="filePath"
```

Parameters

Parameter	Description
repositoryConsistency	Specifies that the snapshot group, snapshot volume, volume, or asynchronous mirror group (depending on which is specified by the corresponding parameter) is checked for consistency.
snapGroup	The name of the snapshot group on which to run a consistency check. Enclose the snapshot group name in square brackets ([ ]). If the snapshot group name contains special characters or consists only of numbers, you also must enclose the name in double quotation marks (" ") inside square brackets.
snapVolume	The name of the snapshot volume on which to run a consistency check. Enclose the snapshot volume name in square brackets ([ ]). If the snapshot volume name contains special characters or consists only of numbers, you also must enclose the name in double quotation marks (" ") inside square brackets.
volume	The name of the thin volume on which to run a consistency check. Enclose the thin volume name in square brackets ([ ]). If the thin volume name contains special characters or consists only of numbers, you also must enclose the name in double quotation marks (" ") inside square brackets.
volumeCopy	Specifies that the target of a volume copy relationship is checked for consistency.

Parameter	Description
target	Use only in conjunction with the **volumeCopy** parameter to specify the name of the volume that is the target of the volume copy relationship. If the volume name contains special characters or consists only of numbers, you also must enclose the name in double quotation marks (" ") inside square brackets.
asyncMirrorGroup	The name of the asynchronous mirror group on which to run a consistency check. Enclose the asynchronous mirror group name in square brackets ([ ]). If the asynchronous mirror group name contains special characters or consists only of numbers, you also must enclose the name in double quotation marks (" ") inside square brackets.
localVolume	Use only with the **asyncMirrorGroup** parameter to specify the name of a local volume that participates in the mirror relationship. You can specify a local volume that is either the source or the destination on a mirror relationship. Enclose the local volume name in double quotation marks (" ").
file	The file path and the file name to which you want to save the report that results from the consistency check. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\repoConsistency.txt"` This parameter must appear last, after any of the optional parameters.

Notes

The report generated by this command is intended for use by technical support to analyze problems.

Session commands

Set session

The `set session errorAction` command defines how you want the current script engine session to run.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin, Support Admin, Security Admin, or Storage Monitor role.

Context

For the purpose of this command a session is the duration for the running of the commands. This command does not permanently set the parameters for the storage array.

Syntax

```
set session errorAction=(stop | continue)
password="storageArrayPassword"
userRole=(admin | monitor)
performanceMonitorInterval=intervalValue
performanceMonitorIterations=iterationValue
```

Parameters

Parameter	Description
errorAction	How the session responds if an error is encountered during processing. You can choose to stop the session if an error is encountered, or you can continue the session after encountering an error. The default value is stop . (This parameter defines the action for execution errors, not syntax errors. Some error conditions might override the continue value.)
password	The password for the storage array. Enclose the password in double quotation marks (" "). **Attention:** When the client type is set to `https` , this parameter is obsolete. The password must be specified prior to the CLI command script execution, and cannot be changed in the middle of a script.
performanceMonitorInterval	The frequency of gathering performance data. Enter an integer value for the polling interval, in seconds, for which you want to capture data. The range of values is 3 to 3600 seconds. The default value is 5 seconds. **Attention:** When the client type is set to `https` , this parameter is obsolete. Instead, to change the default interval value, use this parameter with the individual impacted commands. The commands are `save storageArray performanceStats` and `show drive performanceStats` .
performanceMonitorIterations	The number of samples to capture. Enter an integer value. The range of values for samples captured is 1 to 3600 . The default value is 5 . **Attention:** When the client type is set to `https` , this parameter is obsolete. Instead, to change the default iteration value, use this parameter with the individual impacted commands. The commands are `save storageArray performanceStats` and `show drive performanceStats` .

Notes

When you use this command, you can specify one or more of the optional parameters.

Passwords are stored on each storage array in a management domain. If a password was not previously set, you do not need a password. The password can be any combination of alphanumeric characters with a maximum of 30 characters. (You can define a storage array password by using the `set storageArray` command.)

The polling interval and the number of iterations that you specify remain in effect until you end the session. After you end the session, the polling interval and the number of iterations return to the default values.

Storage array commands

Activate storage array firmware

The `activate storageArray firmware` command activates firmware that you have previously downloaded to the pending configuration area on the controllers in the storage array.

Syntax

```
activate storageArray firmware
[healthCheckMelOverride=(TRUE | FALSE)]
```

Parameter

Parameter	Description
healthCheckMelOverride	The setting to override the results of the health check of the major event log (MEL). MEL validation still occurs; it is not bypassed. If the MEL check fails, you can bypass the failure by using this parameter when running the command. Before any activation, the controller checks the event log to determine if an event has occurred that might prevent the new controller firmware from successfully activating. If such an event has occurred, the controller will normally not activate new firmware. This parameter forces the controller to activate new firmware. The default value is FALSE . Set this value to TRUE if you want to force the controller to activate new controller firmware.

Autoconfigure storage array

The `autoConfigure storageArray` command automatically configures a storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Before you enter the `autoConfigure storageArray` command, run the `show storageArray autoConfiguration` command. The `show storageArray autoConfiguration` command returns configuration information in the form of a list of valid drive types, RAID levels, volume information, and hot spare information. (This list corresponds to the parameters for the `autoConfigure storageArray` command.) The controllers audit the storage array and then determine the highest RAID level that the storage array can support and the most efficient volume definition for the RAID level. If the configuration that is described by the returned list is acceptable, you can enter the `autoConfigure storageArray` command without any parameters. If you want to modify the configuration, you can change the parameters to meet your configuration requirements. You can change a single parameter or all of the parameters. After you enter the `autoConfigure storageArray` command, the controllers set up the storage array by using either the default parameters or those you selected.

Syntax

```
autoConfigure storageArray
[driveType=(SAS)]
[driveMediaType=(hdd | ssd | allMedia | unknown)]
[raidLevel=(0 | 1 | 3 | 5 | 6)]
[volumeGroupWidth=numberOfDrives]
[volumeGroupCount=numberOfVolumeGroups]
[volumesPerGroupCount=numberOfVolumesPerGroup]
[hotSpareCount=numberOfHotSpares]
[segmentSize=segmentSizeValue]
[cacheReadPrefetch=(TRUE | FALSE)]
[readAheadMultiplier=multiplierValue]
[securityType=(none | capable | enabled)]
```

```
[secureDrives=(fips | fde)]
[dataAssurance=(none | enabled)]
```

Parameters

Parameter	Description
driveType	The type of drives that you want to use for the storage array. You must use this parameter when you have more than one type of drive in your storage array. Valid drive types is: SAS
driveMediaType	The type of drive media that you want to use for the storage array. You must use this parameter when you have more than one type of drive media in your storage array. These drive media types are valid: • ssd – Use this option when you have solid state disks. • unknown – Use if you are not sure what types of drive media are in the drive tray.
raidLevel	The RAID level of the volume group that contains the drives in the storage array. Valid RAID levels are 0 , 1 , 3 , 5 , or 6 .
volumeGroupWidth	The number of drives in a volume group in the storage array.
volumeGroupCount	The number of volume groups in the storage array. Use integer values.
volumesPerGroupCount	The number of equal-capacity volumes per volume group. Use integer values.
hotSpareCount	The number of hot spares that you want in the storage array. Use integer values.
segmentSize	The amount of data (in KB) that the controller writes on a single drive in a volume before writing data on the next drive. Valid values are 4 (SSD only) 8 , 16 , 32 , 64 , 128 , 256 , or 512 .
cacheReadPrefetch	The setting to turn on or turn off cache read prefetch. To turn off cache read prefetch, set this parameter to FALSE . To turn on cache read prefetch, set this parameter to TRUE .
securityType	The setting to specify the security level when creating the volume groups and all associated volumes. These settings are valid: • none – The volume group and volumes are not secure. • capable – The volume group and volumes are capable of having security set, but security has not been enabled. • enabled – The volume group and volumes have security enabled.
secureDrives	The type of secure drives to use in the volume group. These settings are valid: • fips – To use FIPS compliant drives only. • fde – To use FDE compliant drives. **Important:** Use this parameter along with the **securityType** parameter. If you specify none for the **securityType** parameter, the value of the **secureDrives** parameter is ignored, because non-secure volume groups do not need to have secure drive types specified.

Drives and volume groups

A volume group is a set of drives that are logically grouped together by the controllers in the storage array. The number of drives in a volume group is a limitation of the RAID level and the controller firmware. When you create a volume group, follow these guidelines:

- You can create an empty volume group so that you can reserve the capacity for later use.
- You cannot mix HDD and SSD drives within a single volume group for DE2000H, DE4000H, and DE6000H. .
- DE4000F and DE6000F suppport SSD only.
- The maximum number of drives in a volume group depends on these conditions:
  - The type of controller
  - The RAID level
- RAID levels include: 0, 1, 3, 5, and 6.
  - A volume group with RAID level 3, RAID level 5, or RAID level 6 cannot have more than 30 drives and must have a minimum of three drives.
  - A volume group with RAID level 6 must have a minimum of five drives.
  - If a volume group with RAID level 1 has four or more drives, the storage management software automatically converts the volume group to a RAID level 10, which is RAID level 1 + RAID level 0.
- To enable tray/drawer loss protection, refer to the following tables for additional criteria:

Level	Criteria for Shelf Loss Protection	Minimum number of shelves required
Disk Pool	The disk pool contains no more than two drives in a single tray.	6
RAID 6	The volume group contains no more than two drives in a single shelf.	3
RAID 3 or RAID 5	Each drive in the volume group is located in a separate shelf.	3
RAID 1	Each drive in a RAID 1 pair must be located in a separate shelf.	2
RAID 0	Cannot achieve Shelf Loss Protection.	Not applicable

Level	Criteria for drawer loss protection	Minimum number of drawers required
Disk Pool	The pool includes drives from all five drawers and there are an equal number of drives in each drawer. A 60-drive tray can achieve Drawer Loss Protection when the disk pool contains 15, 20, 25, 30, 35, 40, 45, 50, 55, or 60 drives.	5
RAID 6	The volume group contains no more than two drives in a single drawer.	3
RAID 3 or RAID 5	Each drive in the volume group is located in a separate drawer.	3
RAID 1	Each drive in a mirrored pair must be located in a separate drawer.	2
RAID 0	Cannot achieve Drawer Loss Protection.	Not applicable

Hot spares

With volume groups, a valuable strategy to protect data is to assign available drives in the storage array as hot spare drives. A hot spare is a drive, containing no data, that acts as a standby in the storage array in case a drive fails in a RAID 1, RAID 3, RAID 5, or RAID 6 volume group. The hot spare adds another level of redundancy to the storage array.

Generally, hot spare drives must have capacities that are equal to or greater than the used capacity on the drives that they are protecting. Hot spare drives must be of the same media type, the same interface type, and the same capacity as the drives that they are protecting.

If a drive fails in the storage array, the hot spare is normally substituted automatically for the failed drive without requiring your intervention. If a hot spare is available when a drive fails, the controller uses redundancy data parity to reconstruct the data onto the hot spare. Data evacuation support also allows data to be copied to a hot spare before the software marks the drive "failed."

After the failed drive is physically replaced, you can use either of the following options to restore the data:

When you have replaced the failed drive, the data from the hot spare is copied back to the replacement drive. This action is called copyback.

If you designate the hot spare drive as a permanent member of a volume group, the copyback operation is not needed.

The availability of tray loss protection and drawer loss protection for a volume group depends on the location of the drives that comprise the volume group. Tray loss protection and drawer loss protection might be lost because of a failed drive and the location of the hot spare drive. To make sure that tray loss protection and drawer loss protection are not affected, you must replace a failed drive to initiate the copyback process.

The storage array automatically selects Data Assurance (DA)-capable drives for hot spare coverage of DA-enabled volumes.

Make sure you have DA-capable drives in the storage array for hot spare coverage of DA-enabled volumes. For more information about DA-capable drives, refer to Data Assurance feature.

Secure-capable (FIPS and FDE) drives can be used as a hot spare for both secure-capable and non-secure-capable drives. Non-secure-capable drives can provide coverage for other non-secure-capable drives, and for secure-capable drives if the volume group does not have the security enabled. A FIPS volume group can only use a FIPS drive as a hot spare; however, you can use a FIPS hot spare for non-secure-capable, secure-capable, and secure-enabled volume groups.

If you do not have a hot spare, you can still replace a failed drive while the storage array is operating. If the drive is part of a RAID 1, RAID 3, RAID 5, or RAID 6 volume group, the controller uses redundancy data parity to automatically reconstruct the data onto the replacement drive. This action is called reconstruction.

Segment size

The size of a segment determines how many data blocks that the controller writes on a single drive in a volume before writing data on the next drive. Each data block stores 512 bytes of data. A data block is the smallest unit of storage. The size of a segment determines how many data blocks that it contains. For example, an 8-KB segment holds 16 data blocks. A 64-KB segment holds 128 data blocks.

When you enter a value for the segment size, the value is checked against the supported values that are provided by the controller at run time. If the value that you entered is not valid, the controller returns a list of valid values. Using a single drive for a single request leaves other drives available to simultaneously service other requests. If the volume is in an environment where a single user is transferring large units of data (such

as multimedia), performance is maximized when a single data transfer request is serviced with a single data stripe. (A data stripe is the segment size that is multiplied by the number of drives in the volume group that are used for data transfers.) In this case, multiple drives are used for the same request, but each drive is accessed only once.

For optimal performance in a multiuser database or file system storage environment, set your segment size to minimize the number of drives that are required to satisfy a data transfer request.

Cache read prefetch

Cache read prefetch lets the controller copy additional data blocks into cache while the controller reads and copies data blocks that are requested by the host from the drive into cache. This action increases the chance that a future request for data can be fulfilled from cache. Cache read prefetch is important for multimedia applications that use sequential data transfers. Valid values for the **cacheReadPrefetch** parameter are TRUE or FALSE . The default is TRUE .

Security type

Use the **securityType** parameter to specify the security settings for the storage array.

Before you can set the **securityType** parameter to enabled , you must create a storage array security key. Use the `create storageArray securityKey` command to create a storage array security key. These commands are related to the security key:

- `create storageArray securityKey`
- `export storageArray securityKey`
- `import storageArray securityKey`
- `set storageArray securityKey`
- `enable volumeGroup [volumeGroupName] security`
- `enable diskPool [diskPoolName] security`

Secure drives

Secure-capable drives can be either Full Disk Encryption (FDE) drives or Federal Information Processing Standard (FIPS) drives. Use the **secureDrives** parameter to specify the type of secure drives to use. The values you can use are fips and fde .

Example command

```
autoConfigure storageArray securityType=capable secureDrives=fips;
```

Autoconfigure storage array hot spares

The `autoConfigure storageArray hotSpares` command automatically defines and configures the hot spares in a storage array. You can run this command at any time. This command provides the best hot spare coverage for a storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
autoConfigure storageArray hotSpares
```

Parameters

None.

Notes

When you run the `autoconfigure storageArray hotSpares` command, the controller firmware determines the number of hot spares to create based on the total number and type of drives in the storage array. For SAS drives, the controller firmware creates one hot spare for the storage array and one additional hot spare for every 60 drives in the storage array.

Clear storage array configuration

The `clear storageArray configuration` command clears an entire storage array configuration or part of a storage array configuration, or clears volume group and volume configuration only.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Use this command to perform one of these operations:

- Clear the entire storage array configuration, and return it back to the initial installation state.
- Clear the configuration except for security information and identification information.
- Clear volume group configuration information and volume configuration information only.

Attention: Possible damage to the storage array configuration – As soon as you run this command, the existing storage array configuration is deleted.

Syntax

```
clear storageArray configuration (all | volumeGroups)
clear storageArray configuration factoryReset
```

Parameters

Parameter	Description
None	If you do not enter a parameter, this command removes all configuration information for the storage array, except for information related to security and identification.
all	The setting to remove the entire configuration of the storage array, including security information and identification information. Removing all configuration information returns the storage array to its initial state.
volumeGroups	The setting to remove the volume configuration and the volume group configuration. The rest of the configuration stays intact.

Parameter	Description
factoryReset	This setting removes the entire configuration of the storage array (the same function as the **all** parameter), but also resets network configuration and any password information stored in the controller.
supportReset	**Attention:** This command is for technical support use only. This setting behaves like the **factoryReset** parameter, but also clears all bundle keys.

Notes

With this command, you can clear the configuration of the storage array in a number of different ways. When you clear the storage array for volume groups, recovery mode automatically starts. In recovery mode, onboard (cache) backups (if they exist on the platform) are retained. When the storage array is in recovery mode, you can, optionally, restore the storage array configuration from a host-based backup file or from one of the onboard (cache) backups.

This command also resets the storage array identifier. Any premium features enabled with a key file are invalidated, and new premium feature keys must be created and applied. Contact technical support.

When you run this command, the storage array becomes unresponsive, and all script processing is canceled.

Clear storage array event log

The `clear storageArray eventLog` command clears the event log in the storage array by deleting the data in the Event Log buffer.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Attention: Possible damage to the storage array configuration – As soon as you run this command, the existing event log in the storage array is deleted.

Syntax

```
clear storageArray eventLog
```

Parameters

None.

Clear storage array firmware pending area

The `clear storageArray firmwarePendingArea` command deletes a firmware image or NVSRAM values that you have previously downloaded from the pending area buffer.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Attention: Possible damage to the storage array configuration – As soon as you run this command, the contents of the existing pending area in the storage array are deleted.

Syntax

```
clear storageArray firmwarePendingArea
```

Parameters

None.

Clear storage array recovery mode

The `clear storageArray recoveryMode` command forces a storage array to exit recovery mode.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
clear storageArray recoveryMode
```

Parameters

None.

Notes

Note: Recovery mode is entered during start-of-day operations when the system configuration is cleared and a valid on board backup is available. This mode is exited by either restoring the system configuration from a backup location, or by clearing the existing on board backups. While recovery mode is in force, a **needs attention** condition is raised and the Recovery Guru is available from the user interface. However, the system configuration is empty during recovery mode.

Attention: If you want to return the storage array to a previous configuration, you must restore the configuration from the backup before clearing recovery mode. You must perform validation checks or check with technical support to make sure that the restore was successful. After determining that the restore was successful, recovery mode can be cleared.

Create storage array security key

The `create storageArray securityKey` command creates or changes a new security key for a storage array that has full disk encryption (FDE) drives.

Supported Arrays

If external key management is enabled, then this command applies only to the DE2000H/ DE4000H / DE4000F / DE6000H / DE6000F arrays. If internal key management is enabled, then the command applies to any individual storage array, as long as all SMcli packages are installed.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

For internal key management, this command enables the Internal Key Management feature and creates the security key. After creating the key, use the `set storageArray securityKey` command to put the key into use. This command can also be used to change the security key.

For external key management, this command creates a different key to replace the key initially created when you enabled the feature. Use the `enable storageArray externalKeyManagement` command to enable the External Key Management feature and create the initial security key. This command can also be used to change the security key.

Syntax

```
create storageArray securityKey
[keyIdentifier="keyIdentifierString"]
passPhrase="passPhraseString"
file="fileName"
[commitSecurityKey=(TRUE | FALSE)]
```

Parameters

Parameter	Description
keyIdentifier - only applicable for internal key management	A character string that you can read that is a wrapper around a security key. Enclose the key identifier in double quotation marks (" ").
	You can enter characters for the key identifier for internal security keys to help you identify the key later. These are the formatting rules:
	• You can enter up to 189 alphanumeric characters for a key identifier. The key identifier cannot have these characters:
	– Spaces
	– Punctuation
	– Symbols
	• If you do not enter the **keyIdentifer** parameter for internal keys, the controller automatically generates the **keyIdentifer** parameter.
	Additional characters are automatically generated and appended to the end of the string that you enter for the key identifier. If you do not enter any string for the **keyIdentifier** parameter, the key identifier consists of only the characters that are automatically generated.
	Important: This parameter is ignored for external key management, because the key identifier is completely automatically generated. If the storage array has a user label, this automatically generated string is composed of the characters `sa.`, followed by the storage array user label, the storage array identifier, and a randomly generated string. Any characters in the user label that are not alpha-numeric are converted to an underscore (_) character. For example, a user label of abc#8 will be converted to `sa.abc_8` before being prepended to the rest of the key identifier. For storage arrays without a user label, the key identifier is composed of the storage array identifier and a randomly generated string.
passPhrase	A character string that encrypts the security key so that you can store the security key in an external file. Enclose the pass phrase in double quotation marks (" ").
	For information about the correct form for creating a valid pass phrase, refer to the Notes in this command description.
	Your pass phrase must meet these criteria:
	• Must be between eight and 32 characters long.
	• Must contain no whitespace.
	• Must contain at least one uppercase letter.
	• Must contain at least one lowercase letter.
	• Must contain at least one number.
	• Must contain at least one non-alphanumeric character, for example, < > @ +.
	Note: If your pass phrase does not meet these criteria, you will receive an error message and will be asked to retry the command.

Parameter	Description
file	The file path and the file name to which you want to save the security key. For example: `file="C:\Program Files\CLI\sup\drivesecurity.slk"` **Important:** The file name must have an extension of .slk . Enclose the file path and name in double quotation marks (" ").
commitSecurityKey - only applicable for internal key management	This parameter commits the security key to the storage array for all FDE drives as well as the controllers. After the security key is committed, a key is required to access data on Security Enabled drives in the storage array. The data can only be read or changed by using a key, and the drive can never be used in a non-secure mode without rendering the data useless or totally erasing the drive. The default value is FALSE. If this parameter is set to FALSE, send a separate **set storageArray securityKey** command to commit the security key to the storage array.

Disable storage array feature

The `disable storageArray` command disables a storage array feature.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Run the `show storageArray` command to show a list of the feature identifiers for all enabled features in the storage array.

Syntax

`disable storageArray (featurePack | feature=featureAttributeList)`

The *featureAttributeList* can be one or more of these attribute values. If you enter more than one attribute value, separate the values with a space.

- **driveSecurity**

Parameters

None.

Download storage array drive firmware

The `download storageArray driveFirmware file` command downloads firmware images to all of the drives in the storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Syntax

```
download storageArray driveFirmware file="filename"
[file="filename2"... file="filenameN"]
```

Parameter

Parameter	Description
file	The file path and the file name of the file that contains the firmware image. Enclose the file path and the file name of the firmware image in double quotation marks (" "). For example: `file="C:\Program Files\CLI\dnld\sadrvfrm.dlp"` Valid file names have a *.dlp* extension.

Notes

When you run this command, you can download more than one firmware image file to the drives in a storage array. The number of firmware image files that you can download depends on the storage array. The storage management software returns an error if you try to download more firmware image files than the storage array can accept.

You can schedule downloads for multiple drives at the same time, including multiple drives in a redundant volume group. Each firmware image file contains information about the drive types on which the firmware image runs. The specified firmware images can be downloaded only to a compatible drive. Use the `download drive firmware` command to download a firmware image to a specific drive.

The `download storageArray driveFirmware` command blocks all I/O activity until either download try has been made for each candidate drive or you run the `stop storageArray downloadDriveFirmware` command. When the `download storageArray driveFirmware` command finishes downloading the firmware image, each candidate drive shows the download status for each drive. One of these statuses is returned:

- Successful
- Unsuccessful With Reason
- Never Attempted With Reason

Download storage array firmware/NVSRAM

The `download storageArray firmware` command downloads firmware and, optionally, NVSRAM values for the storage array controller.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Context

If you want to download only NVSRAM values, use the `downLoad storageArray NVSRAM` command.

Syntax

```
download storageArray firmware [, NVSRAM ]
file="filename" [, "NVSRAM-filename"]
[downgrade=(TRUE | FALSE)
activateNow=(TRUE | FALSE)
healthCheckMelOverride=(TRUE | FALSE)
```

Parameters

Parameter	Description
NVSRAM	This parameter downloads a file with NVSRAM values when you download a firmware file. Do not include square brackets with this parameter. Include a comma after the **firmware** parameter.
file	This parameter specifies the file path and the file name that contains the firmware. Enclose the file path and the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\dnld\safrm.dlp"` Valid file names have a `.dlp` extension.
NVSRAM-filename	This parameter specifies the file path and the file name that contains the NVSRAM values. Enclose the NVSRAM file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\dnld\safrm.dlp"` Valid file names have a `.dlp` extension. Include a comma before the file name when you download both firmware and NVSRAM.
downgrade	**Attention: Possible damage to the storage array configuration** – Downloading a previous version of the controller firmware or NVSRAM incorrectly can result in damage to the controllers or a loss of data access. Contact technical support before using this parameter. This setting allows a previous version of firmware to be loaded. The default value is FALSE . Set the **downgrade** parameter to TRUE if you want to download an earlier version of firmware. **Note:** This parameter is not valid when you are only downloading NVSRAM.
activateNow	This setting activates the firmware image and the NVSRAM image. The default value is TRUE . If you set the **activateNow** parameter to FALSE , you must run the `activate storageArray firmware` command to activate the firmware and the NVSRAM at a later time. **Note:** This parameter is not valid when you are only downloaded NVSRAM.
healthCheckMelOverride	This setting overrides the results of the health check of the major event log (MEL). MEL validation still occurs; it is not bypassed. If the MEL check fails, you can bypass the failure by using this parameter when running the command. Before any download, the controller checks the event log to determine if an event has occurred that might prevent the new controller firmware from successfully downloading. If such an event has occurred, the controller will normally not download new firmware. This parameter forces the controller to download new firmware. The default value is FALSE . Set this value to TRUE if you want to force the controller to download new controller firmware.

Download storage array NVSRAM

The `download storageArray NVSRAM` command downloads the NVSRAM values for the storage array controller.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Syntax

```
download storageArray NVSRAM file="filename"
[healthCheckMelOverride=(TRUE | FALSE)]
```

Parameters

Parameter	Description
file	The file path and the file name that contains the NVSRAM values. Enclose the NVSRAM file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\dnld\afrm.dlp"` Valid file names have a `.dlp` extension.
healthCheckMelOverride	The setting to override the results of the health check of the major event log (MEL). MEL validation still occurs, it is not bypassed. If the MEL check fails, you can bypass the failure by using this parameter when running the command. Before any download, the controller checks the event log to determine if an event has occurred that might prevent the new NVSRAM from successfully downloading. If such an event has occurred, the controller will normally not download new NVSRAM. This parameter forces the controller to download new NVSRAM. The default value is FALSE . Set this value to TRUE if you want to force the controller to download new NVSRAM.

Enable or disable host connectivity reporting

The `set storageArray hostConnectivityReporting` command enables or disables host connectivity reporting on the controller.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set storageArray hostConnectivityReporting (enable | disable)
```

Context

When you enable host connectivity reporting on the storage array, the storage array continuously monitors the connection between the storage array's controllers and the configured hosts and alerts you if the connection is disrupted due to a loose, damaged, or missing cable or other problems with the host. You are also notified if the host type is incorrectly specified on the storage array (which could result in failover problems).

Note: To disable host connectivity reporting, you must first disable automatic load balancing.

Note: You can keep host connectivity reporting enabled if automatic load balancing is disabled.

Note: Host connectivity reporting and automatic load balancing function only on the Linux DHALUA, Windows/Windows Clustered, and VMware host types.

Parameters

None.

Enable storage array feature

The `enable storageArray feature file` command enables a feature for a permanent upgrade to the storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Context

This command performs one of these actions:

- Enables a feature key for a permanent upgrade of a feature
- Enables a feature key for a permanent upgrade of a feature pack

A feature pack is a predefined set of several features, such as Snapshot Upgrade and Synchronous Mirroring. These features are combined for the convenience of the users. When users install a feature pack, all of the features in the feature pack are installed at one time.

Each feature is managed by a license key that is generated for a specific feature or feature pack and a specific storage array. The license key is delivered as a file that you run to apply the license for the feature.

To determine which features are loaded on the storage array run the `show storageArray features` command. The `show storageArray features` command lists all of the features installed on the storage array, which features can be evaluated for a trial period, which features are enabled, and which features are disabled.

Syntax to enable a feature key

```
enable storageArray feature file="filename"
```

The **file** parameter identifies the file path and the file name of a valid feature key file. Enclose the file path and the file name in double quotation marks (" "). For example:

```
file="C:\Program Files\CLI\dnld\ftrkey.key"
```

Valid file names for feature key files end with a `.key` extension.

You will need a feature key file for each feature that you want to enable.

Syntax to enable a feature pack

```
enable storageArray featurePack file="filename"
```

The **file** parameter identifies the file path and the file name of a valid feature pack file. Enclose the file path and the file name in double quotation marks (" "). For example:

```
file="C:\Program Files\CLI\dnld\ftrpk.key"
```

Valid file names for feature key files end with a .key extension.

Syntax to enable a feature key

```
enable storageArray feature file="filename"
```

The **file** parameter identifies the file path and the file name of a valid feature key file. Enclose the file path and the file name in double quotation marks (" "). For example:

```
file="C:\Program Files\CLI\dnld\ftrkey.key"
```

Valid file names for feature key files end with a .key extension.

You will need a feature key file for each feature that you want to enable.

Export storage array security key

The export storageArray securityKey command saves a drive security key to a file.

Supported Arrays

If external key management is enabled, then this command applies only to the DE2000H/ DE4000H / DE4000F and DE6000H / DE6000F arrays. If internal key management is enabled, then the command applies to any individual storage array, as long as all SMcli packages are installed.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

When the key file is exported from one storage array, that key can be imported into another storage array. This enables you to move security-capable drives between storage arrays.

Note: This command applies to both internal and external key management.

Syntax

```
export storageArray securityKey
passPhrase="passPhraseString"
file="fileName"
```

Parameters

Parameter	Description
passPhrase	A character string that encrypts the security key so that you can store the security key in an external file. Enclose the pass phrase in double quotation marks (" ").
file	The file path and the file name to which you want to save the security key. For example: `file="C:\Program Files\CLI\sup\drivesecurity.slk"` **Important:** The file name must have an extension of .slk .

Notes

The storage array to which you will be moving drives must have drives with a capacity that is equal to or greater than the drives that you are importing.

The controller firmware creates a lock that restricts access to the full disk encryption (FDE) drives. FDE drives have a state called Security Capable. When you create a security key, the state is set to Security Enabled, which restricts access to all FDE drives that exist within the storage array.

Your pass phrase must meet these criteria:

- Must be between eight and 32 characters long.
- Must contain no whitespace.
- Must contain at least one uppercase letter.
- Must contain at least one lowercase letter.
- Must contain at least one number.
- Must contain at least one non-alphanumeric character, for example, < > @ +.

Note: If your pass phrase does not meet these criteria, you will receive an error message and will be asked to retry the command.

Import storage array security key

The `import storageArray securityKey file` command unlocks one or more full disk encryption (FDE) drives that you have moved from one storage array to another storage array.

Supported Arrays

If external key management is enabled, then this command applies only to the DE2000H/ DE4000H / DE4000F and DE6000H / DE6000F arrays. If internal key management is enabled, then the command applies to any individual storage array, as long as all SMcli packages are installed.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

Only the drives with the matching security key are unlocked. After they are unlocked, the security key for the new storage array is applied.

Note: This command applies to both internal and external key management.

Syntax

```
import storageArray securityKey file="fileName"
passPhrase="passPhraseString"
```

Parameters

Parameter	Description
file	The file path and the file name that has the original security key of the imported FDE drives. For example: `file="C:\Program Files\CLI\sup\drivesecurity.slk"` **Important:** The file name must have an extension of `.slk` .
passPhrase	The character string that provides authentication for the security key.

Notes

The controller firmware creates a lock that restricts access to the FDE drives. FDE drives have a state called Security Capable. When you create a security key, the state is set to Security Enabled, which restricts access to all FDE drives that exist within the storage array.

Your pass phrase must meet these criteria:

- Must be between eight and 32 characters long.
- Must contain at least one uppercase letter.
- Must contain at least one lowercase letter.
- Must contain at least one number.
- Must contain at least one non-alphanumeric character, for example, < > @ +.

Note: If your pass phrase does not meet these criteria, you will receive an error message and will be asked to retry the command.

Load storage array DBM database

The `load storageArray dbmDatabase` command restores a Database Management (DBM) database image by retrieving the image from a file or from cache.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

This command restores a storage array DBM database to the exact configuration that existed when the database image was captured using the `save storageArray dbmDatabase` command. The data in a file includes data for RAID configuration, volume groups and disk pools.

Before using this command with the file option, you must first obtain a validator string (a security code) from technical support. To obtain a validator, use the `save storageArray dbmValidatorInfo` command to generate an XML file that contains validator information. Technical support uses the XML file to generate the validator string required for this command.

Syntax

```
load storageArray dbmDatabase
((file="filename" validator="validatorValue") | sourceLocation=onboard)
[controller [(a|b)]]
[contentType= all]
```

Parameters

Parameter	Description
file	The file path and the file name of the DBM database you want to upload. Enclose the file name in double quotation marks (" "). For example: `file="C:\Array Backups\DBMbackup_03302010.dbm"` This command does not automatically append a file extension to the saved file. You must specify a file extension when entering the file name.
validator	The alphanumeric security code that is required to restore a storage array to an existing configuration. You must get the validator from technical support. To get the validator, generate the required validation information XML file by running the `save storageArray dbmValidatorInfo` command. After the validation information XML file is available, contact technical support to get the validator. Enclose the validator in double quotation marks (" ").
sourceLocation	This parameter specifies the location from which to retrieve backup database information. The parameter must be included for consistency, but the only allowed value is onboard .
controller	This parameter specifies the controller from which data will be exclusively retrieved. Enclose the controller identifier in square brackets ([ ]). If the **controller** parameter is not specified, data might be retrieved from either controller. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B .
contentType	This parameter specifies the content type of the data that will be retrieved. This parameter is set to all by default, so that all of the data including disk pool configuration data is retrieved.

Notes

Depending on the size of the database image, restoring the database might take up as much as 30 minutes. The host software will not show the controllers in an Optimal state until after all actions for loading the database image are completed on the controllers.

Re-create external security key

The `recreate storageArray securityKey` command regenerates a storage array security key for use with the external security key management feature.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

Note: This command applies only to external key management.

Syntax

```
recreate storageArray securityKey
passPhrase="passPhraseString"
```

```
file="fileName"
```

Parameters

Parameter	Description
passPhrase	A character string that encrypts the security key so that you can store the security key in an external file. Enclose the pass phrase in double quotation marks (" ").
file	The file path and the file name that has the security key. For example: `file="C:\Program Files\CLI\sup\drivesecurity.slk"` **Important:** The file name must have an extension of `.slk` .

Notes

Your pass phrase must meet these criteria:

- The pass phrase must be between eight and 32 characters long.
- The pass phrase must contain at least one uppercase letter.
- The pass phrase must contain at least one lowercase letter.
- The pass phrase must contain at least one number.
- The pass phrase must contain at least one non-alphanumeric character, for example, < > @ +.

Note: If your pass phrase does not meet these criteria, you will receive an error message.

Reset storage array diagnostic data

The `reset storageArray diagnosticData` command resets the NVSRAM that contains the diagnostic data for the storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

This command does not delete the diagnostic data. This command replaces the Needs Attention status with the Diagnostic Data Available status. The old diagnostic data is written over automatically when new data is captured. The memory that contains the diagnostic data is also cleared when the controllers reboot. Before you reset the diagnostic data, use the `save storageArray diagnosticData` command to save the diagnostic data to a file.

Attention: Run this command only with the assistance of technical support.

Syntax

```
reset storageArray diagnosticData
```

Parameters

None.

Reset storage array iSCSI baseline

The `reset storageArray iscsiStatsBaseline` command resets the iSCSI baseline to 0 for the storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Important: This command is deprecated and is replaced by the " Reset storage array host port statistics baseline " on page 111 command.

Syntax

```
reset storageArray iscsiStatsBaseline
```

Parameters

None.

Notes

This command resets the baseline to 0 for both controllers in the storage array. The purpose of resetting both of the controller baselines is to help make sure that the controller counts are synchronized between the controllers. If one controller resets but the second controller does not reset, the host is informed that the controllers are out of synchronization. The host is informed by the time stamps that are reported with the statistics.

Reset storage array RLS baseline

The `reset storageArray RLSBaseline` command resets the read link status (RLS) baseline for all devices by setting all of the RLS counts to 0.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
reset storageArray RLSBaseline
```

Parameters

None.

Reset storage array SAS PHY baseline

The `reset storageArray SASPHYBaseline` command resets the SAS physical layer (SAS PHY) baseline for all devices, and removes the list of errors from the `.csv` file.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

The `.csv` file is generated when you run the `save storageArray SASPHYCounts` command.

Note: The `reset storageArray SASPHYBaseline` command now resets the SAS PHY baseline for the drives as well as the other devices. All errors are deleted from the `.csv` file.

Syntax

```
reset storageArray SASPHYBaseline
```

Parameters

None.

Reset storage array SOC baseline

The `reset storageArray SOCBaseline` command resets the baseline for all switch-on-a-chip (SOC) devices that are accessed through the controllers.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

This command resets the baseline by setting all of the SOC counts to 0. This command is valid only for Fibre Channel devices in an arbitrated loop topology.

Syntax

```
reset storageArray SOCBaseline
```

Parameters

None.

Reset storage array volume distribution

The `reset storageArray volumeDistribution` command reassigns (moves) all of the volumes to their preferred controller.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
reset storageArray volumeDistribution
```

Parameters

None.

Notes

If you use this command on a host without a multi-path driver, you must stop I/O operations to the volumes until this command has completed to prevent application errors.

Under certain host operating system environments, you might be required to reconfigure the multi-path host driver. You might also need to make operating system modifications to recognize the new I/O path to the volumes.

Save storage array configuration

The `save storageArray configuration` command creates a script file that you can use to re-create the current storage array volume configuration.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role. However, the use of this command with the LDAP parameter is restricted to those with the Security Admin role.

Context

Attention: This command does not save remote mirroring or volume copy configuration data on the current storage array to a file.

Syntax

```
save storageArray configuration file="filename"
(allconfig|[globalSettings=(TRUE | FALSE)]
[volumeConfigAndSettings=(TRUE | FALSE)]
[hostTopology=(TRUE | FALSE)]
[lunMappings=(TRUE | FALSE)])
```

Parameters

Parameter	Description
file	The file path and the file name to which you want to save the configuration settings. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\saconf.cfg"` The default name of the file that contains the configuration settings is `storage-array-configuration.cfg` . This command does not automatically append a file extension to the saved file. You must specify a file extension when entering the file name.
allConfig	The setting to save all of the configuration values to the file. (If you choose this parameter, all of the configuration parameters are set to TRUE .)
globalSettings	The setting to save the global settings to the file. To save the global settings, set this parameter to TRUE . To prevent saving the global settings, set this parameter to FALSE . The default value is TRUE .

Parameter	Description
volumeConfigAndSettings	The setting to save the volume configuration settings and all of the global settings to the file. To save the volume configuration settings and global settings, set this parameter to TRUE . To prevent saving the volume configuration settings and global settings, set this parameter to FALSE . The default value is TRUE .
hostTopology	The setting to save the host topology to the file. To save the host topology, set this parameter to TRUE . To prevent saving the host topology, set this parameter to FALSE . The default value is FALSE .
lunMappings	The setting to save the LUN or NSID mapping to the file. To save the LUN or NSID mapping, set this parameter to TRUE. To prevent saving the LUN or NSID mapping, set this parameter to FALSE. The default value is FALSE.

Notes

When you use this command, you can specify any combination of the parameters for the global setting, the volume configuration setting, the host topology, or the LUN mapping. If you want to enter all settings, use the **allConfig** parameter. You must either use the **allConfig** parameter, or one or more of the other four parameters.

Save storage array DBM database

The `save storageArray dbmDatabase` command backs up RAID configuration data or all data to a file on the host. You can specify multiple data locations and controllers.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
save storageArray dbmDatabase
[sourceLocation=(disk | onboard)]
[controller [(a|b)]]
[contentType= all]
 file="fileName"
```

Parameters

Parameter	Description
file	The file path and the file name to which you want to save the database. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\dbmdata.zip"` This parameter must appear last, after any of the optional parameters. This command creates a .zip file and you do not need to specify a file extension.
sourceLocation	This parameter specifies the location from which to obtain backup database information. • disk indicates that data comes directly from the database on the drive • onboard indicates that data comes from the RPA memory location The default location is onboard .

Parameter	Description
controller	This parameter specifies the controller from which data will be exclusively retrieved, if **sourceLocation** is set to onboard . If the **controller** parameter is not specified, data might be retrieved from either controller. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B .
contentType	This parameter specifies the content type of the data that will be retrieved. This parameter is set to all by default, so that all of the data including disk pool configuration data is retrieved.

Notes

The data that you save to the host using this command can, if needed, be restored to the controller. A validator, however, is required to restore data from the file on the host.

Save storage array DBM validator information file

The `save storageArray dbmValidatorInfo` command saves the database management (DBM) validation information for a storage array in an XML file.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

Technical support can use this XML file to generate a validator string (a security code). The validator string must be included in the `load storageArray dbmDatabase` command when restoring a storage array back to a pre-existing configuration.

Syntax

```
save storageArray dbmValidatorInfo file="filename" dbmDatabase="filename"
```

Parameters

Parameter	Description
file	The file path and the file name of the DBM validator required for technical support. Enclose the file name in double quotation marks (" "). For example: `file="C:\Array Backups \DBMvalidator.xml"` This command does not automatically append a file extension to the saved file. You must specify the .xml file extension when you enter the file name.
dbmDatabase	The file path and the file name of the DBM database from which you want to generate the XML information file. Enclose the file name in double quotation marks (" "). For example: `dbmDatabase="C:\Array Backups \DBMbackup_03302010.dbm"` This command does not automatically append a file extension to the saved file. You must specify the .dbm file extension when you enter the file name.

Notes

If you are generating the XML information file to obtain a validator string, you must run this command while you are connected to the controller where you intend to restore the database. The following example show the format of the XML file:

```
<?xml version="1.0" encoding="utf-8"?>
<DbmImageMetadata>
<Controllers>

<A>1IT0nnnnnnnnnABCD</A>
<B>1T0nnnnnnnnnABCD</B>
</Controllers>
<Header>

<ImageVersion>1</ImageVersion>
<TimeStamp>1269388283</TimeStamp>
</Header>

<Trailer>
<CRC>nnnnnnnnnn</CRC><
/Trailer>
</DbmImageMetadata>
```

Save storage array diagnostic data

The `save storageArray diagnosticData` command saves the storage array diagnostic data from either the controllers or the environmental services modules (ESMs) to a file.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

You can review the file contents at a later time. You can also send the file to technical support for further review.

After you have saved the diagnostic data, you can reset the NVSRAM registers that contain the diagnostic data so that the old data can be overwritten. Use the `reset storageArray diagnosticData` command to reset the diagnostic data registers.

Attention: Run this command only with the assistance of technical support.

Syntax

```
save storageArray diagnosticData [(controller | tray)]
file="filename"
```

Parameters

Parameter	Description
diagnosticData	This parameter allows you to download the diagnostic data from either the controllers or the ESMs.
file	The file path and the file name to which you want to save the storage array diagnostic data. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\sadiag.zip"` This command automatically saves the data to a compressed file; however, this command does not automatically append a file extension to the saved file. You must specify the `.zip` extension when entering the file name.

Save storage array events

The `save storageArray warningEvents` command saves events from the Major Event Log to a file.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

This command saves events from the Major Event Log to a file. You can save these events:

- **Critical events** – An error occurred on the storage array that needs to be addressed immediately. Loss of data access might occur if you do not immediately correct the error.

- **Warning events** – An error occurred on the storage array that results in degraded performance or reduced ability to recover from another error. Access to data has not been lost, but you must correct the error to prevent possible loss of data access if another error would occur.

- **Informational events** – An event occurred on the storage array that does not impact normal operations. The event is reporting a change in configuration or other information that might be useful in evaluating how well the storage array is performing.

- **Debug events** – An event occurred on the storage array that provides information that you can use to help determine the steps or states that led to an error. You can send a file with this information to technical support to help determine the cause of an error.

Note: Some storage arrays might not be able to support all four types of events.

Syntax

```
save storageArray (allEvents | criticalEvents |
warningEvents | infoEvents | debugEvents)
file="filename"
[count=numberOfEvents]
[forceSave=(TRUE | FALSE)]
```

Parameters

Parameter	Description
allEvents	The parameter to save all of the events to a file.
criticalEvents	The parameter to save only the critical events to a file.

Parameter	Description
warningEvents	The parameter to save only the warning events to a file.
infoEvents	The parameter to save only the informational events to a file.
debugEvents	The parameter to save only the debug events to a file.
file	The file path and the file name to which you want to save the events. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\events.txt"` The default name of the file that contains the contents of the Major Event Log is `major-event-log.txt` . This command does not automatically append a file extension to the saved file. You must specify a file extension when entering the file name.
count	The number of events that you want to save to a file. If you do not enter a value for the count, all events matching the type of event you specify are saved to the file. If you enter a value for the count, only that number of events (starting with the last event entered) are saved to the file. Use integer values.
forceSave	The parameter to force saving the debug events you may have filtered from view to a file. To force saving the events, set this parameter to TRUE . The default value is FALSE . **Note:** Using this parameter saves debug events that have been filtered out of the ThinkSystem SAN OS Event Viewer.

Save storage array firmware inventory

The `save storageArray firmwareInventory` command saves a report to a file of all of the firmware currently running on the storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

The report lists the firmware for these components:

- Controllers
- Drives
- Drawers (if applicable)
- Environmental services modules (ESMs)
- Power supplies

You can use the information to help identify out-of-date firmware or firmware that does not match the other firmware in your storage array. You can also send the report to technical support for further review.

Syntax

```
save storageArray firmwareInventory file="filename"
```

Parameter

Parameter	Description
file	The file path and the file name to which you want to save the firmware inventory. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\fwinvent.txt"` The default name of the file that contains the firmware inventory is `firmware-inventory.txt`. This command does not automatically append a file extension to the saved file. You must specify a file extension when entering the file name.

Save storage array iSCSI statistics

The `save storageArray iscsiStatistics` command saves the iSCSI performance statistics of the storage array to a file.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Important: This command is deprecated and is replaced by the " Save storage array host port statistics " on page 112 command.

Syntax

```
save storageArray iscsiStatistics [(raw | baseline)] file="filename"
```

Parameters

Parameter	Description
raw	The statistics collected are all statistics from the controller start-of-day. Enclose the parameter in square brackets ([ ]).
baseline	The statistics that are collected are all statistics from the time the controllers were reset to zero using the `reset storageArray ibStatsBaseline` command. Enclose the parameter in square brackets ([ ]).
file	The file path and the file name to which you want to save the performance statistics. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\iscsistat.csv"` The default name of the file that contains the iSCSI performance statistics is `iscsi-statistics.csv`. You can use any file name, but you must use the `.csv` extension.

Notes

If you have not reset the iSCSI baseline statistics since the controller start-of-day, the time at the start-of-day is the default baseline time.

Save storage array performance statistics

The `save storageArray performanceStats` command saves the performance statistics to a file.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Before you use this command, run the `set session performanceMonitorInterval` command and the `set session performanceMonitorIterations` command to specify how often statistics are collected.

Syntax

```
save storageArray performanceStats file="filename"
```

Parameter

Parameter	Description
file	The file path and the file name to which you want to save the performance statistics. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\sastat.csv"` The default name of the file that contains the performance statistics is `performanceStatistics.csv`. You can use any file name, but you must use the `.csv` extension.

Save storage array RLS counts

The `save storageArray RLSCounts` command saves the read link status (RLS) counters to a file.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
save storageArray RLSCounts file="filename"
```

Parameter

Parameter	Description
file	The file path and the file name to which you want to save the RLS counters. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\rlscnt.csv"` The default name of the file that contains the RLS counts is `read-link-status.csv`. You can use any file name, but you must use the `.csv` extension.

Notes

To more effectively save RLS counters to a file, perform these steps:

1. Run the `reset storageArray RLSBaseline` command to set all of the RLS counters to 0.
2. Run the storage array for a predetermined amount of time (for instance, two hours).

3. Run the `save storageArray RLSCounts file="`*filename*`"` command.

Save storage array SAS PHY counts

The `save storageArray SASPHYCounts` command saves the SAS physical layer (SAS PHY) counters to a file.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

To reset the SAS PHY counters, run the `reset storageArray SASPHYBaseline` command.

Syntax

```
save storageArray SASPHYCounts file="filename"
```

Parameter

Parameter	Description
file	The file path and the file name to which you want to save the SAS PHY counters. Enclose the file path and the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\sasphy.csv"` The default name of the file that contains the SAS PHY error statistics is `sas-phy-error-log.csv`. You can use any file name, but you must use the `.csv` extension.

Save storage array SOC counts

The `save storageArray SOCCounts` command saves the SOC error statistics to a file.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

This command is valid only for Fibre Channel devices in an arbitrated loop topology.

Syntax

```
save storageArray SOCCounts file="filename"
```

Parameter

Parameter	Description
file	The file path and the file name to which you want to save the SOC error statistics. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\socstat.csv"` The default name of the file that contains the SOC error statistics is `soc-statistics.csv`. You can use any file name, but you must use the `.csv` extension.

Notes

To more effectively save SOC error statistics to a file, perform these steps:

1. Run the `reset storageArray SOCBaseline` command to set all of the SOC counters to 0.
2. Run the storage array for a predetermined amount of time (for example, two hours).
3. Run the `save storageArray SOCCounts file="`*filename*`"` command.

Save storage array state capture

The `save storageArray stateCapture` command saves the state capture of a storage array to a file.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

`save storageArray stateCapture file="`*filename*`"`

Parameter

Parameter	Description
file	The file path and the file name to which you want to save the state capture. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\state.txt"` You can use any file name, but you must use the `.txt` extension. The default name of the file that contains the state capture is `state-capture-data.txt`. This command does not automatically append a file extension to the saved file. You must specify a file extension when entering the file name.

Save storage array support data

The `save storageArray supportData` command saves the support-related information of the storage array to a file.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Context

The following table lists the type of support data that you can collect.

Type of data	File name and description

Automatic Load Balancing statistics	`alb-statistics-A.txt`
	
	`alb-statistics-B.txt`
	
	This file, one per controller, specify various statistics related to the Automatic Load Balancing feature that allow further analysis via offline analysis tool.

Core dump metadata	`all-coredump.xml` This file contains core dump metadata for the array.
AutoSupport status	`autosupport.xml` This file specifies the current status of ASUP for the given array.
The AutoSupport history file	`autosupport-history.xml` This file specifies all ASUP messages, both standard and AutoSupport OnDemand messages, for the given array. Each entry in the table corresponds to an ASUP message currently sitting in one of the repositories for a given array.
AutoSupport logs	`asup-transmission-logs.txt` This file contains all the transmitted AutoSupport messages.
Web Server Client Info	`client-info.txt` This file specifies various Web Services client information.
Drive cabling topology	`connection.txt` This file contains information about the connections between the drive tray environmental services module (ESM) and the controller pair.
Cumulative statistics bundles	`cumulative-drive-vol-stats.xml` This file contains cumulative statistics for the controllers.
Misbehaving drive log	`controller-drive-error-event-log.txt` This file contains the storage array controller drive-side error and event log messages.
Controller health image metadata	`all-coredump.xml` This file contains DPL controller health image information.
DOM 0 journal files for controller A	`dom0-complete-journal-A.7z` This file, one per controller, contains detailed Linux system logs. This includes logs for Linux packages and standard Linux utilities and services.

Type of data	File name and description
DOM 0 journal files for controller B	`dom0-complete-journal-B.7z` This file, one per controller, contains detailed Linux system logs. This includes logs for Linux packages and standard Linux utilities and services.
Miscellaneous DOM 0 log files for controller A	`dom0-misc-logs-A.7z` This file, one per controller, contains system logs that cannot be contained with the Journal. This includes the serial log for the RAID Application and debug logs for the Hypervisor.
Miscellaneous DOM 0 log files for controller B	`dom0-misc-logs-B.7z` This file, one per controller, contains system logs that cannot be contained with the Journal. This includes the serial log for the RAID Application and debug logs for the Hypervisor.
Drive command aging timeout values	`drive-command-aging-timeout.txt` This file contains the default values and current values for the command aging timeout field for every drive.
Drive health logs	`drive-health-data.bin` This file contains various drive information related to the drive's health. **Note:** This file is a binary file and will require an offline parser to convert to human readable format.
Drive performance analyzer data	`drive-performance-log.txt` This file contains drive performance data that helps you identify any drives that are performing below expectations.
Failed repository analysis	`failed-repository-analysis.txt` This file contains the failed repository analysis information.
Features of the storage array	`feature-bundle.txt` This file contains a list of the number of volumes, drives, and drive trays allowed in the storage array and a list of the features available and their limits.
Firmware inventory	`firmware-inventory.txt` This file contains a list of all of the firmware versions for all of the components in the storage array.
I/O path statistics	`io-path-statistics.7z` This file contains raw performance data for each controller that can be used to analyze application performance issues.
IOC dump info for the host interface chip	`ioc-dump-info.txt` This file contains IOC dump information for the host interface chip.
IOC dump logs for the host interface chip	`ioc-dump.gz` This file contains the log dump from the host interface chip on the controller. The file is compressed in gz format. The zip file is saved as a file inside of the Customer Support Bundle.
iSCSI connections (iSCSI only)	`iscsi-session-connections.txt` This file contains a list of all of the current iSCSI sessions.
iSCSI statistics (iSCSI only)	`iscsi-statistics.csv` This file contains statistics for the Ethernet media access control (MAC), Ethernet Transmission Control Protocol (TCP)/Internet Protocol (IP), and iSCSI target.

Type of data	File name and description
Major event log	`major-event-log.txt` This file contains a detailed list of events that occur on the storage array. The list is stored in reserved areas on the disks in the storage array. The list records configuration events and component failures in the storage array.
Manifest file	`manifest.xml` This file contains a table that describes the files included in the archive file and the collected status of each of those files.
Storage management software runtime information	`msw-runtime-info.txt` This file contains the storage management software application runtime information. Contains the JRE version currently used by the storage management software.
NVMe-oF statistics	`nvmeof-statistics.csv` This file contains a list of statistics, including NVMe controller statistics, NVMe queue statistics, and interface statistics for the transport protocol.
NVSRAM data	`nvsram-data.txt` This controller file specifies the default settings for the controllers.
Object bundle	`object-bundle`.bin `object-bundle`.json This bundle contains a detailed description of the status of your storage array and its components, which was valid at the time that the file was generated.

Summary performance statistics	`perf-stat-daily-summary-a.csv`
	`perf-stat-daily-summary-b.csv`
	
	This file contains various controller performance statistics, one file per controller.

Persistent reservations and registrations	`persistent-reservations.txt` This file contains a detailed list of volumes on the storage array with persistent reservations and registrations.
Recovery Guru procedures	`recovery-guru-procedures.html` This file contains a detailed list of all of the recovery guru topics that are issued in response to problems detected on the storage array. This file contains only the recovery guru details, not the HTML files.
Recovery profile	`recovery-profile.csv` This file contains a detailed description of the latest recovery profile record and historical data.
SAS PHY error logs	`sas-phy-error-logs.csv` This file contains the error information for SAS PHY.
State capture data	`state-capture-data.txt` This file contains a detailed description of the current state of your storage array.
Storage array configuration	`storage-array-configuration.cfg` This file contains a detailed description of the logical configuration on your storage array.
Storage array profile	`storage-array-profile.txt` This file contains a description of all of the components and properties of a storage array.

Type of data	File name and description
Trace buffer contents	`trace-buffers.7z` This file contains the contents of the controllers' trace buffers that are used to record debug information.
Tray capture data	`tray-component-state-capture.7z` If your tray contains drawers, the diagnostic data is archived in this zipped file. The Zip file contains a separate text file for each tray that contains drawers. The Zip file is saved as a file inside of the Customer Support Bundle.
Unreadable sectors	`unreadable-sectors.txt` This file contains a detailed list of all of the unreadable sectors that have been logged to the storage array.

Web Services Trace Log	`web-server-trace-log-A.7z`
	
	`web-server-trace-log-B.7z`
	
	This file, one per controller, contains Web Services trace buffers that are used to record debug information.

Workload capture analytics log file	`wlc-analytics-a.lz4`
	`wlc-analytics-b.lz4`
	
	This file, one per controller, contains computed key workload characteristics such as LBA histogram, read/write ratio and I/O throughput across all active volumes.

X-header data file	`x-header-data.txt` This AutoSupport message header consists of plain text key-value pairs; which include information about the array and message type.

Syntax

```
save storageArray supportData file="filename" [force=(TRUE | FALSE)]
save storageArray supportData file="filename"
[force=(TRUE | FALSE) |
csbSubsetid=(basic | weekly | event | daily | complete) |
csbTimeStamp=hh:mm]
```

Parameters

Parameter	Description
file	The file path and the file name to which you want to save the support-related data for the storage array. Enclose the file path and the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\supdat.7z"`
force	This parameter forces the collection of support data if there are any failures in securing a lock on controller operations. To force the collection of support data, set this parameter to TRUE . The default value is FALSE .

Parameter	Description
csbSubsetid	This parameter collects a subset of data in the support bundle. The options for the subset of data are: • **basic** – Use this option to collect support bundle data about storage array discovery. • **weekly** – Use this option to collect support bundle data each week. • **event** – Use this option to collect support bundle data when a critical event occurs. • **daily** – Use this option to collect support bundle data every day. • **complete** – Use this option to collect all of the support bundle data. This is the default option.
csbTimeStamp	This parameter adds a time stamp to the support bundle. Enter hours and minutes in a 24-hour format. For example: 13:30 for 1:30 p.m.

Set storage array

The `set storageArray` command defines the properties of the storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set storageArray
([autoLoadBalancingEnable=(TRUE | FALSE)]|
[autoSupportMaintenanceWindow AutoSupport Maintenance Window parameters]
[autoSupport schedule AutoSupport Schedule Parameters]|
[autoSupportConfig (enable | disable)]|
[autoSupportOnDemand (enable | disable)]|
[autoSupportRemoteDiag (enable |disable)]|
[cacheBlockSize=cacheBlockSizeValue]|
[cacheFlushStart=cacheFlushStartSize]|
[cacheFlushStop=cacheFlushStopSize]|
[cacheMirrorDataAssuranceCheckEnable=(TRUE | FALSE)]|
[controllerHealthImageAllowOverWrite]|
[defaultHostType=("hostTypeName" |"hostTypeIdentifier")] |
[directoryServer directory server parameters]|
[externalKeyManagement external key management parameters]|
[failoverAlertDelay=delayValue]|
[hostConnectivityReporting (enable | disable)]|
[icmpPingResponse=(TRUE | FALSE)]|
[isnsIPV4ConfigurationMethod isns IPv4 Config Method Parameters]|
[isnsIPv6Address=ipAddress]|
[isnsListeningPort=listeningPortIPAddress]]|
[isnsRegistration=(TRUE | FALSE)]|
[learnCycleDate learn cycle parameters]|
[localUsername=local user name parameters]|
[loginBanner file="path_to_login_banner"]|
[managementInterface restOnly={true | false}]|
[mediaScanRate=(disabled | 1-30)]|
[odxEnabled=(TRUE | FALSE)]|
[password="password"]|
[passwordLength=<INTEGER>]|
[pqValidateOnReconstruct P/Q Validate on Reconstruct parameters]|
[redundancyMode=(simplex | duplex)]|
```

```
[revocationCheckSettings revocation check settings parameters]|
[securityKey]|
[symbol SYMbol user name and password parameters]|
[syslog syslog parameters]|
[time]|
[trayPositions=(controller | trayID ... trayIDn)]|
[unnamedDiscoverySession=(TRUE | FALSE)]|
[userLabel="storageArrayName"]|
[userSession sessionTimeout=n]|
[vaaiEnabled=(TRUE | FALSE)])
```

Parameters

Parameter	Description
autoLoadBalancingEnable	This parameter enables auto-load balancing on the controller. To enable the option, set this parameter to TRUE . To disable the option, set this parameter to FALSE . **Note:** When the Automatic Load Balancing feature is enabled, the Host Connectivity Reporting feature will also be enabled.
autoSupport schedule	Sets the daily and weekly times and days of the week that AutoSupport messages are sent.
autoSupportConfig	The setting for automatically collecting support data each time the firmware detects a critical MEL event. This parameter has these values: • enable – Turns on the collection of support data • disable – Turns off the collection of support data Use this parameter under these conditions only: • The AutoSupport (ASUP) feature is not available on the storage array • To support configurations on storage arrays that previously used this parameter **Note:** You cannot use this parameter with the ASUP commands.
autoSupportMaintenanceWindow	Turns on or turns off the AutoSupport maintenance window feature and configures the feature.
cacheBlockSize	The cache block size that is used by the controller for managing the cache. Valid values are 4 (4 KB), 8 (8 KB), 16 (16 KB), or 32 (32 KB).
cacheMirrorDataAssuranceCheckEnable	This parameter enables cache mirror data assurance check on the controller. To enable the option, set this parameter to TRUE . To disable the option, set this parameter to FALSE .
cacheFlushStart	The percentage of unwritten data in the cache that causes a cache flush. Use integer values from 0 to 100 to define the percentage. The default value is 80 .
controllerHealthImageAllowOverWrite	Sets a flag on a controller to allow a new controller health image to overwrite an existing controller health image on storage arrays that support the controller health image feature.

Parameter	Description
defaultHostType	The default host type of any unconfigured host port to which the controllers are connected. To generate a list of valid host types for the storage array, run the `show storageArray hostTypeTable` command. Host types are identified by a name or a numerical index. Enclose the host type name in double quotation marks (" "). Do not enclose the host type numerical identifier in double quotation marks.
directoryServer	Updates the directory server configuration, including role mappings.
externalKeyManagement	Configures the external key management server address and port number
failoverAlertDelay	The failover alert delay time in minutes. The valid values for the delay time are 0 to 60 minutes. The default value is 5 .
hostConnectivityReporting	This parameter enables host connectivity reporting on the controller. To enable the option, set this parameter to enable . To disable the option, set this parameter to disable . **Note:** If you attempt to disable Host Connectivity Reporting when Automatic Load Balancing is enabled, you receive an error. First disable the Automatic Load Balancing feature, then disable the Host Connectivity Reporting feature. **Note:** You can keep Host Connectivity Reporting enabled when Automatic Load Balancing is disabled.
icmpPingResponse	This parameter turns on or turns off Echo Request messages. Set the parameter to TRUE to turn on Echo Request messages. Set the parameter to FALSE to turn off Echo Request messages.
isnsIPv4ConfigurationMethod	The method that you want to use to define the iSNS server configuration. You can enter the IP address for the IPv4 iSNS servers by selecting static . For IPv4, you can choose to have a Dynamic Host Configuration Protocol (DHCP) server select the iSNS server IP address by entering dhcp . To enable DHCP, you must set the **isnsIPv4Address** parameter to 0.0.0.0 .
isnsIPv6Address	The IPv6 address that you want to use for the iSNS server.
isnsListeningPort	The IP address that you want to use for the iSNS server listening port. The range of values for the listening port is 49152 to 65535 . The default value is 53205 . The listening port resides on the server and performs these activities: • Monitors incoming client connection requests • Manages traffic to the server When a client requests a network session with a server, the listener receives the actual request. If the client information matches the listener information, then the listener grants a connection to the database server.

Parameter	Description
isnsRegistration	This parameter lists the storage array as an iSCSI target on the iSNS server. To register the storage array on the iSNS server, set this parameter to TRUE . To remove the storage array from the iSNS server, set this parameter to FALSE . **Note:** You cannot use the **isnsRegistration** parameter with any other parameter when running the `set storageArray` command. For more information about iSNS registration, refer to the `set storageArray isnsRegistration` command.
learnCycleDate	Sets controller battery learn cycles.
localUsername	Allows you to set a local user name password or a SYMbol password for a particular role.
loginBanner	Allows you to upload a text file to be used as a login banner. The banner text can include an advisory notice and consent message, which is presented to users before they establish sessions in ThinkSystem System Manager or before they run commands
managementInterface	Changes the management interface of the controller. Change the management interface type to enforce confidentiality between the storage array and its management software or to access external tools.
mediaScanRate	The number of days over which the media scan runs. Valid values are disabled , which turns off the media scan, or 1 day to 30 days, where 1 day is the fastest scan rate, and 30 days is the slowest scan rate. A value other than disabled or 1 to 30 does not allow the media scan to function.
odxEnabled	Turns on or turns off Offloaded Data Transfer (ODX) for a storage array.
passwordLength	Allows you to set the minimum required length for all new or updated passwords. Use a value between 0 and 30.
pqValidateOnReconstruct	Modifies the P/Q validate on reconstruction capability.
redundancyMode	Use simplex mode when you have a single controller. Use duplex mode when you have two controllers.
revocationCheckSettings	Allows you to enable or disable revocation checking, and configure an Online Certificate Status Protocol (OCSP) server.
securityKey	Sets the internal security key that is used throughout the storage array to implement the Drive Security feature. **Note:** Used for an internal security key. When an external key management server is used, use the `create storageArray securityKey` command.
symbol	Allows you to set a SYMbol password for a particular role.
syslog	Allows you to change the syslog server address, protocol, or port number.
time	Sets the clocks on both controllers in a storage array by synchronizing the controller clocks with the clock of the host from which you run this command.

Parameter	Description
trayPositions	A list of all of the tray IDs. The sequence of the tray IDs in the list defines the positions for the controller tray and the drive trays in a storage array. Valid values are 0 to 99 . Enter the tray ID values separated with a space. Enclose the list of tray ID values in parentheses. For storage arrays where the controller tray has a predefined identifier that is not in the range of valid tray position values, use the controller value.
unnamedDiscoverySession	Enables the storage array to participate in unnamed discovery sessions.
userLabel	The name for the storage array. Enclose the storage array name in double quotation marks (" ").
userSession	Allows you to set a timeout in System Manager , so that users' inactive sessions are disconnected after a specified time.
vaaiEnabled	Turns on or turns off VMware vStorage API Array Architecture (VAAI) for a storage array

Notes

Except for the **isnsRegistration** , when you use this command you can specify one or more of the optional parameters.

Auto Support data

Note: You cannot use this parameter with the ASUP commands.

When enabled, the **set storageArray autoSupportConfig** command causes all configuration and state information for the storage array to be returned each time a critical Major Event Log (MEL) event is detected. The configuration and state information is returned in the form of an object graph. The object graph contains all relevant logical and physical objects and their associated state information for the storage array.

The **set storageArray autoSupportConfig** command collects configuration and state information in this way:

- Automatic collection of the configuration and state information occurs every 72 hours. The configuration and state information is saved to the storage array zip archive file. The archive file has a time stamp that is used to manage the archive files.

- Two storage array zip archive files are maintained for each storage array. The zip archive files are kept on a drive. After the 72-hour time period is exceeded, the oldest archive file is always overwritten during the new cycle.

- After you enable automatic collection of the configuration and state information using this command, an initial collection of information starts. Collecting information after the you issue the command makes sure that one archive file is available and starts the time stamp cycle.

You can run the **set storageArray autoSupportConfig** command on more than one storage array.

Cache block size

When you define cache block sizes, use the 4-KB cache block size for storage arrays that require I/O streams that are typically small and random. Use the 8-KB cache block size when the majority of your I/O streams are larger than 4 KB but smaller than 8 KB. Use the 16-KB cache block size or the 32-KB cache block size for storage arrays that require large data transfer, sequential, or high-bandwidth applications.

The **cacheBlockSize** parameter defines the supported cache block size for all of the volumes in the storage array. Not all controller types support all cache block sizes. For redundant configurations, this parameter includes all of the volumes that are owned by both controllers within the storage array.

Cache flush start

When you define values to start a cache flush, a value that is too low increases the chance that data needed for a host read is not in the cache. A low value also increases the number of drive writes that are necessary to maintain the cache level, which increases system overhead and decreases performance.

Default host type

When you define host types, if Storage Partitioning is enabled, the default host type affects only those volumes that are mapped in the default group. If Storage Partitioning is not enabled, all of the hosts that are attached to the storage array must run the same operating system and be compatible with the default host type.

Media scan rate

Media scan runs on all of the volumes in the storage array that have Optimal status, do not have modification operations in progress, and have the **mediaScanRate** parameter enabled. Use the `set volume` command to enable or disable the **mediaScanRate** parameter.

Password

Passwords are stored on each storage array. For best protection, the password must meet these criteria:

- The password must be between eight and 30 characters long.
- The password must contain at least one uppercase letter.
- The password must contain at least one lowercase letter.
- The password must contain at least one number.
- The password must contain at least one non-alphanumeric character, for example, < > @ +.

Note: If you are using full disk encryption drives in your storage array, you must use these criteria for your storage array password.

Note: You must set a password for your storage array before you can create a security key for encrypted full disk encryption drives.

Set storage array ICMP response

The `set storageArray icmpPingResponse` command returns the default values for negotiable settings for sessions and connections, which represent the starting point for the storage array for negotiations.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set storageArray icmpPingResponse=(TRUE | FALSE)
```

Parameter

Parameter	Description
icmpPingResponse	This parameter turns on or turns off Echo Request messages. Set the parameter to TRUE to turn on Echo Request messages. Set the parameter to FALSE to turn off Echo Request messages.

Notes

The Internet Control Message Protocol (ICMP) is used by operating systems in a network to send error messages, test packets, and informational messages related to the IP, such as a requested service is not available or that a host or router could not be reached. The ICMP response command sends ICMP Echo Request messages and receives ICMP Echo Response messages to determine if a host is reachable and the time it takes for packets to get to and from that host.

Set storage array iSNS server IPv4 address

The `set storageArray isnsIPv4ConfigurationMethod` command sets the configuration method and address for an IPv4 Internet Storage Name Service (iSNS).

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set storageArray isnsIPv4ConfigurationMethod=(static | dhcp)
isnsIPv4Address=ipAddress
```

Parameters

Parameters	Description
isnsIPv4ConfigurationMethod	The method that you want to use to define the iSNS server configuration. You can enter the IP address for the IPv4 iSNS servers by selecting static . For IPv4, you can choose to have a Dynamic Host Configuration Protocol (DHCP) server select the iSNS server IP address by entering dhcp . To enable DHCP, you must set the **isnsIPv4Address** parameter to 0.0.0.0 .
isnsIPv4Address	The IP address that you want to use for the iSNS server. Use this parameter with the static value for IPv4 configurations. If you choose to have a DHCP server set the IP address for an IPv4 Internet iSNS server, you must set the **isnsIPv4Address** parameter to 0.0.0.0 .

Notes

The iSNS protocol facilitates the automated discovery, management, and configuration of iSCSI devices and Fibre Channel devices on a TCP/IP network. iSNS provides intelligent storage discovery and management services comparable to those found in Fibre Channel networks, which allow a commodity IP network to function in a similar capacity as a storage area network. iSNS also facilitates a seamless integration of IP networks and Fibre Channel networks, due to its ability to emulate Fibre Channel fabric services and manage both iSCSI devices and Fibre Channel devices.

The DHCP server passes configuration parameters, such as network addresses, to IP nodes. DHCP enables a client to acquire all of the IP configuration parameters that it needs to operate. DHCP lets you automatically allocate reusable network addresses.

Set storage array iSNS server IPv6 address

The `set storageArray isnsIPv6Address` command sets the IPv6 address for the iSNS server.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

`set storageArray isnsIPv6Address=`*ipAddress*

Parameter

Parameters	Description
isnsIPv6Address	The IPv6 address that you want to use for the iSNS server.

Notes

The iSNS protocol facilitates the automated discovery, management, and configuration of iSCSI devices and Fibre Channel devices on a TCP/IP network. iSNS provides intelligent storage discovery and management services comparable to those found in Fibre Channel networks, which permits a commodity IP network to function in a similar capacity as a storage area network. iSNS also facilitates a seamless integration of IP networks and Fibre Channel networks, due to its ability to emulate Fibre Channel fabric services, and manage both iSCSI devices and Fibre Channel devices. iSNS provides value in any storage network that has iSCSI devices, Fibre Channel devices, or any combination.

Set storage array iSNS server listening port

The `set storageArray isnsListeningPort` command sets the iSNS server listening port.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

`set storageArray isnsListeningPort=`*listeningPortIPAddress*

Parameter

Parameter	Description
isnsListeningPort	The IP address that you want to use for the iSNS server listening port. The range of values for the listening port is 49152 to 65535 . The default value is 53205 .
	The listening port resides on the server and performs these activities:
	• Monitors incoming client connection requests
	• Manages traffic to the server
	When a client requests a network session with a server, the listener receives the actual request. If the client information matches the listener information, then the listener grants a connection to the database server.

Notes

A listening port resides on the database server and is responsible for these activities:

• Listening (monitoring) for incoming client connection requests
• Managing the traffic to the server

When a client requests a network session with a server, a listener receives the actual request. If the client information matches the listener information, then the listener grants a connection to the database server.

Set storage array iSNS server refresh

The `set storageArray isnsServerRefresh` command refreshes the network address information for the iSNS server.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

This command is valid for only IPv4.

Syntax

```
set storageArray isnsServerRefresh
```

Parameters

None.

Notes

If the DHCP server is not operating at full capability, or if the DHCP server is unresponsive, the refresh operation can take between two and three minutes to complete.

The `set storageArray isnsServerRefresh` command returns an error if you did not set the configuration method to DHCP. To set the configuration method to DHCP, use the `set storageArray isnsIPV4ConfigurationMethod` command.

Set storage array controller battery learn cycle

The `set storageArray learnCycleDate controller` command sets controller battery learn cycles.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Important: To set individual learn cycles for each controller in the storage array, send this command to both controllers.

Important: The learn cycles are not linked together and so a disruption in one controller battery learn cycle will not impact the learn cycle for the battery in the other controller.

Note: A learn cycle might take several hours to complete.

Syntax

```
set storageArray learnCycleDate (controller[(a| b)] )
(daysToNextLearnCycle=numberOfDays |
day=dayOfTheWeek) time=HH:MM
```

Parameters

Parameter	Description
controller	The controller for which you want to specify a battery learn cycle. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . Enclose the controller identifier in square brackets ([ ]). If you do not specify a controller, the controller firmware returns a syntax error. **Note:** Omitting this parameter sets the learn cycle for both controller batteries in a dual-controller array.
daysToNextLearnCycle	Valid values are 0 through 7 , where 0 is immediately and 7 is in seven days. The **daysToNextLearnCycle** parameter takes place up to seven days after the next scheduled learn cycle.
day	Valid values for the **day** parameter include the days of the week (Sunday , Monday , Tuesday , Wednesday , Thursday , Friday , and Saturday). Setting the day causes the next learn cycle to be scheduled on the specified day, after the currently scheduled learn cycle.
time	The time in 24-hour format; for example 8:00 a.m. is entered as 08:00 . Nine o'clock p.m. is entered as 21:00 , and 9:30 p.m. is entered as 21:30 .

Example

```
set storageArray learnCycleDate controller [a] daysToNextLearnCycle=4
 time=08:30;
```

Notes

You can set the learn cycle to occur only once during a seven-day period.

The **time** parameter selects a specific time that you want to run the learn cycle. If a value is not entered, the command uses a default value of 00:00 (midnight).

If the day and time specified are in the past, the next learn cycle takes place on the next possible day specified.

Set storage array PQ validation on reconstruct

The `set storageArray pqValidateOnReconstruct` command sets the storage array P/Q validation state on reconstruction. When this capability is enabled, data is reconstructed using both data+P and data+Q, and the results checked for consistency before determining how to proceed.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

This feature applies to disk pools and RAID 6 volume groups, which have dual parity. In this case, there is still redundancy in the volume group or disk pool when a drive fails, so it is possible to check data and parity consistency during reconstruction. If an inconsistency is found during reconstruction and Data Assurance is enabled for the volume, it may be possible to identify the source of the inconsistency so that data can be reconstructed using the remaining drives. If this feature is enabled, and Data Assurance is not enabled for the volume, or if the inconsistency cannot be isolated to a single drive, then the block being reconstructed is marked as unreadable.

The validation may increase reconstruction times for SSD drives, so this feature can be enabled or disabled based on media type. If enabled for a given media type, the feature is applied to all pools and RAID 6 volume groups using that media type.

Syntax

```
set storageArray pqValidateOnReconstruct (enable | disable) driveMediaType=(hdd | ssd | allMedia)
```

Parameters

Parameter	Description
pqValidateOnReconstruct	Modifies the P/Q validate on reconstruction capability.
enable or **disable**	Enables or disables P/Q validation on reconstruction.
driveMediaType	The drive media type on which to set the P/Q validate on reconstruction capability. The following drive media types are supported: • `ssd` indicates that you want to set the validation state on solid state disks • `allMedia` indicates that you want to set the validation state on all media in the storage array.

Example with drive media type specified as hard disk drives

```
SMcli -n Array1 -c "set storageArray pqValidateOnReconstruct enable
 driveMediaType=hdd;"
```

```
SMcli completed successfully.
```

Example with drive media type specified as solid-state drives

```
SMcli -n Array1 -c "set storageArray pqValidateOnReconstruct disable
 driveMediaType=ssd;"
```

```
SMcli completed successfully.
```

Set storage array redundancy mode

The `set storageArray redundancyMode` command sets the redundancy mode of the storage array to either simplex or duplex.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set storageArray redundancyMode=(simplex | duplex)
```

Parameter

Parameter	Description
redundancyMode	Use simplex mode when you have a single controller. Use duplex mode when you have two controllers.

Set internal storage array security key

The `set storageArray securityKey` command sets the security key that is used throughout the storage array to implement the Drive Security feature.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

When any security-capable drive in the storage array is assigned to a secured volume group or disk pool, that drive will be security-enabled using the security key. Before you can set the security key, you must use the `create storageArray securityKey` command to create the security key.

Note: This command applies only to internal key management.

Syntax

```
set storageArray securityKey
```

Parameters

None.

Notes

Security-capable drives have hardware to accelerate cryptographic processing and each has a unique drive key. A security-capable drive behaves like any other drive until it is added to a secured volume group, at which time the security-capable drive becomes security-enabled.

Whenever a security-enabled drive is powered on, it requires the correct security key from the controller before it can read or write data. So, a security-enabled drive uses two keys: the drive key that encrypts and decrypts the data and the security key that authorizes the encryption and decryption processes. The `set storageArray securityKey` command commits the security key to all of the controllers and security-enabled drives in the storage array. The full disk encryption feature ensures that if a security-enabled drive is physically removed from a storage array, its data cannot be read by any other device unless the security key is known.

Set storage array time

The `set storageArray time` command sets the clocks on both controllers in a storage array by synchronizing the controller clocks with the clock of the host from which you run this command.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set storageArray time
```

Parameters

None.

Set storage array tray positions

The `set storageArray trayPositions` command defines the position of the trays in a storage array. You must include all of the trays in the storage array when you enter this command.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set storageArray trayPositions=(controller | trayID ... trayIDn)
```

Parameter

Parameter	Description
trayPositions	A list of all of the tray IDs. The sequence of the tray IDs in the list defines the positions for the controller tray and the drive trays in a storage array. Valid values are 0 to 99 . Enter the tray ID values separated with a space. Enclose the list of tray ID values in parentheses. For storage arrays where the controller tray has a predefined identifier that is not in the range of valid tray position values, use the controller value.

Notes

This command defines the position of a tray in a storage array by the position of the tray ID in the **trayPositions** list. For example, if you have a controller tray with an ID set to 84 and drive trays with IDs set to 1, 12, and 50, the **trayPositions** sequence (84 1 12 50) places the controller tray in the first position, drive tray 1 in the second position, drive tray 12 in the third position, and drive tray 50 in the fourth position. The **trayPositions** sequence (1 84 50 12) places the controller tray in the second position, drive tray 1 in the first position, drive tray 50 in the third position, and drive tray 12 in the fourth position.

Note: You must include all of the trays in the storage array in the list defined by the **trayPositions** parameter. If the number of trays in the list does not match the total number of trays in the storage array, an error message appears.

Note: The management software visually shows the first position on top, and the other positions in relative order beneath with the last position on the bottom.

Set storage array unnamed discovery session

The `set storageArray unnamedDiscoverySession` command enables the storage array to participate in unnamed discovery sessions.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set storageArray unnamedDiscoverySession=(TRUE | FALSE)
```

Parameter

Parameter	Description
unnamedDiscoverySession	This parameter turns on or turns off unnamed discovery sessions. Set the parameter to TRUE to turn on unnamed discovery sessions. Set the parameter to FALSE to turn off unnamed discovery sessions.

Notes

Discovery is the process where initiators determine the targets that are available. Discovery occurs at power-on/initialization and also if the bus topology changes, for example, if an extra device is added.

An unnamed discovery session is a discovery session that is established without specifying a target ID in the login request. For unnamed discovery sessions, neither the target ID nor the target portal group ID are available to the targets.

Show storage array

The `show storageArray` command returns configuration information about the storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Context

The parameters return lists of values for the components and features in the storage array. You can enter the command with a single parameter or more than one parameter. If you enter the command without any parameters, the entire storage array profile is shown (which is the same information as if you entered the **profile** parameter).

Syntax

```
show storageArray
[autoSupport| autoSupportConfig | profile |
batteryAge | connections | defaultHostType | healthStatus |
hostTypeTable | hotSpareCoverage | features | time |
volumeDistribution | longRunningOperations | summary | preferredVolumeOwners |
iscsiNegotiationDefaults | unconfiguredIscsiInitiators | autoLoadBalancingEnable |
cacheMirrorDataAssuranceCheckEnable | hostConnectivityReporting]
```

Parameters

Parameter	Description
autoLoadBalancingEnable	The parameter to return the enablement status of the Automatic Load Balancing feature. **Note:** When the Automatic Load Balancing feature is enabled, the Host Connectivity Reporting feature will also be enabled.
autoSupport	**Note:** This parameter is only valid for DE2000H, DE4000H, DE4000F, DE6000H, and DE6000F storage arrays running with an `https` client type. For DE2000H, DE4000H, DE4000F, DE6000H, and DE6000F storage arrays running with a client type, use the **autoSupportConfig** parameter.
autoSupportConfig	The parameter to return information about the current state of the operation to automatically collect support data. The following information is returned: • Whether the operation is enabled or disabled • The location of the folder where the support data file is located **Note:** This parameter is only valid for DE2000H, DE4000H, DE4000F, DE6000H, and DE6000Fstorage arrays running with a `symbol` client type. For DE2000H, DE4000H, DE4000F, DE6000H, and DE6000F storage arrays running with an `https` client type, use the **autoSupport** parameter.
batteryAge	The parameter to show the status, the age of the battery in days, and the number of days until the battery needs to be replaced. The information for both batteries is shown.
cacheMirrorDataAssuranceCheckEnable	The parameter to returns the enablement status of the cache mirror data assurance feature.

Parameter	Description
connections	The parameter to show a list of where the drive channel ports are located and where the drive channels are connected.
defaultHostType	The parameter to show the default host type and the host type index.
features	The parameter to show the feature configuration of the storage array.
healthStatus	The parameter to show the health, logical properties, and physical component properties of the storage array.
hostConnectivityReporting	The parameter to return the enablement status of the host connectivity reporting feature.
hostTypeTable	The parameter to show a table of all of the host types that are known to the controller. Each row in the table shows a host type index and the platform that the host type index represents.
hotSpareCoverage	The parameter to show information about which volumes of the storage array have hot spare coverage and which volumes do not.
iscsiNegotiationDefaults	The parameter to return information about connection-level settings that are subject to initiator-target negotiation.
longRunningOperations	The parameter to show the long running operations for each volume group and each volume in the storage array. The **longRunningOperation** parameter returns this information: • Name of the volume group or volume • Long running operation • Status • % complete • Time left
preferredVolumeOwners	The parameter to show the preferred controller owner for each volume in the storage array.

profile	The parameter to show all of the properties of the logical components and the physical components that comprise the storage array. The information appears in several screens.
	Note: The profile parameter returns detailed information about the storage array. The information covers several screens on a display. You might need to increase the size of your display buffer to see all the information. Because this information is so detailed, you might want to save the output of this parameter to a file.
	
	Use the following command to save the profile output to a file:
	
	`c:\...\smX\client>smcli 123.45.67.88`
	`123.45.67.89 -c "show storagearray profile;"`
	`-o "c:\folder\storagearray`
	`profile.txt"`

summary	The parameter to show a concise list of information about the storage array configuration.
time	The parameter to show the current time to which both controllers in the storage array are set.

Parameter	Description
unconfiguredIscsiInitiators	The parameter to return a list of initiators that have been detected by the storage array but are not yet configured into the storage array topology.
volumeDistribution	The parameter to show the current controller owner for each volume in the storage array.

Notes

The **profile** parameter shows detailed information about the storage array. The information appears on several screens on a display monitor. You might need to increase the size of your display buffer to see all of the information. Because this information is so detailed, you might want to save the output of this parameter to a file. To save the output to a file, run the show storageArray command that looks like this example.

```
-c "show storageArray profile;" -o "c:\\folder\\storageArrayProfile.txt"
```

The previous command syntax is for a host that is running a Windows operating system. The actual syntax varies depending on your operating system.

When you save information to a file, you can use the information as a record of your configuration and as an aid during recovery.

Note: While the storage array profile returns a large amount of data that is all clearly labeled, the additional wear life is reporting information for SSD drives in DE2000H, DE4000H, DE4000F, DE6000H, and DE6000F storage arrays. While previously the wear life reporting included information on average erase count and spare blocks remaining, it now includes the percent endurance used. The percent endurance used is the amount of data written to the SSD drives to date divided by the total theoretical write limit for the drives.

The **batteryAge** parameter returns information in this form.

```
Battery status: Optimal
    Age: 1 day(s)
    Days until replacement: 718 day(s)
```

The newer controller trays do not support the **batteryAge** parameter.

The **defaultHostType** parameter returns information in this form.

```
Default host type: Linux (Host type index 6)
```

The **healthStatus** parameter returns information in this form.

```
Storage array health status = optimal.
```

The **hostTypeTable** parameter returns information in this form.

```
NVSRAM HOST TYPE INDEX DEFINITIONS
HOST TYPE                          ALUA/AVT STATUS       ASSOCIATED INDEXS
Factory Default                    Enabled               0
Linux DM-MP(Kernel 3.10 or later)  Enabled               28(Default)
Linux DM-MP(Kernel 3.9 or earlier) Enabled               7
SVC                                Enabled               18
VMWare                             Enabled               10
Windows                            Enabled               1
Windows Clustered                  Enabled               8
```

The **hotSpareCoverage** parameter returns information in this form.

```
The following volume groups are not protected: 2, 1
Total hot spare drives: 0
   Standby: 0
   In use: 0
```

The **features** parameter returns information that shows which features are enabled, disabled, evaluation, and available to be installed. This command returns the feature information in a format similar to this:

```
PREMIUM FEATURE            STATUS

asyncMirror                Trial available
syncMirror                 Trial available/Deactivated
thinProvisioning           Trial available
driveSlotLimit             Enabled (12 of 192 used)
snapImage                   Enabled (0 of 512 used) - Trial version expires m/d/y
snapshot                    Enabled (1 of 4 used)
storagePartition           Enabled (0 of 2 used)
volumeCopy                  Enabled (1 of 511 used)
SSDSupport                  Disabled (0 of 192 used) - Feature Key required
driveSecurity              Disabled - Feature Key required
enterpriseSecurityKeyMgr   Disabled - Feature Key required
highPerformanceTier        Disabled - Feature Key required
```

The **time** parameter returns information in this form.

```
Controller in Slot A

Date/Time: Thu Jun 03 14:54:55 MDT 2004
Controller in Slot B

Date/Time: Thu Jun 03 14:54:55 MDT 2004
```

The **longRunningOperations** parameter returns information in this form:

```
LOGICAL DEVICES  OPERATION          STATUS        TIME REMAINING
Volume-2         Volume Disk Copy  10% COMPLETED  5 min
Right.
```

The information fields returned by the **longRunningOperations** parameter have these meanings:

- **NAME** is the name of a volume that is currently in a long running operation. The volume name must have the "Volume" as a prefix.

- **OPERATION** lists the operation being performed on the volume group or volume.

- **% COMPLETE** shows how much of the long running operation has been performed.

- **STATUS** can have one of these meanings:

  - Pending – The long running operation has not started but will start after the current operation is completed.

  - In Progress – The long running operation has started and will run until completed or stopped by user request.

- **TIME REMAINING** indicates the duration remaining to completing the current long running operation. The time is in an "hours minute" format. If less than an hour remains, only the minutes are shown. If less than a minute remains, the message "**less than a minute**" is shown.

The **volumeDistribution** parameter returns information in this form.

```
volume name: 10
     Current owner is controller in slot: A

volume name: CTL 0 Mirror Repository
     Current owner is controller in slot: A

volume name: Mirror Repository 1
     Current owner is controller in slot:A

volume name: 20
     Current owner is controller in slot:A

volume name: JCG_Remote_MirrorMenuTests
     Current owner is controller in slot:A
```

Show storage array auto configuration

The `show storageArray autoConfiguration` command shows the default auto-configuration that the storage array creates if you run the `autoConfigure storageArray` command.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Context

If you want to determine whether the storage array can support specific properties, enter the parameter for the properties when you run this command. You do not need to enter any parameters for this command to return configuration information.

Syntax

```
show storageArray autoConfiguration
[driveType=(SAS)
driveMediaType=(HDD | SSD | unknown | allMedia)
raidLevel=(0 | 1 | 3 | 5 | 6)
volumeGroupWidth=numberOfDrives
volumeGroupCount=numberOfVolumeGroups
volumesPerGroupCount=numberOfVolumesPerGroup
hotSpareCount=numberOfHotspares
segmentSize=segmentSizeValue
cacheReadPrefetch=(TRUE | FALSE)
securityType=(none | capable | enabled)
secureDrives=(fips | fde)]
```

Parameters

Parameter	Description
driveType	The type of drives that you want to use for the storage array. The **driveType** parameter is not required if only one type of drive is in the storage array. You must use this parameter when you have more than one type of drive in your storage array. Valid drive type is: SAS
driveMediaType	The type of drive media that you want to use for the mirror repository volume group. Valid drive media are these: • SSD – Use this option when you have solid state drives in the drive tray. • unknown – Use if you are not sure what types of drive media are in the drive tray. • allMedia – Use this option when you want to use all types of drive media that are in the drive tray. Use this parameter when you use the **repositoryDriveCount** parameter. You must use this parameter when you have more than one type of drive media in your storage array.
raidLevel	The RAID level of the volume group that contains the drives in the storage array. Valid RAID levels are 0 , 1 , 3 , 5 , or 6 .
volumeGroupWidth	The number of drives in a volume group in the storage array, which depends on the capacity of the drives. Use integer values.
volumeGroupCount	The number of volume groups in the storage array. Use integer values.
volumesPerGroupCount	The number of equal-capacity volumes per volume group. Use integer values.
hotSpareCount	The number of hot spares that you want in the storage array. Use integer values.
segmentSize	The amount of data (in KB) that the controller writes on a single drive in a volume before writing data on the next drive. Valid values are 8 , 16 , 32 , 64 , 128 , 256 , or 512 .
cacheReadPrefetch	The setting to turn on or turn off cache read prefetch. To turn off cache read prefetch, set this parameter to FALSE . To turn on cache read prefetch, set this parameter to TRUE .

Parameter	Description
securityType	The setting to specify the security level when creating the volume groups and all associated volumes. These settings are valid: • none – The volume group and volumes are not secure. • capable – The volume group and volumes are capable of having security set, but security has not been enabled. • enabled – The volume group and volumes have security enabled.
secureDrives	The type of secure drives to use in the volume group. These settings are valid: • fips – To use FIPS compliant drives only. • fde – To use FDE compliant drives. **Important:** Use this parameter along with the **securityType** parameter. If you specify none for the **securityType** parameter, the value of the **secureDrives** parameter is ignored, because non-secure volume groups do not need to have secure drive types specified.

Notes

If you do not specify any properties, this command returns the RAID Level 5 candidates for each drive type. If RAID Level 5 candidates are not available, this command returns candidates for RAID Level 6, RAID Level 3, RAID Level 1, or RAID Level 0. When you specify auto configuration properties, the controllers validate that the firmware can support the properties.

Drives and volume groups

A volume group is a set of drives that are logically grouped together by the controllers in the storage array. The number of drives in a volume group is a limitation of the RAID level and the controller firmware. When you create a volume group, follow these guidelines:

• You can create an empty volume group so that you can reserve the capacity for later use.

• The maximum number of drives in a volume group depends on these conditions:

  – The type of controller

  – The RAID level

• RAID levels include: 0, 1, 10, 3, 5, and 6 .

  – A volume group with RAID level 3, RAID level 5, or RAID level 6 cannot have more than 30 drives.

  – A volume group with RAID level 6 must have a minimum of five drives.

  – If a volume group with RAID level 1 has four or more drives, the storage management software automatically converts the volume group to a RAID level 10, which is RAID level 1 + RAID level 0.

• If a volume group contains drives that have different capacities, the overall capacity of the volume group is based on the smallest capacity drive.

• To enable tray/drawer loss protection, refer to the following tables for additional criteria:

Level	Criteria for Shelf Loss Protection	Minimum number of shelves required
Disk Pool	The disk pool contains no more than two drives in a single tray.	6
RAID 6	The volume group contains no more than two drives in a single shelf.	3

Level	Criteria for Shelf Loss Protection	Minimum number of shelves required
RAID 3 or RAID 5	Each drive in the volume group is located in a separate shelf.	3
RAID 1	Each drive in a RAID 1 pair must be located in a separate shelf.	2
RAID 0	Cannot achieve Shelf Loss Protection.	Not applicable

Level	Criteria for drawer loss protection	Minimum number of drawers required
Disk Pool	The pool includes drives from all five drawers and there are an equal number of drives in each drawer. A 60-drive tray can achieve Drawer Loss Protection when the disk pool contains 15, 20, 25, 30, 35, 40, 45, 50, 55, or 60 drives.	5
RAID 6	The volume group contains no more than two drives in a single drawer.	3
RAID 3 or RAID 5	Each drive in the volume group is located in a separate drawer.	3
RAID 1	Each drive in a mirrored pair must be located in a separate drawer.	2
RAID 0	Cannot achieve Drawer Loss Protection.	Not applicable

Hot spares

With volume groups, a valuable strategy to protect data is to assign available drives in the storage array as hot spare drives. A hot spare is a drive, containing no data, that acts as a standby in the storage array in case a drive fails in a RAID 1, RAID 3, RAID 5, or RAID 6 volume group. The hot spare adds another level of redundancy to the storage array.

Generally, hot spare drives must have capacities that are equal to or greater than the used capacity on the drives that they are protecting. Hot spare drives must be of the same media type, the same interface type, and the same capacity as the drives that they are protecting.

If a drive fails in the storage array, the hot spare is normally substituted automatically for the failed drive without requiring your intervention. If a hot spare is available when a drive fails, the controller uses redundancy data parity to reconstruct the data onto the hot spare. Data evacuation support also allows data to be copied to a hot spare before the software marks the drive "failed."

After the failed drive is physically replaced, you can use either of the following options to restore the data:

When you have replaced the failed drive, the data from the hot spare is copied back to the replacement drive. This action is called copyback.

If you designate the hot spare drive as a permanent member of a volume group, the copyback operation is not needed.

The availability of tray loss protection and drawer loss protection for a volume group depends on the location of the drives that comprise the volume group. Tray loss protection and drawer loss protection might be lost because of a failed drive and the location of the hot spare drive. To make sure that tray loss protection and drawer loss protection are not affected, you must replace a failed drive to initiate the copyback process.

The storage array automatically selects Data Assurance (DA)-capable drives for hot spare coverage of DA-enabled volumes.

Make sure you have DA-capable drives in the storage array for hot spare coverage of DA-enabled volumes. For more information about DA-capable drives, refer to Data Assurance feature.

Secure-capable (FIPS and FDE) drives can be used as a hot spare for both secure-capable and non-secure-capable drives. Non-secure-capable drives can provide coverage for other non-secure-capable drives, and for secure-capable drives if the volume group does not have the security enabled. A FIPS volume group can only use a FIPS drive as a hot spare; however, you can use a FIPS hot spare for non-secure-capable, secure-capable, and secure-enabled volume groups.

If you do not have a hot spare, you can still replace a failed drive while the storage array is operating. If the drive is part of a RAID 1, RAID 3, RAID 5, or RAID 6 volume group, the controller uses redundancy data parity to automatically reconstruct the data onto the replacement drive. This action is called reconstruction.

Segment size

The size of a segment determines how many data blocks that the controller writes on a single drive in a volume before writing data on the next drive. Each data block stores 512 bytes of data. A data block is the smallest unit of storage. The size of a segment determines how many data blocks that it contains. For example, an 8-KB segment holds 16 data blocks. A 64-KB segment holds 128 data blocks.

When you enter a value for the segment size, the value is checked against the supported values that are provided by the controller at run time. If the value that you entered is not valid, the controller returns a list of valid values. Using a single drive for a single request leaves other drives available to simultaneously service other requests. If the volume is in an environment where a single user is transferring large units of data (such as multimedia), performance is maximized when a single data transfer request is serviced with a single data stripe. (A data stripe is the segment size that is multiplied by the number of drives in the volume group that are used for data transfers.) In this case, multiple drives are used for the same request, but each drive is accessed only once.

For optimal performance in a multiuser database or file system storage environment, set your segment size to minimize the number of drives that are required to satisfy a data transfer request.

Cache read prefetch

Cache read prefetch lets the controller copy additional data blocks into cache while the controller reads and copies data blocks that are requested by the host from the drive into cache. This action increases the chance that a future request for data can be fulfilled from cache. Cache read prefetch is important for multimedia applications that use sequential data transfers. Valid values for the **cacheReadPrefetch** parameter are TRUE or FALSE . The default is TRUE .

Security type

Use the **securityType** parameter to specify the security settings for the storage array.

Before you can set the **securityType** parameter to enabled , you must create a storage array security key. Use the `create storageArray securityKey` command to create a storage array security key. These commands are related to the security key:

- `create storageArray securityKey`
- `export storageArray securityKey`
- `import storageArray securityKey`
- `set storageArray securityKey`
- `enable volumeGroup [volumeGroupName] security`

- `enable diskPool [diskPoolName] security`

Secure drives

Secure-capable drives can be either Full Disk Encryption (FDE) drives or Federal Information Processing Standard (FIPS) drives. Use the **secureDrives** parameter to specify the type of secure drives to use. The values you can use are fips and fde .

Example command

`show storageArray autoConfiguration securityType=capable secureDrives=fips;`

Show storage array DBM database

The `show storageArray dbmDatabase` command retrieves and shows metadata for the on-board backup locations of a storage array. When there are multiple backup locations, metadata is shown for each location.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Syntax

`show storageArray dbmDatabase`

Parameters

None.

Notes

This command returns the configuration database information in a format similar to this example.

Configuration Database MetadataLast Host Backup: <date stamp>						
CTL	LOCATION	REVISION	ID	GEN NUMBER	STATUS	ACCESS MODE
A	Cache	X.Y	999999	999999	R/W	Optimal
B	Cache	X.Y	999999	999999	R/W	Optimal
N/A	Disk	X.Y	999999	999999	R/W	Optimal

Show storage array host connectivity reporting

The `show storageArray hostConnectivityReporting` command returns the enablement status of the host connectivity reporting feature.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Syntax

```
show storageArray hostConnectivityReporting
```

Parameters

None.

Show storage array host topology

The `show storageArray hostTopology` command returns the storage partition topology, the host type labels, and the host type index for the host storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Syntax

```
show storageArray hostTopology
```

Parameters

None.

Notes

This command returns the host topology information similar to this example.

```
TOPOLOGY DEFINITIONS
 DEFAULT GROUP
  Default type: Windows 2012/Server 2016 Non-Clustered
  Host Group: scott
   Host: scott1
    Host Port: 28:37:48:55:55:55:55:55
     Alias: scott11
     Type: Windows 2012/Server 2016 Clustered
   Host: scott2
    Host Port: 98:77:66:55:44:33:21:23
     Alias: scott21
     Type: Windows 2012/Server 2016 Clustered
   Host: Bill
    Host Port: 12:34:55:67:89:88:88:88
     Alias: Bill1
     Type: Windows 2012/Server 2016 Non-Clustered
NVSRAM HOST TYPE INDEX DEFINITIONS
HOST TYPE                        ALUA/AVT STATUS      ASSOCIATED INDEXS
Factory Default                  Enabled              0
Linux DM-MP(Kernel 3.10 or later)  Enabled              28(Default)
Linux DM-MP(Kernel 3.9 or earlier) Enabled              7
SVC                              Enabled              18
VMWare                           Enabled              10
```

```
Windows                           Enabled                  1
Windows Clustered                 Enabled                  8
```

Show storage array LUN mappings

The `show storageArray lunMappings` command returns information from the storage array profile about the logical unit number (LUN) or namespace ID (NSID) mappings in the storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Context

Default group LUN or NSID mappings are always shown. If you run this command without any parameters, this command returns all of the LUN or NSID mappings.

Syntax

```
show storageArray lunMappings (host ["hostName"] |
hostgroup ["hostGroupName"])
```

Parameters

Parameter	Description
host	The name of a specific host for which you want to see the LUN or NSID mappings. Enclose the host name in double quotation marks (" ") inside of square brackets ([ ]).
hostGroup	The name of a specific host group for which you want to see the LUN or NSID mappings. Enclose the host group name in double quotation marks (" ") inside of square brackets ([ ]).

Notes

This command returns host topology information similar to this example.

```
MAPPINGS (Storage Partitioning - Enabled (0 of 16 used))
VOLUME NAME  LUN  CONTROLLER  ACCESSIBLE BY  VOLUME STATUS
Access Volume 7
A
,
B
        Default Group  Optimal
21       21
B
         Default Group  Optimal
22        22
B
        Default Group  Optimal
```

Show storage array negotiation defaults

The `show storageArray iscsiNegotiationDefaults` command returns information about connection-level settings that are subject to initiator-target negotiation.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Syntax

```
show storageArray iscsiNegotiationDefaults
```

Parameters

None.

Notes

Information returned includes controller tray default settings (that is, those settings that are the starting point for negotiation) and the current active settings.

Show storage array ODX setting

The `show storageArray odxsetting` command returns the current settings for Offloaded Data Transfer (ODX) and VMware vStorage API Array Architecture (VAAI) on the storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Context

The settings for this command can be one of the following:

- True – ODX and VAAI are turned on.
- False – ODX and VAAI are turned off.
- Inconsistent – The controllers do not have the same settings.
- Unknown – The setting for ODX or VAAI cannot be determined.

Syntax

```
show storageArray odxsetting
```

Parameters

None.

Notes

This command returns the ODX and VAAI information similar to this example.

```
Windows ODX Setting Status
odxEnabled  True | False | Inconsistent | Unknown

vaaiEnabled True | False | Inconsistent | Unknown
```

Show storage array power information

The `show storageArray powerInfo` command returns information about the amount of power consumed by the entire storage array and each tray in the storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Syntax

```
show storageArray powerInfo
```

Parameters

None.

Notes

This command returns power consumption information similar to this example.

```
total power drawn: 310 watts
number of trays: 1
tray power input details:
   tray id   power supply serial number   input power
   0         0                            160 watts
   0         1                            150 watts
```

Show storage array unconfigured iSCSI initiators

The `show storageArray unconfiguredIscsiInitiators` command returns a list of initiators that have been detected by the storage array but are not yet configured into the storage array topology.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

This command is deprecated. The command that replaces it is "show storageArray unconfiguredInitiators" on page 122.

Syntax

```
show storageArray unconfiguredIscsiInitiators
```

Parameters

None.

Show storage array unreadable sectors

The `show storageArray unreadableSectors` command returns a table of the addresses of all of the sectors in the storage array that cannot be read.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Context

The returned table is organized with column headings for the following information:

- Volume user label
- Logical unit number (LUN)
- Accessible by (host or host group)
- Date/time
- Volume-relative logical block address (hexadecimal format – 0xnnnnnnnn)
- Drive location (tray t, slot s)
- Drive-relative logical block address (hexadecimal format – 0xnnnnnnnn)
- Failure type

The data is sorted first by the volume user label and second by the logical block address (LBA). Each entry in the table corresponds to a single sector.

Syntax

```
show storageArray unreadableSectors
```

Parameters

None.

Show string

The `show textstring` command shows a string of text from a script file. This command is similar to the `echo` command in MS-DOS and UNIX.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Syntax

```
show "textString"
```

Parameters

None.

Notes

Enclose the string in double quotation marks (" ").

Start storage array configuration database diagnostic

The `start storageArray configDbDiagnostic` command runs a consistency check against a configuration database.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
start storageArray configDbDiagnostic
[sourceLocation=(disk | onboard) |
diagnosticType=(fileSystem | mirror) |
controller[(a|b)]]
```

Parameters

Parameter	Description
sourceLocation	This parameter specifies the location of the database. • `disk` indicates that data comes directly from the database on the drive • `onboard` indicates that data comes from the RPA memory location The default location is `disk` .
diagnosticType	The level of diagnostic testing that you want to run on the database. You can run one of these levels of testing: `fileSystem` – This option checks the structural integrity of the database. `mirror` – The tests run using this option vary according to the value of the **sourceLocation** parameter: • When the **sourceLocation** parameter is set to `disk` , the peer controller initiates a block check. • When the **sourceLocation** parameter is set to `onboard` , the peer controller initiates a record check. **Note:** You can run the `mirror` option only from a command line or from the Script editor. This option is not available through the storage management software GUI. The `mirror` option starts a long running operation that you cannot stop. The default value is `fileSystem` .
controller	The controller that has the database on which you want to run the diagnostic tests. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . Enclose the controller identifier in square brackets ([ ]).

Notes

This command runs a consistency check against a configuration database. All database records are checked. Error data is written to a file in the data folder on disk automatically. You do not need to specify an output file.

Note: Running a consistency check with the `diagnosticType` parameter set to `mirror` and with the `sourceLocation` parameter set to `onboard` can cause the operation to run for a long time. This can have

adverse effects on host I/O processing. This operation should be done only under direction from the support organization.

Upon completion of the diagnostic test, the controller firmware returns one of these results:

- `Diagnosis completed without errors. No ZIP file created.`
- `Diagnosis completed with errors. Refer to the ZIP file created at:`

  `...\Install_dir\data\FirmwareUpgradeReports\timestamp_buildNo.zip`

If the diagnostic test detects an inconsistency in the configuration database, the controller firmware performs these actions:

- Returns a description of the inconsistency
- Saves a ZIP file containing raw binary data

The controller firmware saves the ZIP file to this location:

`...\Install_dir\data\FirmwareUpgradeReports\timestamp_buildNo.zip`

You can use the binary data to help determine the cause of the problem, or you can send the file containing the binary data to technical support.

To stop the database configuration diagnostic test, use the `stop storageArray configDbDiagnostic` command.

In addition, you can start the database configuration diagnostic test through the storage management software GUI; however, you cannot stop the database configuration diagnostic test through the storage management software GUI. If you want to stop a running diagnostic test, you must use the `stop storageArray configDbDiagnostic` command.

Start storage array iSNS server refresh

The `start storageArray isnsServerRefresh` command initiates a refresh of the network address information for the iSNS server.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

If the DHCP server is marginal or unresponsive, the refresh operation can take from two to three minutes to complete.

Note: This command is for IPv4 only.

Syntax

`start storageArray isnsServerRefresh`

Parameter

None.

Notes

If you used the `set storageArray isnsIPv4ConfigurationMethod` command to set the configuration but did not set the configuration to DHCP, running the `start storageArray isnsServerRefresh` returns an error.

Start storage array locate

The `start storageArray locate` command locates a storage array by turning on the indicator lights for the storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Use the `stop storageArray locate` command to turn off the indicator lights for the storage array.

Syntax

```
start storageArray locate
```

Parameters

None.

Stop storage array configuration database diagnostic

The `stop storageArray configDbDiagnostic` command stops the diagnostic test to validate the configuration database in the controller firmware that was started by the `start storageArray configDbDiagnostic` command.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
stop storageArray configDbDiagnostic
```

Parameters

None.

Notes

The controller firmware returns a confirmation that the diagnostic test was cancelled.

In addition, you can start the database configuration diagnostic test through the storage management software GUI; however, you cannot stop the database configuration diagnostic test through the storage management software GUI. If you want to stop a running diagnostic test, you must use the `stop storageArray configDbDiagnostic` command.

If you try to use the `stop storageArray configDbDiagnostic` command after validation of the storage array configuration has finished, you do not receive any message that the validation has finished. This behavior is expected.

Stop storage array drive firmware download

The `stop storageArray driveFirmwareDownload` command stops a firmware download to the drives in a storage array that was started with the `download storageArray driveFirmware` command.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

This command does not stop a firmware download that is already in progress to a drive. This command stops all firmware downloads to drives that are waiting for the download.

Syntax

```
stop storageArray driveFirmwareDownload
```

Parameters

None.

Stop storage array iSCSI session

The `stop storageArray iscsiSession` command forces the termination of a storage array iSCSI session.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
stop storageArray iscsiSession [sessionNumber]
```

Parameter

Parameter	Description
iscsiSession	The identifier number of the iSCSI session. Enclose the identifier number of the iSCSI session in square brackets ([ ]).

Stop storage array locate

The `stop storageArray locate` command turns off the indicator lights on the storage array that were turned on by the `start storageArray locate` command.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
stop storageArray locate
```

Parameters

None.

Validate storage array security key

The `validate storageArray securityKey` command validates the security key for a storage array that has security-capable drives to make sure that the back-up security key file is not corrupt.

Supported Arrays

If external key management is enabled, then this command applies only to the DE2000H/ DE4000H / DE4000F DE6000H / DE6000F arrays. If internal key management is enabled, then the command applies to any individual storage array, as long as all SMcli packages are installed.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

Security key validation uses the pass phrase used to generate the file to decrypt the key and match it with the value maintained in controller memory (for internal keys) or on the external server (for external keys).

Note: This command applies to both internal and external key management.

Syntax

```
validate storageArray securityKey file="fileName" passPhrase="passPhraseString"
```

Parameters

Parameter	Description
file	The file path and the file name that has the security key. Enclose file path and the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\sup\drivesecurity.slk"` **Important:** The file name must have an extension of .slk .
passPhrase	A character string that encrypts the security key so that you can store the security key in an external file. Enclose the pass phrase in double quotation marks (" ").

Tray commands

Download environmental card firmware

The `download tray firmware file` command downloads environmental services module (ESM) firmware.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Context

Important: On duplex systems managed by System Manager (for example, there is an IOM Auto-Synchronization Service running on the controllers that will automatically sync the IOM firmware with the version contained in the SANtricity OS bundle that is loaded on the controllers. If you do not want the IOM firmware to be reverted to match the version loaded on the controllers, you will need to disable this service. The IOM Auto-Synchronization Service can be suspended using the System Manager or the REST API. When suspending this service, be aware that leaving auto-synchronization enabled ensures the IOM firmware is up to date.

Syntax

```
download (allTrays | tray [trayID])
firmware file="filename"
```

Parameters

Parameter	Description
allTrays	This parameter downloads new firmware to all of the compatible trays in the storage array. The firmware package you select determines which trays are compatible. Incompatible trays are skipped. No error message is displayed about incompatible trays.
tray	The drive tray that contains the ESM card to which you want to load new firmware. Tray ID values are 0 to 99 . Enclose the tray ID value in square brackets ([ ]). **Note:** There can be no leading zero in the tray ID. For example, if the displayed tray ID is "02," this command requires it to be specified as [2], not [02].
file	The file path and the file name of the file that contains the firmware image. Enclose the file path and the file name of the firmware image in double quotation marks (" "). For example: `file="C:\Program Files\CLI\dnld\esmfrm.esm"` Valid file names have an `.esm` extension.

Notes

The **tray** parameter downloads new firmware to a specific drive tray. If you need to download new firmware to more than one drive tray, but not all drive trays, you must enter this command for each drive tray.

Download tray configuration settings

The `download tray configurationSettings` command downloads the factory default settings to all of the drive trays in a storage array or to a specific drive tray in a storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Syntax

```
download (allTrays | tray [trayID]) configurationSettings
file="filename"
```

Parameters

Parameter	Description
allTrays	This parameter downloads new firmware to all of the trays in the storage array.
tray	The drive tray that contains the ESM card to which you want to load new firmware. Tray ID values are 0 to 99 . Enclose the tray ID value in square brackets ([ ]).
file	The file path and the file name of the file that contains the firmware image. Enclose the file path and the file name of the firmware image in double quotation marks (" "). For example: `file="C:\Program Files\CLI\dnld\trayset.dlp"` Valid file names have a `.dlp` extension.

Notes

The **tray** parameter downloads the factory default configuration settings to a specific drive tray. If you need to download the factory default configuration settings to more than one drive tray, but not all drive trays, you must enter this command for each drive tray.

Save tray log

The `save allTrays logFile` command saves the log sense data to a file.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Log sense data is maintained by the environmental cards for each tray. Not all of the environmental cards contain log sense data.

Syntax

`save allTrays logFile="filename"`

Parameter

Parameter	Description
logFile	The file path and the file name to which you want to save the log sense data. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\traylogdat.txt"` This command does not automatically append a file extension to the saved file. You must specify a file extension when entering the file name.

Set drawer service action allowed indicator

The `set tray drawer` command turns on or turns off the Service Action Allowed indicator light on a drawer that holds drives.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Drawers are used in high-capacity drive trays. The drawers slide out of the drive tray to provide access to the drives. Use this command only for drive trays that use drawers. If the storage array does not support the Service Action Allowed indicator light feature, this command returns an error. If the storage array supports the command but is unable to turn on or turn off the indicator light, this command returns an error.

Syntax

```
set tray [trayID] drawer [drawerID]
serviceAllowedIndicator=(on | off | forceOnWarning)
```

Parameters

Parameter	Description
tray	The tray where the drawer resides. Tray ID values are 0 to 99 . Enclose the tray ID value in square brackets ([ ]). If you do not enter a tray ID value, the tray ID of the controller tray is the default value.
drawer	The location of the drawer for which you want to turn on or turn off the Service Action Allowed Indicator light. Drawer ID values are 1 to 5 . Enclose the drawer ID value in square brackets ([ ]).
serviceAllowedIndicator	The setting to turn on or turn off the Service Action Allowed indicator light. To turn on the Service Action Allowed indicator light, set this parameter to on . To turn off the Service Action Allowed indicator light, set this parameter to off . For information about using **forceOnWarning** , see the Notes.

Notes

Before you can enter this command, the drive tray must meet these conditions:

* The drive tray cannot be over temperature.
* The fans must have a status of Optimal.
* All drive tray components must be in place.
* The volumes in the drive drawer cannot be in a Degraded state. If you remove drives from the drive drawer and a volume is already in a Degraded state, the volume can fail.

Attention: Do not issue this command if you cannot meet any of these conditions.

All volumes with drives in the affected drive drawer are checked to make sure that the volumes have drawer loss protection before the command is sent. If the volumes have drawer loss protection, the Set Service Action Allowed command proceeds without stopping I/O activity to the volume.

If any volumes in the affected drawer do not have drawer loss protection, you must stop I/O activity to those volumes. A warning appears, which indicates that this command should not be completed.

To turn on or turn off the Service Action Allowed indicator light for the entire high-capacity drive tray, use the `set tray serviceAllowedIndicator` command.

Use of the forceOnWarning parameter

If you are preparing a component for removal and want to override the warning that the volumes do not have drawer loss protection, enter this parameter:

```
serviceAllowedIndicator=forceOnWarning
```

The **forceOnWarning** parameter sends the request to prepare to remove a component to the controller firmware, and forces the `set drawer serviceAllowedIndicator` command to proceed.

Attention: This parameter marks all drives in the drawer inaccessible and could result in failed volumes and complex recovery, including the necessity to reboot the host. Use this parameter with caution.

Set tray attribute

The `set tray` command sets user-defined attributes for an tray.

Syntax

```
set tray [trayID] (chassisName | assetTag)="userID"
```

Parameters

Parameter	Description
tray	Identifies a specific tray for which to set the attribute. Tray ID values are 0 to 99. You must put brackets ([ ]) around the enclosure ID value.
chassisName	Chassis name or number to give the new enclosure. Chassis names can be any combination of alphanumeric characters with a maximum length of 32 characters. Alphabetical characters can be uppercase or lowercase. You can also use the underscore character (_) and the hyphen (-) character. You cannot use spaces in a chassis name. You must put quotation marks (" ") around the chassis name.
assetTag	Asset tag name or number to give the new enclosure. Asset tags can be any combination of alphanumeric characters with a maximum length of ten characters. Alphabetical characters can be uppercase or lowercase. You can also use the underscore character (_) and the hyphen (-) character. You cannot use spaces in an asset tag name. You must put quotation marks (" ") around the asset tag name.

Set tray identification

The `set tray` command sets the tray ID of a controller tray, a controller-drive tray, or a drive tray in a storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

This command is valid only for controller trays, controller-drive trays, or drive trays that have tray IDs that you can set through the controller firmware. You cannot use this command for controller trays, controller-drive trays, or drive trays that have a tray ID that you set with a switch.

Syntax

```
set tray ["serialNumber"] id=trayID
```

Parameters

Parameter	Description
tray	The serial number of the controller tray, controller-drive tray, or the drive tray for which you are setting the tray ID. Serial numbers can be any combination of alphanumeric characters and any length. Enclose the serial number in double quotation marks (" ").
id	The value for the controller tray tray ID, controller-drive tray tray ID, or the drive tray tray ID. Tray ID values are 0 through 9 or 10 through 99 . **Note:** You do not need to enclose the tray ID value in parentheses. **Note:** Tray values of 00 through 09 are rejected by the controller. Use 0 through 9 to specify those values.

Set tray service action allowed indicator

The `set tray serviceAllowedIndicator` command turns on or turns off the Service Action Allowed indicator light on a power-fan canister, an interconnect-battery canister, or an environmental services module (ESM) canister.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Context

If the storage array does not support the Service Action Allowed indicator light feature, this command returns an error. If the storage array supports the command but is unable to turn on or turn off the indicator light, this command returns an error.

To turn on or turn off the Service Action Allowed indicator light on the controller canister, use the `set controller serviceAllowedIndicator` command.

Syntax

```
set tray [trayID]
(powerFan [(left | right | top | bottom)] |
interconnect |
esm [(left | right | top | bottom)]) |
battery [(left | right)] |
fanCanister [(left | right)]  |
powerCanister [(top | bottom)] |
serviceAllowedIndicator=(on | off)
```

Parameters

Parameter	Description
tray	The tray where the power-fan canister, the interconnect canister, the ESM canister, or the battery canister resides. Tray ID values are 0 to 99 . Enclose the tray ID value in square brackets ([ ]). If you do not enter a tray ID value, the tray ID of the controller tray is the default value.
powerFan	The Service Action Allowed indicator light on the power-fan canister that you want to turn on or turn off. Valid power-fan canister identifiers are left , right , top , or bottom . Enclose the power-fan canister identifier in square brackets ([ ]).
interconnect	The Service Action Allowed indicator light for the interconnect-battery canister.
esm	The Service Action Allowed indicator light for an ESM canister. Valid ESM canister identifiers are left , right , top , or bottom .
battery	The Service Action Allowed indicator light for a battery. Valid battery identifiers are left or right .
fanCanister	The Service Action Allowed indicator light for a fan canister. Valid fan canister identifiers are left or right .
powerCanister	The Service Action Allowed indicator light for a power canister. Valid power canister identifiers are top or bottom .
serviceAllowedIndicator	The setting to turn on or turn off the Service Action Allowed indicator light. To turn on the Service Action Allowed indicator light, set this parameter to on . To turn off the Service Action Allowed indicator light, set this parameter to off .

Example

This command turns on the Service Action Allowed indicator light for the left ESM in tray 5 with the IP address of 155.155.155.155.

```
SMcli 123.145.167.214 123.145.167.215 -c "set tray [5]
ESM [left]
 serviceAllowedIndicator=on;"
```

Start tray locate

The `start tray locate` command locates a tray by turning on the indicator light.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Use the `stop tray locate` command to turn off the indicator light for the tray.

Syntax

```
start tray [trayID] locate
```

Parameter

Parameter	Description
tray	The tray that you want to locate . Tray ID values are 0 to 99 . Enclose the tray ID value in square brackets ([ ]).

Stop tray locate

The `stop tray locate` command turns off the indicator light on the tray that was turned on by the `start tray locate` command.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
stop tray locate
```

Parameters

None.

Uncategorized commands

Recover SAS port mis-wire

The `recover sasPort miswire` command tells a controller that corrective action has been taken to recover from a mis-wire condition.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Context

The controller can then re-enable any SAS ports that were disabled because a mis-wire was detected. Run this command after you have corrected any SAS mis-wire conditions.

SAS mis-wire conditions can be one of the following:

- Invalid SAS topologies
- Controller host port to expansion tray connection
- Initiator to drive topology connection
- ESM mis-wire

Syntax

```
recover sasPort miswire
```

Parameters

None.

Notes

When a mis-wire condition is detected the controller firmware reports the following:

- A critical MEL event indicating the presence of a mis-wire condition
- A "Needs Attention" condition
- A Recovery Action indicating the mis-wire

In addition, the controller reports "Redundancy Loss" information for the drives, ESMs, and trays for which it has only one access path due to the mis-wire (for example the bottom two trays in a storage array). The Redundancy Loss information is not unique to SAS topologies.

Following are the event notifications related to SAS port mis-wire:

- SAS mis-wire detected
- HBA connected to drive channel
- Drive channels cross wired

For mis-wire conditions where the controller disables one or more SAS ports to protect the integrity of the SAS domain, take these steps to recover from the condition:

1. Determine which cable is in the wrong place and remove it. If the last action taken was to install a new cable, this is the most likely candidate. If not, look for cables attached to devices that are not part of the storage array or cables attached between channels. The recovery event should report the channel on which the mis-wire was detected, and possibly the tray.

2. After you remove a cable or move the cable to the correct location, run the `recover sasPort miswire` command. The controller will attempt to re-enable any SAS ports that were disabled when the mis-wire was detected.

3. If the cable that you removed or moved to correct for the mis-wire provided the controller its only access to the disabled port, the controller will not be able to re-enable the SAS port that was disabled. To complete the recovery, you must power cycle the trays in the storage array.

Show string

The `show textstring` command shows a string of text from a script file. This command is similar to the `echo` command in MS-DOS and UNIX.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Syntax

```
show "textString"
```

Parameters

None.

Notes

Enclose the string in double quotation marks (" ").

Chapter 11. Auto support commands

AutoSupport commands for all storage arrays

This section describes commands that apply to all storage arrays. `AutoSupport` is set to **disabled** by default. To obtain all of the benefits of AutoSupport, it must be enabled. Before enabling AutoSupport, please read the Lenovo Privacy Statement at https://www.lenovo.com/us/en/privacy/.

Note: The Secure Command Line interface package must be installed for these commands to operate on an DE2000H/ DE4000H / DE4000F/ DE6000H/ DE6000F storage array.

Enable or disable AutoSupport (all individual arrays)

This command enables or disables AutoSupport (ASUP) feature for the storage array and makes it possible to transmit messages to the technical support site. After you enable the ASUP feature, the ASUP-capable storage array is automatically prepared to collect and send support-related data to technical support. The data can then be used for remote troubleshooting and problem analysis.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

After enabling this feature, you can next enable the AutoSupport OnDemand feature (if desired), and then enable the AutoSupport Remote Diagnostics feature (if desired). You must enable the three features in this order.
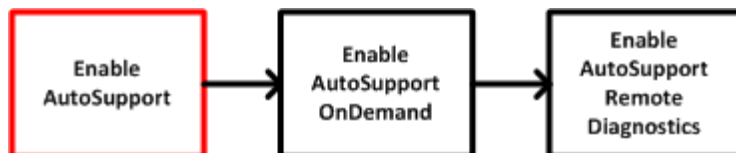
Syntax

```
set storageArray autoSupport (enable | disable)
```

Parameters

Parameter	Description
enable | disable	Allows you to enable or disable AutoSupport. If the OnDemand and Remote Diagnostics features are enabled, the disable action will turn off OnDemand and Remote Diagnostics features as well.

Examples

```
SMcli -n Array1 -c "set storageArray autoSupport enable;"

SMcli completed successfully.
```

Verification

Use the `show storageArray autoSupport` command to see whether you have enabled the feature. The initial line of the displayed output shows the enable status:

```
The AutoSupport feature is enabled on this storage array.
```

Save storage array support data

The `save storageArray supportData` command saves the support-related information of the storage array to a file.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Context

The following table lists the type of support data that you can collect.

Type of data	File name and description

Automatic Load Balancing statistics	`alb-statistics-A.txt`
	
	`alb-statistics-B.txt`
	
	This file, one per controller, specify various statistics related to the Automatic Load Balancing feature that allow further analysis via offline analysis tool.

Core dump metadata	`all-coredump.xml` This file contains core dump metadata for the array.
AutoSupport status	`autosupport.xml` This file specifies the current status of ASUP for the given array.
The AutoSupport history file	`autosupport-history.xml` This file specifies all ASUP messages, both standard and AutoSupport OnDemand messages, for the given array. Each entry in the table corresponds to an ASUP message currently sitting in one of the repositories for a given array.
AutoSupport logs	`asup-transmission-logs.txt` This file contains all the transmitted AutoSupport messages.
Web Server Client Info	`client-info.txt` This file specifies various Web Services client information.
Drive cabling topology	`connection.txt` This file contains information about the connections between the drive tray environmental services module (ESM) and the controller pair.
Cumulative statistics bundles	`cumulative-drive-vol-stats.xml` This file contains cumulative statistics for the controllers.

Type of data	File name and description
Misbehaving drive log	`controller-drive-error-event-log.txt` This file contains the storage array controller drive-side error and event log messages.
Controller health image metadata	`all-coredump.xml` This file contains DPL controller health image information.
DOM 0 journal files for controller A	`dom0-complete-journal-A.7z` This file, one per controller, contains detailed Linux system logs. This includes logs for Linux packages and standard Linux utilities and services.
DOM 0 journal files for controller B	`dom0-complete-journal-B.7z` This file, one per controller, contains detailed Linux system logs. This includes logs for Linux packages and standard Linux utilities and services.
Miscellaneous DOM 0 log files for controller A	`dom0-misc-logs-A.7z` This file, one per controller, contains system logs that cannot be contained with the Journal. This includes the serial log for the RAID Application and debug logs for the Hypervisor.
Miscellaneous DOM 0 log files for controller B	`dom0-misc-logs-B.7z` This file, one per controller, contains system logs that cannot be contained with the Journal. This includes the serial log for the RAID Application and debug logs for the Hypervisor.
Drive command aging timeout values	`drive-command-aging-timeout.txt` This file contains the default values and current values for the command aging timeout field for every drive.
Drive health logs	`drive-health-data.bin` This file contains various drive information related to the drive's health. **Note:** This file is a binary file and will require an offline parser to convert to human readable format.
Drive performance analyzer data	`drive-performance-log.txt` This file contains drive performance data that helps you identify any drives that are performing below expectations.
Failed repository analysis	`failed-repository-analysis.txt` This file contains the failed repository analysis information.
Features of the storage array	`feature-bundle.txt` This file contains a list of the number of volumes, drives, and drive trays allowed in the storage array and a list of the features available and their limits.
Firmware inventory	`firmware-inventory.txt` This file contains a list of all of the firmware versions for all of the components in the storage array.
I/O path statistics	`io-path-statistics.7z` This file contains raw performance data for each controller that can be used to analyze application performance issues.
IOC dump info for the host interface chip	`ioc-dump-info.txt` This file contains IOC dump information for the host interface chip.

Type of data	File name and description
IOC dump logs for the host interface chip	`ioc-dump.gz` This file contains the log dump from the host interface chip on the controller. The file is compressed in gz format. The zip file is saved as a file inside of the Customer Support Bundle.
iSCSI connections (iSCSI only)	`iscsi-session-connections.txt` This file contains a list of all of the current iSCSI sessions.
iSCSI statistics (iSCSI only)	`iscsi-statistics.csv` This file contains statistics for the Ethernet media access control (MAC), Ethernet Transmission Control Protocol (TCP)/Internet Protocol (IP), and iSCSI target.
Major event log	`major-event-log.txt` This file contains a detailed list of events that occur on the storage array. The list is stored in reserved areas on the disks in the storage array. The list records configuration events and component failures in the storage array.
Manifest file	`manifest.xml` This file contains a table that describes the files included in the archive file and the collected status of each of those files.
Storage management software runtime information	`msw-runtime-info.txt` This file contains the storage management software application runtime information. Contains the JRE version currently used by the storage management software.
NVMe-oF statistics	`nvmeof-statistics.csv` This file contains a list of statistics, including NVMe controller statistics, NVMe queue statistics, and interface statistics for the transport protocol.
NVSRAM data	`nvsram-data.txt` This controller file specifies the default settings for the controllers.
Object bundle	`object-bundle`.bin `object-bundle`.json This bundle contains a detailed description of the status of your storage array and its components, which was valid at the time that the file was generated.

Summary performance statistics	`perf-stat-daily-summary-a.csv`
	`perf-stat-daily-summary-b.csv`
	
	This file contains various controller performance statistics, one file per controller.

Persistent reservations and registrations	`persistent-reservations.txt` This file contains a detailed list of volumes on the storage array with persistent reservations and registrations.
Recovery Guru procedures	`recovery-guru-procedures.html` This file contains a detailed list of all of the recovery guru topics that are issued in response to problems detected on the storage array. This file contains only the recovery guru details, not the HTML files.
Recovery profile	`recovery-profile.csv` This file contains a detailed description of the latest recovery profile record and historical data.

Type of data	File name and description
SAS PHY error logs	`sas-phy-error-logs.csv` This file contains the error information for SAS PHY.
State capture data	`state-capture-data.txt` This file contains a detailed description of the current state of your storage array.
Storage array configuration	`storage-array-configuration.cfg` This file contains a detailed description of the logical configuration on your storage array.
Storage array profile	`storage-array-profile.txt` This file contains a description of all of the components and properties of a storage array.
Trace buffer contents	`trace-buffers.7z` This file contains the contents of the controllers' trace buffers that are used to record debug information.
Tray capture data	`tray-component-state-capture.7z` If your tray contains drawers, the diagnostic data is archived in this zipped file. The Zip file contains a separate text file for each tray that contains drawers. The Zip file is saved as a file inside of the Customer Support Bundle.
Unreadable sectors	`unreadable-sectors.txt` This file contains a detailed list of all of the unreadable sectors that have been logged to the storage array.

Web Services Trace Log	`web-server-trace-log-A.7z`
	
	`web-server-trace-log-B.7z`
	
	This file, one per controller, contains Web Services trace buffers that are used to record debug information.

Workload capture analytics log file	`wlc-analytics-a.lz4`
	`wlc-analytics-b.lz4`
	
	This file, one per controller, contains computed key workload characteristics such as LBA histogram, read/write ratio and I/O throughput across all active volumes.

X-header data file	`x-header-data.txt` This AutoSupport message header consists of plain text key-value pairs; which include information about the array and message type.

Syntax

```
save storageArray supportData file="filename" [force=(TRUE | FALSE)]
save storageArray supportData file="filename"
[force=(TRUE | FALSE) |
csbSubsetid=(basic | weekly | event | daily | complete) |
csbTimeStamp=hh:mm]
```

Parameters

Parameter	Description
file	The file path and the file name to which you want to save the support-related data for the storage array. Enclose the file path and the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\supdat.7z"`
force	This parameter forces the collection of support data if there are any failures in securing a lock on controller operations. To force the collection of support data, set this parameter to TRUE . The default value is FALSE .
csbSubsetid	This parameter collects a subset of data in the support bundle. The options for the subset of data are: • **basic** – Use this option to collect support bundle data about storage array discovery. • **weekly** – Use this option to collect support bundle data each week. • **event** – Use this option to collect support bundle data when a critical event occurs. • **daily** – Use this option to collect support bundle data every day. • **complete** – Use this option to collect all of the support bundle data. This is the default option.
csbTimeStamp	This parameter adds a time stamp to the support bundle. Enter hours and minutes in a 24-hour format. For example: 13:30 for 1:30 p.m.

AutoSupport Commands

The following commands are used for the DE2000H/ DE4000H / DE4000F/ DE6000H/ DE6000F.

Enable or disable AutoSupport maintenance window

The `set storageArray autoSupportMaintenanceWindow` command turns on or turns off the AutoSupport maintenance window feature.

Use a maintenance window to suppress automatic ticket creation on error events. Under normal operation mode the storage array will use AutoSupport to open a case with Technical Support if there is an issue. When AutoSupport is placed in a maintenance window this feature is suppressed.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Syntax

```
set storageArray autoSupportMaintenanceWindow (enable | disable)
    emailAddresses=("emailAddress1" "emailAddress2" ...)
    [duration=<duration_in_hours>];
```

Parameters

Parameter	Description
emailAddresses	The list of email addresses to receive a confirmation email that the maintenance window request has been processed. You can specify up to five email addresses.
duration	Optional. The duration (in hours) to enable maintenance window. If omitted, the maximum supported duration (72 hours) is used.

Examples

```
SMcli -n Array1 -c "set storageArray autoSupportMaintenanceWindow enable
     emailAddresses=\"me@company.com\" duration=5;"

SMcli completed successfully.
SMcli -n Array1 -c "set storageArray autoSupportMaintenanceWindow enable
     emailAddresses=(\"me1@company.com\" \"me2@company.com\");"

SMcli completed successfully.
SMcli -n Array1 -c "set storageArray autoSupportMaintenanceWindow disable
     emailAddresses=(\"me1@company.com\" \"me2@company.com\" \"me3@company.com\"
     \"me4@company.com\" \"me5@company.com\");"

SMcli completed successfully.
```

Enable or disable the AutoSupport OnDemand feature

The `set storageArray autoSupportOnDemand` command turns on or turns off the AutoSupport OnDemand feature. This feature allows technical support to coordinate AutoSupport data transmission, and allows them to request the re-transmission of missing support data.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Context

Before enabling this feature, you must first enable the AutoSupport feature on the storage array. After enabling this feature, you can next enable the AutoSupport Remote Diagnostics feature (if desired).

Syntax

```
set storageArray autoSupportOnDemand (enable | disable)
```

Parameters

Parameter	Description
enable	disable	Allows the user to enable or disable AutoSupport OnDemand feature. If AutoSupport is disabled, the enable action will error and asks the user to enable it first. If the Remote Diagnostics feature is enabled, the disable action will also turn off Remote Diagnostics feature.

Examples

```
SMcli -n Array1 -c "set storageArray autoSupportOnDemand enable;"

SMcli completed successfully.
```

Verification

Use the `show storageArray autoSupport` command to see if you have enabled the feature. The initial two lines of the displayed output show the enable status of the AutoSupport feature, followed by the AutoSupport OnDemand feature:

```
   The AutoSupport is enabled on this storage array.
   The AutoSupport
 OnDemand feature is enabled on this storage array.
   The AutoSupport Remote
 Diagnostics feature is enabled on this storage array.
```

Enable or disable the AutoSupport Remote Diagnostics feature

The `set storageArray autoSupportRemoteDiag` command turns on or turns off the AutoSupport OnDemand Remote Diagnostics feature. This feature enables technical support to request support data to diagnose problems remotely.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Context

Before enabling this feature, first enable the AutoSupport feature and then the AutoSupport OnDemand feature on the storage array. You must enable the three features in this order:
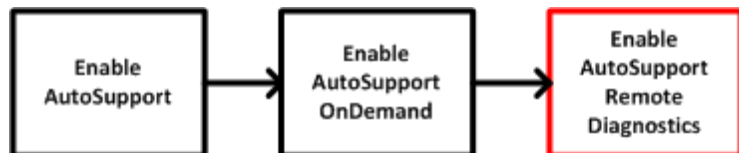
Syntax

```
set storageArray autoSupportRemoteDiag (enable | disable)
```

Parameters

Parameter	Description
enable | disable	Allows the user to enable or disable AutoSupport Remote Diagnostics feature. If AutoSupport and AutoSupport OnDemand are disabled, then the enable action will error and asks the user to enable them first.

Examples

```
SMcli -n Array1 -c "set storageArray autoSupportRemoteDiag enable;"

SMcli completed successfully.
```

Verification

Use the `show storageArray autoSupport` command to see if you have enabled the feature. The initial three lines of the displayed output show the enable status of the AutoSupport feature, followed by the AutoSupport OnDemand feature and the AutoSupport Remote Diagnostics feature:

```
The AutoSupport feature is enabled on this storage array.
   The AutoSupport
OnDemand feature is enabled on this storage array.
   The AutoSupport Remote
Diagnostics feature is enabled on this storage array.
```

Retrieve an AutoSupport log

The *save storageArray autoSupport log* command allows you to view an AutoSupport log file. This file provides information about status, history of transmission activity, and any errors encountered during delivery of the AutoSupport messages. The log is available for all AutoSupport-capable and AutoSupport-enabled storage arrays.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Context

This command allows you to view two types of logs:

- Current log – View the log captured at this point in time.
- Archive log – View the log from an archived file.

Syntax

```
save storageArray autoSupport log [inputArchive=n]
file="filename"
```

Parameters

Parameter	Description
inputArchive	Allows you to specify the archived AutoSupport log, where the archive file is *n* , an integer starting at 0. **Note:** Omitting this parameter means you select the current AutoSupport log (captured at this point in time).
file	Allows you to specify the output ASUP transmission log filename. **Note:** This parameter is required.

Examples

```
SMcli -n Array1 -c "save storageArray autoSupport log inputArchive=0 file=\"ASUPTransmissionLog\";"

SMcli completed successfully.
```

Reset AutoSupport message collection schedule

The `reset storageArray autoSupport schedule` command resets the daily and weekly times and days of the week that AutoSupport messages are sent back to the random values generated by the management software.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Context

• The management software randomly selects a time of day for both daily and weekly messages and a day of the week for weekly messages.

• The management software makes all attempts to ensure that no two storage arrays within a management domain send scheduled AutoSupport messages at the same time.

Syntax

```
reset storageArray autoSupport schedule
```

Parameters

None.

Examples

```
SMcli -n Array1 -c "reset storageArray autoSupport schedule;"

SMcli completed successfully.
```

Verification

Use the `show storageArray autoSupport` command to see the resulting change to the schedule.

Set AutoSupport message collection schedule

The `set storageArray autoSupport schedule` command sets the daily and weekly times and days of the week that AutoSupport messages are sent.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Context

- If AutoSupport is enabled, the management software sends both daily AutoSupport messages and weekly AutoSupport messages.
- You can specify a range (hour-level granularity) of when to send daily and when to send weekly messages for the storage arrays in your management domain.
- For the weekly schedule, you select preferred days of the week for AutoSupport collection and transmission.

Syntax

```
set storageArray autoSupport schedule dailyTime=startTime-endTime
 [dayOfWeek=(Sunday Monday Tuesday Wednesday Thursday Friday Saturday)]
weeklyTime=startTime-endTime
```

Parameters

Parameter	Description
dailyTime	*< startTime > - < endTime >* Specifies the time of day that you want to start and end the collection of AutoSupport data for all storage arrays. The startTime and endTime must be in the 24-hour form of HH:00 and must be on the hour. For example, 9:00 p.m. should be entered as 21:00.
dayOfWeek	(Sunday|Monday|Tuesday|Wednesday|Thursday|Friday|Saturday) Specifies the preferred days of the week (Sunday through Saturday) that you want to collect AutoSupport bundle collection data. The *dayOfWeek* parameter must be surrounded by parentheses and separated with a space.
weeklyTime	*< startTime > - < endTime >* Specifies the time of day that you want to start and end the collection of the AutoSupport bundle collection data for each day of the week that you have selected. The *startTime* and *endTime* must be in the form of HH:MM[am|pm].

Examples

```
SMcli -n Array1 -c "set storageArray autoSupport schedule dailyTime=14:00-15:00
weeklyTime=1:00-5:00;"

SMcli -n Array1 -c "set storageArray autoSupport schedule dailyTime=14:00-15:00 dayOfWeek=(Monday Friday)
weeklyTime=1:00-5:00;"

SMcli completed successfully.
```

Verification

Use the `show storageArray autoSupport` command to see the resulting change to the schedule.

Show AutoSupport configuration

The `show storageArray autoSupport` command displays the AutoSupport bundle collection settings for the storage array.

Supported Arrays

This command is operational for either the DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage arrays.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin or Storage Monitor role.

Context

The command output from this command shows the following configuration information:

- The activation status for this management domain of the AutoSupport feature, the AutoSupport OnDemand feature, and the AutoSupport Remote Diagnostics feature
- Delivery parameters that depend on the configured delivery method:
  - Delivery method is Email (SMTP): Destination email address, mail relay server, and sender email address are shown
  - Delivery method is HTTP or HTTPs:
    - Direct connection - destination IP address is shown
    - Proxy server connection - Host address, port number, and authentication details are shown
    - Automatic proxy configuration script (PAC) connection - script location is shown
- Autosupport daily and weekly preferred time ranges
- Information about ASUP capabilities, the chassis serial number, and the configured daily and weekly schedules

Syntax

```
show storageArray autoSupport
```

Parameters

None.

Examples

```
SMcli -n Array1 -c "show storageArray autoSupport;"

The AutoSupport feature is enabled on this storage array.
The AutoSupport OnDemand feature is enabled on this storage array.
The AutoSupport Remote Diagnostics feature is enabled on this storage array.

Delivery Method: Email (SMTP)
  Destination email address: http://support.mycompany.com/put/AsupPut/
  Mail relay server: ra.eng.lenovo.com
  Sender email address: user@lenovo.com
-or-
Delivery Method: HTTP
  Destination IP address: http://support.mycompany.com/put/AsupPut/
  Connection: Direct
       -or-
  Connection: Proxy server
   Host Address: 10.227.76.178
    Port number: 8080
    Authentication required: Yes
     User name: admin
     Password: ********
```

```
        -or-
   Connection: Automatic proxy configuration script (PAC)
    Script location: http://esgweb.eng.mycompany.com/proxy.pac

   The AutoSupport daily schedule preferred time range is from 12:00 AM to 01:00 AM.
   The AutoSupport weekly schedule preferred time range is from 10:00 PM to 11:00 PM on Thursday, Saturday.

   AutoSupport Capable  AutoSupport OnDemand Capable  Chassis Serial Number  Daily Schedule  Weekly Schedule
   Yes (enabled)        Yes                           SX94500434                    12:55 AM      10:08 PM on Thursdays

   SMcli completed successfully.
```

Specify AutoSupport HTTP(S) delivery method

The `set storageArray autoSupport deliveryMethod` command sets up the delivery method for sending AutoSupport messages to HTTP(S).

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Syntax

```
set storageArray autoSupport deliveryMethod={HTTP | HTTPS}
    {direct | proxyConfigScript="proxyConfigScriptUrl" |
proxyServer hostAddress=address portNumber=portNumber
 [userName="username" password="password"]}
```

Parameters

Parameter	Description
deliveryMethod	Allows the user to specify the delivery method for AutoSupport collection. Valid choices are: • email • HTTP • HTTPS **Note:** If the email method is configured, then the AutoSupport OnDemand and Remote Diagnostics will be disabled.
direct	Allows the user to connect directly to the destination technical support systems using the HTTP or HTTPS protocol.
proxyConfigScript	Allows the user to specify the location of a Proxy Auto-Configuration (PAC) script file
proxyServer	Allows the user to specify the HTTP(S) proxy server details required for establishing connection with the destination technical support system.
hostAddress	Allows the user to specify the proxy server's host address. Required if proxyServer is used.
portNumber	Allows the user to specify the proxy server's port number. Required if proxyServer is used.

Parameter	Description
username	Allows the user to specify the proxy server's username if it is configured.
password	Allows the user to specify the proxy server's password if it is configured.

Examples

```
SMcli -n Array1 -c "set storageArray autoSupport deliveryMethod=HTTP direct;"

SMcli -n Array1 -c "set storageArray autoSupport deliveryMethod=HTTP
proxyConfigScript=\"http://company.com/~username/proxy.pac\";"

SMcli -n Array1 -c "set storageArray autoSupport deliveryMethod=HTTPS
proxyServer hostAddress=10.117.12.112 portNumber=8080 userName=\"tracyt\" password=\"1234456\";"

SMcli completed successfully.
```

Verification

Send a test message using the *start storageArray autoSupport deliveryTest* command to verify that your delivery methods are set up correctly.

Specify the Email (SMTP) delivery method

The `set storageArray autoSupport deliveryMethod` command sets up the delivery method for sending AutoSupport messages to email (SMTP).

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Syntax

```
set storageArray autoSupport deliveryMethod=email
mailRelayServer="serverAddress" senderEmail="emailAddress"
```

Parameters

Parameter	Description
deliveryMethod	Allows the user to specify the delivery method for AutoSupport collection. Valid choices are: • email • HTTP • HTTPS **Note:** If the email method is configured, then the AutoSupport OnDemand and Remote Diagnostics will be disabled.
mailRelayServer	Allows the user to specify the mail relay server for the AutoSupport collection.
senderEmail	Allows the user to specify send email address for the AutoSupport collection.

Examples

```
SMcli -n Array1 -c "set storageArray autoSupportConfig deliveryMethod=email mailRelayServer=\"mailserver.company.com\"
senderEmail=\"user@company.com\";"
```

```
SMcli completed successfully.
```

Verification

Send a test message using the *start storageArray autoSupport deliveryTest* command to verify that your delivery methods are set up correctly.

Test AutoSupport delivery settings

The `autoSupportConfig test` command sends a sample AutoSupport bundle collection message so you can test the connection to the destination technical support system using the specified delivery parameters.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Syntax

```
autoSupportConfig test [replyToEmail="address"]
```

Parameters

Parameter	Description
replyToEmail	Allows the user to specify the reply-to email address for the AutoSupport test message. It is only used/required when delivery method is set to email.

Examples

```
SMcli -n Array1 -c "autoSupportConfig test;"
```

```
SMcli -n Array1 -c "autoSupportConfig test replyToEmail=\"user@company.com\";"
```

```
The sample AutoSupport message was successfully sent to the ASUP gateway server.
```

```
SMcli completed successfully.
```

Chapter 12. Mirroring commands

Asynchronous mirroring commands

Activate asynchronous mirroring

The `activate storageArray feature` command activates the Asynchronous Mirroring feature.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

After you activate the Asynchronous Mirroring feature, you must set up an asynchronous mirror group and an asynchronous mirrored pair.

Syntax

```
activate storageArray feature=asyncRemoteMirror
```

Parameters

None.

Add volume to asynchronous mirror group

The `add volume asyncMirrorGroup` command adds a primary volume to an asynchronous mirror group.

Supported Arrays

Attention: If you are running the command on the DE2000H, DE4000H, DE4000F, DE6000H, and DE6000F array, the client type must be set to `symbol`. This command will not execute if they client type is set to `https`.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

This command is valid only on the local storage array that contains the asynchronous mirror group to which you want to add the primary volume. An asynchronous mirror group has a repository volume that is used to save data for all of the point-in-time images that are part of the asynchronous mirror group. Each primary volume in the asynchronous mirror group has a corresponding mirror volume on a remote storage array.

Syntax

```
add volume="volumeName" asyncMirrorGroup="asyncMirrorGroupName"
remotePassword="password"
(repositoryVolume="repos_xxxx" |
repositoryVolume=(volumeGroupName [capacity=capacityValue])
repositoryVolume=(diskPoolName [capacity=capacityValue]))
```

Parameter

Parameter	Description
volume	The name of the primary volume that you want to add to the asynchronous mirror group. Enclose the volume name in double quotation marks (" ").
asyncMirrorGroup	The name of the asynchronous mirror group that will contain the primary volume that you want to add. Enclose the asynchronous mirror group name in double quotation marks (" ").
remotePassword	This parameter is optional. Use this parameter when the remote storage array is password protected. Enclose the password in double quotation marks (" ").
repositoryVolume	The name of the repository volume that will contain the changed data from the primary volume. You have two options for defining the name of a repository volume: • Use an existing repository volume: name. • Create a new repository volume when you run this command. The name of an existing repository volume is comprised of two parts: • The term repos. • A four digit numerical identifier that the storage management software assigns to the repository volume name. Enclose the name of the existing repository volume in double quotation marks (" "). If you want to create a new repository volume when you run this command you must enter the name of either a a volume group or a disk pool in which you want the repository volume. Optionally, you also can define the capacity of the repository volume. If you want to define the capacity you can use these values: • An integer value that represents a percentage of the base volume capacity. • A decimal fraction value that represents a percentage of the base volume capacity. • A specific size for the repository volume. Size is defined in units of bytes , KB , MB , GB , or TB . If you do not define the capacity, the storage management software sets the capacity to 20 percent of the primary volume capacity. The storage management software creates the repository volume and links the repository volume to the primary volume.

Notes

- The asynchronous mirroring feature must be enabled and activated on the local and remote storage arrays that will be used for mirror activities.

- The local and remote storage arrays must be connected through a proper Fibre Channel fabric or iSCSI interface.

- The remote storage array must have a volume that has a capacity that is greater than or equal to the capacity of the primary volume on the local storage array. The volume on the remote storage array will be used as the mirror volume.

Cancel asynchronous mirror group role reversal

The `stop asyncMirrorGroup rolechange` command cancels a pending role reversal operation between asynchronous mirror groups.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
stop asyncMirrorGroup [asyncMirrorGroupName] rolechange
```

Parameter

Parameter	Description
asyncMirrorGroup	The name of the asynchronous mirror group for which or which you want to cancel the pending role reversal operation. Enclose the asynchronous mirror group name in square brackets ([ ]). If the asynchronous mirror group name contains special characters or consists only of numbers, you must enclose the name in double quotation marks (" ") inside square brackets.

Check asynchronous mirror group consistency

The `check asyncMirrorGroup repositoryConsistency` command produces a report based on analysis of the data in the underlying repository volume of the specified asynchronous mirror group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
check asyncMirrorGroup[asyncMirrorGroupName]
repositoryConsistency localVolume=[localVolumeName"]
file="filePath"
```

Parameters

Parameter	Description
asyncMirrorGroup	The name of the asynchronous mirror group on which to run a consistency check. Enclose the asynchronous mirror group name in square brackets ([ ]). If the asynchronous mirror group name contains special characters or consists only of numbers, you also must enclose the name in double quotation marks (" ") inside square brackets.
repositoryConsistency	Specifies that the asynchronous mirror group is checked for consistency.

Parameter	Description
localVolume	Specifies the name of a local volume that participates in the mirror relationship. You can specify a local volume that is either the source or the destination on a mirror relationship. If the local volume name contains special characters or consists only of numbers, you also must enclose the name in double quotation marks (" ") inside square brackets.
file	The file path and the file name to which you want to save the report that results from the consistency check. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\repoConsistency.txt"` This parameter must appear last, after any of the optional parameters.

Notes

The report generated by this command is intended for use by technical support to analyze problems.

Check storage array connectivity

The `check storageArray connectivity` command verifies that the local storage array and the remote storage array have a communication path and displays the connection details between the local and remote storage array.

Supported Arrays

Attention: If you are running the command on the DE2000H, DE4000H, DE4000F, DE6000H, and DE6000F array, the client type must be set to `symbol`. This command will not execute if they client type is set to `https`.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Before creating an asynchronous mirror group, you should check whether the local storage array and the remote storage array can communicate with each other. When you execute this command, the system queries for the remote storage array on all eligible host ports to determine what ports are connected to the remote storage array. The result of the test is a list of all ports on the local storage array along with a list of the remote storage array port addresses accessible through that port.

Note: Connectivity is tested using all possible channels, and if it is a dual controller configuration, connectivity is checked from each controller. It might take up to 20 minutes to check connectivity between two storage arrays.

Syntax

```
check storageArray connectivity
(remoteStorageArrayName="storageArrayName" |
remoteStorageArrayWwid=<wwID>)
```

Parameters

Parameter	Description
remoteStorageArrayName	The name for the remote storage array for which you are checking connectivity. Enclose the storage array name in double quotation marks (" ").
remoteStorageArrayWwid	The World Wide Identifier (WWID) of the storage array for which you are checking connectivity. You can use the WWID instead of the storage array name to identify the storage array. Enclose the WWID in angle brackets (< >).

Notes

Before a mirror can be established between two storage arrays, they must be connected through a Fibre Channel connection or an iSCSI connection.

Fibre Channel asynchronous mirroring must be activated on both storage arrays before they can communicate with each other for mirroring or connectivity checking.

If the local storage array supports iSCSI, connectivity over iSCSI is checked. If the local storage array supports Fibre Channel and mirroring over Fibre Channel has been activated, connectivity over Fibre Channel is checked. If the local storage array does not support iSCSI or Fibre Channel, an error message is displayed and the operation aborted.

Clear asynchronous mirroring fault

The `clear asyncMirrorFault` command clears an asynchronous mirroring "sticky" fault from one or more asynchronous mirror groups and from one or more asynchronous mirror group member volumes.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

An asynchronous mirror group and its member volumes can encounter asynchronous mirroring "sticky" faults, which occur at a single point-in-time but do not impact the functionality of the mirrors. These type of faults must be reviewed, but might not require any changes to the configuration.

An asynchronous mirror group and its member volumes might or can have more than one associated sticky fault. This command clears all of the faults associated with the asynchronous mirror group and its member volume. However, if an asynchronous mirror group has a fault and one of its member volumes has a fault, clearing the fault on the asynchronous mirror group does not clear the fault on its member volume.

Syntax

```
clear asyncMirrorFault(all |
asyncMirrorGroup [asyncMirrorGroupName] |
asyncMirrorGroups ["asyncMirrorGroupName1"
... "asyncMirrorGroupNameN"] |
volume [volumeName] |
volumes ["volumeName1" ... "volumeNameN"])
```

Parameter

Parameter	Description
all	Use this parameter if you want to clear all asynchronous mirroring faults from all asynchronous mirror groups and on all asynchronous mirror group member volumes.
asyncMirrorGroup	The name of the asynchronous mirror group from which you want to clear the asynchronous mirroring fault. Enclose the asynchronous mirror group name in square brackets ([ ]). If the asynchronous mirror group name contains special characters or consists only of numbers, you must enclose the name in double quotation marks (" ") inside square brackets.
asyncMirrorGroups	The names of several asynchronous mirror groups from which you want to clear the asynchronous mirroring fault. Enter the names of the asynchronous mirror groups using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.
volume	The name of the specific member volume (in an asynchronous mirror group) from which you want to clear the asynchronous mirroring fault. Enclose the member volume name in square brackets ([ ]). If the volume name contains special characters or consists only of numbers, you must enclose the name in double quotation marks (" ") inside square brackets.
volumes	The names of several member volumes (in an asynchronous mirror group) from which you want to clear the asynchronous mirroring fault. Enter the names of the member volumes using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.

Create asynchronous mirror group

The `create asyncMirrorGroup` command creates a new, empty asynchronous mirror group on both the local storage array and the remote storage array.

Supported Arrays

Attention: If you are running the command on the DE2000H, DE4000H, DE4000F, DE6000H, and DE6000F array, the client type must be set to `symbol` . This command will not execute if they client type is set to `https` .

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

An asynchronous mirror group is a container that can house several mirrored pairs so that they can be managed as one entity. You create an asynchronous mirror group to define the synchronization settings for all mirrored pairs within the group. Each mirrored pair in an asynchronous mirror group share the same synchronization settings, primary and secondary role, and write mode.

The asynchronous mirror group is associated with the local storage array and remote storage array that is used for mirroring. The local storage array is the primary side of the asynchronous mirror group, while the remote storage array is the secondary side of the asynchronous mirror group. All volumes added to the

asynchronous mirror group on the local storage array hold the primary role in the mirror relationship. Subsequently, all volumes added to the asynchronous mirror group on the remote storage array hold the secondary role in the mirror relationship.

Make sure that you execute the `Create Asynchronous Mirror Group` command on the local storage array. Asynchronous mirror group creation is initiated from the storage array that contains the volumes that hold the primary role in the mirror relationship. You use the `Create Asynchronous Mirror Group` command to specify the identity of the remote storage array that contains the volumes that hold the secondary role in the mirror relationship.

Syntax

```
create asyncMirrorGroup userLabel="asyncMirrorGroupName"
(remoteStorageArrayName="storageArrayName" | remoteStorageArrayWwid="wwID")
[remotePassword="password"]
interfaceType=(FC | iSCSI)
[syncInterval=integer(minutes | hours | days)]
[warningSyncThreshold=integer(minutes | hours | days)]
[warningRecoveryThreshold=integer(minutes | hours | days)]
[warningThresholdPercent=percentValue]
[autoResync=(TRUE | FALSE)]
```

Parameters

Parameter	Description
userLabel	The name of the new asynchronous mirror group that you want to create. Enclose the new asynchronous mirror group name in double quotation marks (" "). The name must be unique on the local and remote storage arrays.
remoteStorageArrayName	The name for the remote storage array on which you are mirroring the asynchronous mirror group. Enclose the storage array name in double quotation marks (" "). The remote storage array must have the same connection type as the local storage array.
remoteStorageArrayWwid	The World Wide Identifier (WWID) of the remote storage array on which you are mirroring the asynchronous mirror group. You can use the WWID instead of the storage array name to identify the storage array. Enclose the WWID in angle brackets (< >). The remote storage array must have the same connection type as the local storage array.
remotePassword	The password for the remote storage array. Use this parameter when the remote storage array is password protected. Enclose the password in double quotation marks (" ").
interfaceType	Specify which connection type to use: either Fibre Channel fabric or iSCSI interface. (The default is Fibre Channel.) The local storage array and the remote storage array must be connected through a proper Fibre Channel fabric or iSCSI interface.

Parameter	Description
syncInterval	Specify the length of time between automatically sending updates of modified data from the local storage array to the remote storage array. You can specify the length of time in minutes, hours, or days. **Note:** Do not add a space between the integer and the length of time. Example: `10minutes`
warningSyncThreshold	Specify the length of time to wait until a warning is triggered for cases in which the synchronization of all of the volumes within the asynchronous mirror group takes longer than the defined time. You can specify the length of time in minutes, hours, or days. **Note:** Do not add a space between the integer and the length of time. Example: `30minutes`
warningRecoveryThreshold	Specify the length of time to wait until a warning is triggered when the automatic data update for the point-in-time image on the remote storage array is older than the defined time. Define the threshold from the end of the previous update. You can specify the length of time in minutes, hours, or days. **Note:** You must set the Recovery Point Threshold to be twice as large as the synchronization interval threshold. **Note:** Do not add a space between the integer and the length of time. Example: `60minutes`
warningThresholdPercent	Specify the length of time to wait until a warning is triggered when the capacity of a mirror repository volume reaches the defined percentage. Define the threshold by percentage (%) of the capacity remaining.
autoResync	The settings for automatic resynchronization between the primary volumes and the secondary volumes of an asynchronous mirrored pair within an asynchronous mirror group. This parameter has these values: • enabled – Automatic resynchronization is turned on. You do not need to do anything further to resynchronize the primary volume and the secondary volume. • disabled – Automatic resynchronization is turned off. To resynchronize the primary volume and the secondary volume, you must run the `resume asyncMirrorGroup` command.

Notes

- The Asynchronous Mirroring feature must be enabled and activated on the local and remote storage arrays that will be used for mirror activities.

- You can use any combination of alphanumeric characters, hyphens, and underscores for the names. Names can have a maximum of 30 characters.

- The local and remote storage arrays must be connected through a Fibre Channel fabric or iSCSI interface.

- Passwords are stored on each storage array in a management domain. If a password was not previously set, you do not need a password. The password can be any combination of a alphanumeric characters

with a maximum of 30 characters. (You can define a storage array password by using the `set storageArray` command.)

- Depending on your configuration, there is a maximum number of asynchronous mirror groups you can create on a storage array.
- Asynchronous mirror groups are created empty and mirrored pairs are added to them later on. Only mirrored pairs can be added to an asynchronous mirror group. Each mirrored pair is associated with exactly one asynchronous mirror group.
- The Asynchronous Mirroring process is initiated at a defined synchronization interval. Periodic point-in-time images are replicated as only the changed data is copied and not the entire volume.

Deactivate asynchronous mirroring

The `deactivate storageArray feature` deactivates the Asynchronous Mirroring feature.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

All existing asynchronous mirror groups or asynchronous mirrored pairs must be deleted from the local storage array and the remote storage array before the Asynchronous Mirroring feature can be deactivated.

Syntax

```
deactivate storageArray feature=asyncRemoteMirror
```

Parameters

None.

Delete asynchronous mirror group

The `delete asyncMirrorGroup` command deletes one or more asynchronous mirror groups from the local storage array and the remote storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

The asynchronous mirror group must be empty before it can be successfully deleted. You must remove all asynchronous mirrored pairs from the asynchronous mirror group before using this command.

Syntax

```
delete (allAsyncMirrorGroups | asyncMirrorGroup["asyncMirrorGroupName"] |
asyncMirrorGroups ["asyncMirrorGroupName_1" ... "asyncMirrorGroupName_n"])
```

Parameter

Parameter	Description
allAsyncMirrorGroups	Use this parameter if you want to remove all asynchronous mirror groups from the local storage array and the remote storage array.
asyncMirrorGroup	The name of the asynchronous mirror group that you want to delete. Enclose the asynchronous mirror group name in double quotation marks (" ") inside square brackets ([ ]).
asyncMirrorGroups	The names of several asynchronous mirror groups that you want to delete. Enter the names of the asynchronous mirror groups using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.

Establish asynchronous mirrored pair

The `establish asyncMirror volume` command completes an asynchronous mirrored pair on the remote storage array by adding a secondary volume to an existing asynchronous mirror group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Before you run this command, the asynchronous mirror group must exist and the primary volume must exist in the asynchronous mirror group. After this command successfully completes, asynchronous mirroring starts between the primary volume and the secondary volume.

The two volumes that comprise an asynchronous mirrored pair function as a single entity. Establishing an asynchronous mirrored pair allows you to perform actions on the entire mirrored pair versus the two individual volumes.

Syntax

```
establish asyncMirror volume="secondaryVolumeName"
asyncMirrorGroup="asyncMirrorGroupName"
primaryVolume="primaryVolumeName"
```

Parameters

Parameter	Description
volume	The name of an existing volume on the remote storage array that you want to use for the secondary volume. Enclose the volume name in double quotation marks (" ").
asyncMirrorGroup	The name of an existing asynchronous mirror group that you want to use to contain the asynchronous mirrored pair. Enclose the asynchronous mirror group name in double quotation marks (" ").
primaryVolume	The name of an existing volume on the local storage array that you want to use for the primary volume. Enclose the volume name in double quotation marks (" ").

Notes

An asynchronous mirrored pair is comprised of two volumes, a primary volume and a secondary volume, that contain identical copies of the same data. The mirrored pair is a part of an asynchronous mirror group, which allows the mirrored pair to synchronize at the same time as any other mirrored pairs within the asynchronous mirror group.

You can use any combination of alphanumeric characters, hyphens, and underscores for the names. Names can have a maximum of 30 characters.

When you choose the primary volume and the secondary volume, the secondary volume must be of equal or greater size than the primary volume. The RAID level of the secondary volume does not have to be the same as the primary volume.

Remove incomplete asynchronous mirrored pair from asynchronous mirror group

The `remove asyncMirrorGroup` command removes an orphaned mirrored pair volume on the storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

An orphaned mirrored pair volume exists when a member volume in an asynchronous mirror group has been removed on one side of the asynchronous mirror group (either the primary side or secondary side) but not on the other side.

Orphan mirrored pair volumes are detected when inter-controller communication is restored and the two sides of the mirror configuration reconcile mirror parameters.

Use this command when the mirror relationship is successfully removed on the local or remote storage array, but cannot be removed on the corresponding storage array because of a communication problem.

Syntax

```
remove asyncMirrorGroup ["asyncMirrorGroupName"]
incompleteMirror volume="volumeName"
```

Parameters

Parameter	Description
asyncMirrorGroup	The name of the asynchronous mirror group that contains the orphaned volume that you want to remove. Enclose the asynchronous mirror group name in double quotation marks (" ") inside square brackets ([ ]).
volume	The name of the orphaned volume that you want to remove from the asynchronous mirror group. Enclose the volume name in double quotation marks (" ").

Remove volume from asynchronous mirror group

The `remove volume asyncMirrorGroup` command removes a member volume from an existing asynchronous mirror group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Optionally, you can delete the repository volume members from the asynchronous mirror group.

This command is valid only on the local storage array that contains the asynchronous mirror group whose member volume that you want to remove.

Syntax

```
remove volume ["volumeName"] asyncMirrorGroup="asyncMirrorGroupName"
[deleteRepositoryMembers=(TRUE | FALSE)]
```

Parameters

Parameter	Description
volume	The name of the specific volume that you want to remove from the asynchronous mirror group. Enclose the volume name in double quotation marks (" ") inside square brackets ([ ]).
asyncMirrorGroup	The name of the asynchronous mirror group that contains the member volume that you want to remove. Enclose the asynchronous mirror group name in double quotation marks (" ").
deleteRepositoryMembers	Determines whether to remove all of the repository members from the asynchronous mirror group.

Reset asynchronous mirror group statistics

The `reset storageArray arvmStats asyncMirrorGroup` command resets the synchronization statistics for one or more member volumes in an asynchronous mirror group to a relative 0.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
reset storageArray arvmStats asyncMirrorGroup [asyncMirrorGroupName]
volume="volumeName" sampleType=(all | mostRecent | longestSyncTime | errors)
```

Parameters

Parameter	Description
asyncMirrorGroup	The name of the asynchronous mirror group for which you are resetting the synchronization statistics. Enclose the asynchronous mirror group name in square brackets ([ ]). If the asynchronous mirror group name has special characters or numbers, you must enclose the asynchronous mirror group name in double quotation marks (" ") inside square brackets.
volume	This parameter is optional. The name of the specific member volume in the asynchronous mirror group for which you are resetting the synchronization statistics. If no volume is specified, the statistics for every member volume in the asynchronous mirror group are reset. Enclose the volume name in double quotation marks (" ").
sampleType	This parameter is optional. The default value for **sampleType** is `all`. • `all` — Data for all three sample types are reset. • `mostRecent` — Statistics are reset for the most recent 50 resynchronization samples. • `longestSyncTime` — Statistics are reset for the most recent 20 longest resynchronization samples. • `errors` — Statistics are reset for the most recent 20 failed resynchronization samples.

Notes

Statistics are reset for mirrored volumes in the Primary role. The statistics that are reset include the following data:

- Synchronization start time
- Synchronization type (manual or periodic)
- Synchronization duration
- Number of bytes sent
- Maximum and minimum write time (for a single write)
- Maximum and minimum synchronization data rate
- Total write time
- Repository utilization (%)
- Recovery point age

Reset iSCSI IP address

The `reset iscsiIpAddress` command resets the IP address of the remote storage array to re-establish connection with the local storage array.

Supported Arrays

Attention: If you are running the command on the DE2000H, DE4000H, DE4000F, DE6000H, and DE6000F array, the client type must be set to `symbol`. This command will not execute if they client type is set to `https`.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

You can use this command to notify the local storage array that the iSCSI IP address of the remote storage array has changed and needs to be updated.

When establishing an asynchronous mirroring relationship with an iSCSI connection, both the local and the remote storage arrays store a record of the IP address of the remote storage array in the asynchronous mirroring configuration. If the IP address of an iSCSI port changes, the remote storage array that is attempting to use that port encounters a communication error.

The storage array with the changed IP address sends a message to each remote storage array associated with the asynchronous mirror groups that are configured to mirror over an iSCSI connection. Storage arrays that receive this message automatically update their remote-target IP address.

If the storage array with the changed IP address is unable to send its inter-controller message to a remote storage array, the system sends you an alert of the connectivity issue. Use the `reset` command to re-establish connection with the local storage array.

Syntax

```
reset (remoteStorageArrayName="storageArrayName" | remoteStorageArrayWwid=<wwID>)
iscsiIpAddress
```

Parameters

Parameter	Description
remoteStorageArrayName	The name for the remote storage array for which you are resetting the iSCSI IP address. Enclose the storage array name in double quotation marks (" ").
remoteStorageArrayWwid	The World Wide Identifier (WWID) of the storage array for which you are resetting the iSCSI IP address. You can use the WWID instead of the storage array name to identify the storage array. Enclose the WWID in angle brackets (< >).

Resume asynchronous mirror group

The `resume asyncMirrorGroup` command resumes data transfer between all mirrored pairs in an asynchronous mirror group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Data written to the primary volumes while the asynchronous mirror group was suspended is written to the secondary volumes immediately. Periodic synchronization resumes if an automatic synchronization interval has been set.

Syntax

```
resume asyncMirrorGroup ["asyncMirrorGroupName"]
[deleteRecoveryPointIfNecessary]
```

Parameters

Parameter	Description
asyncMirrorGroup	The name of the asynchronous mirror group for which you want to start synchronization. Enclose the asynchronous mirror group name in double quotation marks (" ") inside square brackets ([ ]").
deleteRecoveryPointIfNecessary	The parameter to delete the recovery point if the recoverable synchronization data has exceeded time threshold for recovery. Recovery point age is measured from the time the data was frozen on the primary storage array.

Save asynchronous mirror group statistics

The `save storageArray arvmStats asyncMirrorGroup` command saves the synchronization statistics to a file for one or more member volumes in an asynchronous mirror group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

The statistics collected are available only for asynchronous mirror group member volumes in a primary role on the local storage array.

A set of data is collected during the synchronization process that can be used to evaluate how well the mirror configuration is functioning. The data is collected as a set of *samples* . A sample is created at the beginning of a synchronization process and updated regularly while the synchronization process proceeds.

A sample collects data until the synchronization process completes or until a disruption to the synchronization process occurs, such as a volume ownership transfer or a `read-write` error. When a synchronization process disruption is resolved (for example, the volume is transferred to the alternate controller), a new sample is created and updated as the synchronization process continues.

Syntax

```
save storageArray arvmStats asyncMirrorGroup [asyncMirrorGroupName]
arvmStats file="filename
"
[volume="volumeName"]
[sampleType=(all | mostRecent | longestSyncTime | errors)]
[recordLimit=(1-90)]
```

Parameters

Parameter	Description
asyncMirrorGroup	The name of the asynchronous mirror group for which you are saving synchronization statistics. Enclose the asynchronous mirror group name in square brackets ([ ]). If the asynchronous mirror group name has special characters or numbers, you must enclose the asynchronous mirror group name in double quotation marks (" ") inside square brackets.
file	The file path and the file name to which you want to save the synchronization statistics. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\asynchdata.csv"` This command does not automatically append a file extension to the saved file. You can use any file name, but you must use the `.csv` extension.
volume	This parameter is optional. The name of the specific member volume in the asynchronous mirror group for which you are retrieving synchronization statistics. If no volume is specified, the statistics for every member volume in the asynchronous mirror group are saved. If statistics are collected for more than one volume in an asynchronous mirror group, all the data will be written to the same file. Enclose the volume name in double quotation marks (" ").
sampleType	This parameter is optional. The default value for **sampleType** is `all`. • `all` – Data for all three sample types are collected and written to the same file. • `mostRecent` – Statistics are recorded for the most recent 50 resynchronization samples. • `longestSyncTime` – Statistics are collected for the most recent 20 longest resynchronization samples. • `errors` – Statistics are recorded for the most recent 20 failed resynchronization samples. These samples include a failure code.
recordLimit	This parameter is optional. The default value for record limit is `no limit`. The `recordLimit` must be greater than 0 and less than or equal to 90.

Notes

Statistics are captured for mirrored volumes in the Primary role. The statistics collected include the following data:

- Synchronization start time
- Synchronization type (manual or periodic)
- Synchronization duration
- Number of bytes sent
- Maximum write time (for a single write)
- Minimum write time (for a single write)
- Minimum synchronization data rate
- Maximum synchronization data rate
- Total write time
- Repository utilization (%)

- Recovery point age

During initial synchronization, statistics samples are captured approximately every 15 minutes.

The synchronization statistics are included in the support bundle.

Set asynchronous mirror group

The `set asyncMirrorGroup` command changes the synchronization settings and warning thresholds that the controller owner of the primary side of the asynchronous mirror group uses when it performs an initial synchronization or resynchronization.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Context

Changing the synchronization settings affects the synchronization operations of all mirrored pairs within the asynchronous mirror group.

Syntax

```
set asyncMirrorGroup [asyncMirrorGroupName]
[volume="repos_xxxx" increaseRepositoryCapacity (repositoryVolume=("repos_xxxx"))]
[syncInterval=integer (minutes | hours | days)]
[warningSyncThreshold=integer (minutes | hours | days)]
[warningRecoveryThreshold=integer (minutes | hours | days)]
[userLabel="New_asyncMirrorGroupName"]
[warningThresholdPercent=percentValue]
[role=(primary | secondary)]
[autoResync=(TRUE | FALSE)]
```

Parameters

Parameter	Description
asyncMirrorGroup	The name of the asynchronous mirror group that you want to modify. Enclose the asynchronous mirror group name in square brackets ([ ]). If the asynchronous mirror group name has special characters or numbers, you must enclose the name in double quotation marks (" ") inside square brackets.
volume	The name of an asynchronous mirror group repository volume for which you want to increase the capacity. The name of a repository volume is comprised of two parts: • The term "repos" • A four-digit numerical identifier that the storage management software assigns to the repository volume name Enclose the name of the repository volume in double quotation marks (" ").
syncInterval	Specify the length of time between automatically sending updates of modified data from the local storage array to the remote storage array. You can specify the length of time in minutes, hours, or days.

Parameter	Description
warningSyncThreshold	Specify the length of time to wait until a warning is triggered for cases in which the synchronization of all of the volumes within the asynchronous mirror group takes longer than the defined time. You can specify the length of time in minutes, hours, or days.
warningRecoveryThreshold	Specify the length of time to wait until a warning is triggered when the automatic data update for the point-in-time image on the remote storage array is older than the defined time. Define the threshold from the end of the previous update. You can specify the length of time in minutes, hours, or days. **Note:** You must set the Recovery Point Threshold to be twice as large as the synchronization interval threshold.
userLabel	The new name that you want to give to the asynchronous mirror group. Use this parameter when you want to rename the asynchronous mirror group. Enclose the new asynchronous mirror group name in double quotation marks (" ").
warningThresholdPercent	Specify the percent value that determines when a warning is triggered when the capacity of a mirror repository volume reaches the defined percentage. Define the threshold by percentage (%) of the capacity remaining.
role	Use this parameter to promote the asynchronous mirror group to a primary role or demote the asynchronous mirror group to a secondary role. To define the asynchronous mirror group as the primary role, set this parameter to primary . To define the asynchronous mirror group as the secondary role, set this parameter to secondary .
autoResync	The settings for automatic resynchronization between the primary volumes and the secondary volumes of an asynchronous mirrored pair within an asynchronous mirror group. This parameter has these values: • enabled – Automatic resynchronization is turned on. You do not need to do anything further to resynchronize the primary volume and the secondary volume. • disabled – Automatic resynchronization is turned off. To resynchronize the primary volume and the secondary volume, you must run the `start asyncMirrorGroup` command.

Notes

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the names. Names can have a maximum of 30 characters.

When you use this command, you can specify one or more of the parameters. You do not, however, need to use all of the parameters.

An asynchronous mirror group repository volume is an expandable volume that is structured as a concatenated collection of up to 16 standard volume entities. Initially, an expandable repository volume has only a single volume. The capacity of the expandable repository volume is exactly that of the single volume. You can increase the capacity of an expandable repository volume by attaching additional unused repository volumes to it. The composite expandable repository volume capacity then becomes the sum of the capacities of all of the concatenated standard volumes.

Show asynchronous mirror groups

The `show asyncMirrorGroup summary` command displays configuration information for one or more asynchronous mirror groups.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

This command also displays the asynchronous mirrored pairs associated with each asynchronous mirror group, including incomplete asynchronous mirrored pairs.

You also can use this command to show the progress of periodic data synchronization on all of the mirrored pairs within the asynchronous mirror group.

Syntax

```
show (allAsyncMirrorGroups |
asyncMirrorGroup [asyncMirrorGroupName] |
asyncMirrorGroups [asyncMirrorGroupName1 ... asyncMirrorGroupNameN])
[summary]
```

Parameter

Parameter	Description
allAsyncMirrorGroups	Use this parameter if you want to display the properties for all asynchronous mirror groups.
asyncMirrorGroup	The name of an asynchronous mirror group for which you want to show configuration information and the progress of periodic data synchronization. Enclose the asynchronous mirror group name in square brackets ([ ]). If the asynchronous mirror group name has special characters or numbers, you must enclose the asynchronous mirror group name in double quotation marks (" ") inside square brackets.
asyncMirrorGroups	The names of several asynchronous mirror groups for which you want to retrieve information. Enter the names of the asynchronous mirror groups using these rules: • Enclose all of the names in square brackets ([ ]). • Separate each of the names with a space. If the asynchronous mirror group names have special characters or numbers, enter the names using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.
summary	This parameter displays a concise list of information about the synchronization progress of one or more asynchronous mirror groups.

Show asynchronous mirror group synchronization progress

The `show asyncMirrorGroup synchronizationProgress` command displays the progress of *periodic* synchronization of the asynchronous mirror group between the local and remote storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

This command returns the progress of data synchronization on all of the mirrored pairs within the asynchronous mirror group. This command shows the progress as a percentage of data synchronization that has been completed.

Note: There are two types of synchronization: initial synchronization and periodic synchronization. Initial asynchronous mirror group synchronization progress is displayed in the Long Running Operations dialog and by executing the `show storageArray longRunningOperations` command.

Syntax

```
show asyncMirrorGroup [asyncMirrorGroupName]
[synchronizationProgress]
[summary]
```

Parameters

Parameter	Description
asyncMirrorGroup	The name of an asynchronous mirror group for which you want to show synchronization of the asynchronous mirror group between the local and remote storage array. Enclose the asynchronous mirror group name in square brackets ([ ]). If the asynchronous mirror group name has special characters or numbers, you must enclose the asynchronous mirror group name in double quotation marks (" ") inside square brackets.
synchronizationProgress	This parameter displays the periodic synchronization progress of the asynchronous mirror group.
summary	This parameter displays a concise list of information about the synchronization of the asynchronous mirror group between the local and remote storage array.

Start asynchronous mirroring synchronization

The `start asyncMirrorGroup synchronize` command starts Asynchronous Mirroring synchronization.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
start asyncMirrorGroup ["asyncMirrorGroupName"] synchronize
[deleteRecoveryPointIfNecessary]
```

Parameter

Parameter	Description
asyncMirrorGroup	The name of the asynchronous mirror group for which you want to start synchronization. Enclose the asynchronous mirror group name in double quotation marks (" ") inside square brackets ([" "]).
deleteRecoveryPointIfNecessary	The parameter to delete the recovery point if the recoverable synchronization data has exceeded time threshold for recovery. Recovery point age is measured from the time the data was frozen on the primary storage array.

Suspend asynchronous mirror group

The `suspend asyncMirrorGroup` command suspends the synchronization of data on all mirrored pairs at the asynchronous mirror group level.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

This `suspend` command helps to reduce any performance impact to the host application that might occur while any changed data on the local storage array is copied to the remote storage array.

Syntax

`suspend asyncMirrorGroup [`*asyncMirrorGroupName*`]`

Parameters

Parameter	Description
asyncMirrorGroup	The name of the asynchronous mirror group for which you want to suspend synchronization of data. Enclose the asynchronous mirror group name in square brackets ([ ]). If the asynchronous mirror group name has special characters or numbers, you must enclose the asynchronous mirror group name in double quotation marks (" ") inside square brackets.

Notes

When an asynchronous mirror group is in a suspended state, no attempt is made to copy data from the primary volumes to the secondary volumes of the mirrored pairs. Any writes to the primary side of the asynchronous mirror group are persistently logged in its associated mirror repository volumes. After the asynchronous mirror group is resumed, only the modified regions of the primary volumes are written to the secondary volumes.

Test asynchronous mirror group connectivity

The `diagnose asyncMirrorGroup` command tests possible communication problems between the local storage array and the remote storage array associated with an asynchronous mirror group.

Supported Arrays

Attention: If you are running the command on the DE2000H, DE4000H, DE4000F, DE6000H, and DE6000F array, the client type must be set to `symbol` . This command will not execute if they client type is set to `https` .

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
diagnose asyncMirrorGroup [asyncMirrorGroupName]
testID=(all | connectivity | latency | bandwidth | portConnections)
```

Parameter

Parameter	Description
asyncMirrorGroup	The name of an existing asynchronous mirror group that you want to test. Enclose the asynchronous mirror group name in square brackets ([ ]). If the asynchronous mirror group name has special characters or numbers, you must enclose the asynchronous mirror group name in double quotation marks (" ") inside square brackets.
testID	The identifier for the diagnostic test you want to run. The identifier and corresponding tests are as follows: • All – Performs all the tests associated with this command. • Connectivity – Verifies that the two controllers have a communication path. The connectivity test sends an inter-controller message between the storage arrays, and then validates that the corresponding asynchronous mirror group on the remote storage array exists. It also validates that the volume members of the asynchronous mirror group on the remote system match the volume members of the asynchronous mirror group on the local system. • Latency – Sends a SCSI test unit command to each volume on the remote storage array associated with the asynchronous mirror group to test the minimum, average, and maximum latency. • Bandwidth – Sends two inter-controller messages to the remote storage array to test the minimum, average, and maximum bandwidth as well as the negotiated link speed of the port on the controller performing the test. • Port connections – Shows the port that is being used for mirroring on the local storage array and the port that is receiving the mirrored data on the remote storage array.

Synchronous mirroring commands

Activate synchronous mirroring

The `activate storageArray feature` command activates the Synchronous Mirroring feature and creates the mirror repository volume.

Supported Arrays

This command applies to an individual DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

When you use this command, you can define the mirror repository volume in one of three ways:

- User-defined drives
- User-defined volume group
- User-defined number of drives

If you choose to define a number of drives, the controller firmware chooses which drives to use for the mirror repository volume.

Syntax (user-defined drives)

```
activate storageArray feature=syncMirror
repositoryRAIDLevel=(0 |1 | 3 | 5 | 6)
repositoryDrives=(trayID1,[drawerID1],slotID1 ... trayIDn,[drawerIDn],[slotIDn])
[driveType=(SAS)]
[repositoryVolumeGroupUserLabel="volumeGroupName"]
[trayLossProtect=(TRUE | FALSE)]
[drawerLossProtect=(TRUE | FALSE)]
[dataAssurance=(none | enabled)]
```

Syntax (user-defined volume group)

```
activate storageArray feature=syncMirror
repositoryVolumeGroup=volumeGroupName
[freeCapacityArea=freeCapacityIndexNumber]
```

Syntax (user-defined number of drives)

```
activate storageArray feature=syncMirror
repositoryRAIDLevel=(1 | 3 | 5 | 6)
repositoryDriveCount=numberOfDrives
[repositoryVolumeGroupUserLabel="volumeGroupName"]
[trayLossProtect=(TRUE | FALSE)]
[drawerLossProtect=(TRUE | FALSE)]
[dataAssurance=(none | enabled)]
```

Parameters

Parameter	Description
repositoryRAIDLevel	The RAID level for the mirror repository volume. Valid values are 0 , 1 , 3 , 5 , or 6 .
repositoryDrives	The drives for the mirror repository volume. For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).
repositoryVolumeGroupUserLabel	The name that you want to give the new volume group in which the mirror repository volume will be located. Enclose the volume group name in double quotation marks (" ").

Parameter	Description
repositoryVolumeGroup	The name of the mirror repository volume group where the mirror repository volume is located. (To determine the names of the volume groups in your storage array, run the `show storageArray profile` command.)
freeCapacityArea	The index number of the free space in an existing volume group that you want to use to create the mirror repository volume. Free capacity is defined as the free capacity between existing volumes in a volume group. For example, a volume group might have the following areas: volume 1, free capacity, volume 2, free capacity, volume 3, free capacity. To use the free capacity following volume 2, you would specify: `freeCapacityArea=2` Run the `show volumeGroup` command to determine if a free capacity area exists.
repositoryDriveCount	The number of unassigned drives that you want to use for the mirror repository volume.
driveType	The type of drive for which you want to retrieve information. You cannot mix drive types. Valid drive type is: SAS If you do not specify a drive type, the command defaults to all type.
trayLossProtect	The setting to enforce tray loss protection when you create the mirror repository volume. To enforce tray loss protection, set this parameter to TRUE . The default value is FALSE .
drawerLossProtect	The setting to enforce drawer loss protection when you create the mirror repository volume. To enforce drawer loss protection, set this parameter to TRUE . The default value is FALSE .

Notes

The **repositoryDrives** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0 , and specify the ID of the slot in which a drive resides.

If the drives that you select for the **repositoryDrives** parameter are not compatible with other parameters (such as the **repositoryRAIDLevel** parameter), the script command returns an error, and Synchronous Mirroring is not activated. The error returns the amount of space that is needed for the mirror repository volume. You can then re-enter the command, and specify the appropriate amount of space.

If you enter a value for the repository storage space that is too small for the mirror repository volumes, the controller firmware returns an error message that provides the amount of space that is needed for the mirror repository volumes. The command does not try to activate Synchronous Mirroring. You can re-enter the command by using the value from the error message for the repository storage space value.

When you assign the drives, if you set the **trayLossProtect** parameter to TRUE and have selected more than one drive from any one tray, the storage array returns an error. If you set the **trayLossProtect** parameter to FALSE , the storage array performs operations, but the volume group that you create might not have tray loss protection.

When the controller firmware assigns the drives, if you set the **trayLossProtect** parameter to TRUE , the storage array returns an error if the controller firmware cannot provide drives that result in the new volume group having tray loss protection. If you set the **trayLossProtect** parameter to FALSE , the storage array performs the operation even if it means that the volume group might not have tray loss protection.

The **drawerLossProtect** parameter determines whether data on a volume is accessible if a drawer fails. When you assign the drives, if you set the **drawerLossProtect** parameter to TRUE and select more than one drive from any one drawer, the storage array returns an error. If you set the **drawerLossProtect** parameter to FALSE , the storage array performs operations, but the volume group that you create might not have drawer loss protection.

Data assurance management

The Data Assurance (DA) feature increases data integrity across the storage system. DA enables the storage array to check for errors that might occur when data is moved between the controllers and drives. When this feature is enabled, the storage array appends error-checking codes (also known as cyclic redundancy checks or CRCs) to each block of data in the volume. After a data block is moved, the storage array uses these CRC codes to determine if any errors occurred during transmission. Potentially corrupted data is not written to disk.

If you want to use the DA feature, start with a pool or volume group that includes only drives that support DA. Then, create DA-capable volumes.

Note: When all the drives are DA-capable, you can set the **dataAssurance** parameter to **enabled** and then use DA with certain operations. For example, you can create a volume group that includes DA-capable drives, and then create a volume within that volume group that is DA-enabled. Other operations that use a DA-enabled volume have options to support the DA feature.

If the **dataAssurance** parameter is set to **enabled**, only data assurance capable drives will be considered for volume candidates; otherwise, both data assurance capable and non-data assurance capable drives will be considered. If only data assurance drives are available the new volume group will be created using the enabled data assurance drives.

Check synchronous mirroring status

The `check syncMirror` command returns the status of a remote-mirror volume. Use this command to determine when the status of the remote-mirror volume becomes Optimal.

Supported Arrays

This command applies to an individual DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

`check syncMirror localVolume [`*volumeName*`] optimalStatus timeout=`*timeoutValue*

Parameters

Parameter	Description
localVolume	The name of any remote-mirror volume. The remote-mirror volume can be the primary volume or the secondary volume of a remote mirrored pair. Enclose the volume name in square brackets ([ ]). If the volume name has special characters, you must enclose the volume name in double quotation marks (" ").
timeout	The time interval within which the software can return the remote-mirror volume status. The timeout value is in minutes.

Notes

This command waits until the status becomes Optimal or the timeout interval expires. Use this command when you run the Asynchronous Synchronous Mirroring utility.

Create synchronous mirroring

The `create syncMirror` command creates both the primary volume and the secondary volume for a synchronous remote mirrored pair. This command also sets the write mode (synchronous write mode or asynchronous write mode) and the synchronization priority.

Supported Arrays

This command applies to an individual DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Attention: If you are running the command on the DE4000H, DE4000F, DE6000H, and DE6000F storage array, the client type must be set to `symbol`. This command will not execute if they client type is set to `https`.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
create syncMirror primary="primaryVolumeName"
secondary="secondaryVolumeName"
(remoteStorageArrayName="storageArrayName" |
remoteStorageArrayWwid="wwID")
[remotePassword="password"]
[syncPriority=(highest | high | medium | low | lowest)]
[autoResync=(enabled | disabled)]
[writeOrder=(preserved | notPreserved)]
[writeMode=(synchronous | asynchronous)]
[role=(primary | secondary)]
[force=(TRUE | FALSE)]
```

Parameters

Parameter	Description
primary	The name of an existing volume on the local storage array that you want to use for the primary volume. Enclose the primary volume name in double quotation marks (" ").
secondary	The name of an existing volume on the remote storage array that you want to use for the secondary volume. Enclose the secondary volume name in double quotation marks (" ").
remoteStorageArrayName	The name of the remote storage array. Enclose the remote storage array name in double quotation marks (" ").

Parameter	Description
remoteStorageArrayWwid	The World Wide Identifier (WWID) of the remote storage array. Enclose the WWID in double quotation marks (" ").
remotePassword	The password for the remote storage array. Use this parameter when the remote storage array is password protected. Enclose the password in double quotation marks (" ").
syncPriority	The priority that full synchronization has relative to host I/O activity. Valid values are highest , high , medium , low , or lowest .
autoResync	The settings for automatic resynchronization between the primary volumes and the secondary volumes of a remote-mirror pair. This parameter has these values: • enabled – Automatic resynchronization is turned on. You do not need to do anything further to resynchronize the primary volume and the secondary volume. • disabled – Automatic resynchronization is turned off. To resynchronize the primary volume and the secondary volume, you must run the `resume syncMirror` command.
writeOrder	The write order for data transmission between the primary volume and the secondary volume. Valid values are preserved or notPreserved .
writeMode	How the primary volume writes to the secondary volume. Valid values are synchronous or asynchronous .
role	Use this parameter to promote the asynchronous mirror group to a primary role or demote the asynchronous mirror group to a secondary role. To define the asynchronous mirror group as the primary role, set this parameter to primary . To define the asynchronous mirror group as the secondary role, set this parameter to secondary .
force	The role reversal is forced if the communications link between the storage arrays is down and promotion or demotion on the local side results in a dual-primary condition or a dual-secondary condition. To force a role reversal, set this parameter to TRUE . The default value is FALSE .

Notes

You can use any combination of alphanumeric characters, hyphens, and underscores for the names. Names can have a maximum of 30 characters.

When you choose the primary volume and the secondary volume, the secondary volume must be of equal or greater size than the primary volume. The RAID level of the secondary volume does not have to be the same as the primary volume.

Passwords are stored on each storage array in a management domain. If a password was not previously set, you do not need a password. The password can be any combination of a alphanumeric characters with a maximum of 30 characters. (You can define a storage array password by using the `set storageArray` command.)

Synchronization priority defines the amount of system resources that are used to synchronize the data between the primary volume and the secondary volume of a mirror relationship. If you select the highest priority level, the data synchronization uses the most system resources to perform the full synchronization, which decreases performance for host data transfers.

The **writeOrder** parameter applies only to asynchronous write modes and makes the mirrored pair part of a consistency group. Setting the **writeOrder** parameter to preserved causes the remote mirrored pair to

transmit data from the primary volume to the secondary volume in the same order as the host writes to the primary volume. In the event of a transmission link failure, the data is buffered until a full synchronization can occur. This action can require additional system overhead to maintain the buffered data, which slows operations. Setting the **writeOrder** parameter to notPreserved frees the system from having to maintain data in a buffer, but it requires forcing a full synchronization to make sure that the secondary volume has the same data as the primary volume.

Deactivate synchronous mirroring

The `deactivate storageArray feature` command deactivates the synchronous mirroring feature, disassembles the mirror repository volume, and releases the controller owner of the secondary volume.

Supported Arrays

This command applies to an individual DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Context

The controller host port that is dedicated to the secondary volume is available for host data transfers.

Syntax

```
deactivate storageArray feature=syncMirror
```

Parameters

None.

Diagnose synchronous mirroring

The `diagnose syncMirror` command tests the connection between the specified primary volumes and the mirror volumes on a storage array with the synchronous mirroring feature enabled.

Supported Arrays

This command applies to an individual DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
diagnose syncMirror (primary [primaryVolumeName] |
primaries ["primaryVolumeName1" ... "primaryVolumeNameN"])
testID=connectivity
```

Parameter

Parameter	Description
primary	The name of the primary volume of the remote mirror pair that you want to test. Enclose the primary volume name in square brackets ([ ]). If the primary volume name has special characters or consists only of numbers, you must enclose the primary volume name in double quotation marks (" ") inside square brackets.
primaries	You can enter more than one volume name. Enclose all of the volume names in one set of square brackets ([ ]). Enclose each volume name in double quotation marks (" "). Separate each volume name with a space. The names of several volumes that you want you want to use as primary volumes. Enter the names of the primary volumes using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.

Re-create synchronous mirroring repository volume

The `recreate storageArray mirrorRepository` command creates a new Synchronous Mirroring repository volume (also called a mirror repository volume) by using the parameters defined for a previous mirror repository volume.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Note: With firmware version 7.80, the `recreate storageArray mirrorRepository` command is deprecated. This command is no longer supported in either the GUI or the CLI. If you attempt to run this command, an error message returns indicating that this functionality is no longer supported and that no changes will be made to the specified remote mirror repositories.

The underlying requirement is that you have previously created a mirror repository volume. When you use this command, you can define the mirror repository volume in one of three ways: user-defined drives, user-defined volume group, or user-defined number of drives for the mirror repository volume. If you choose to define a number of drives, the controller firmware chooses which drives to use for the mirror repository volume.

Syntax (user-defined drives)

```
recreate storageArray mirrorRepository
repositoryRAIDLevel=(1 | 3 | 5 | 6)
repositoryDrives=(trayID1,[drawerID1,]slotID1
... trayIDN,[drawerIDN,]slotIDN)
[trayLossProtect=(TRUE | FALSE)]
[dataAssurance=(none | enabled)]
```

Syntax (user-defined volume group)

```
recreate storageArray mirrorRepository
repositoryVolumeGroup=volumeGroupName
[freeCapacityArea=freeCapacityIndexNumber]
```

Syntax (user-defined number of drives)

```
recreate storageArray mirrorRepository
repositoryRAIDLevel=(1 | 3 | 5 | 6)
repositoryDriveCount=numberOfDrives
(
    [driveMediaType=(HDD | SSD | unknown | allMedia)] |
    [driveType=(SAS)]
)
[repositoryVolumeGroupUserLabel="userLabel"] |
[trayLossProtect=(TRUE | FALSE)] |
[drawerLossProtect=(true|false)] |
[dataAssurance=(none | enabled)]
```

Parameters

Parameter	Description
repositoryRAIDLevel	The RAID level for the mirror repository volume. Valid values are 1, 3, 5, or 6.
repositoryDrives	The drives that you want to use for the mirror repository volume. Drawer ID values are 1 to 5 . Slot ID values are 1 to 24 . Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]). Enter the names of the repository volumes using these rules: For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]). • Enclose all of the tray ID values, the drawer ID values, and the slot ID value sin square brackets ([ ]). • Separate the tray ID value, the drawer ID value, and the slot ID value with commas. • Separate each of the drive positions with a space.
repositoryVolumeGroup	The name of the volume group where the mirror repository volume is located.
repositoryVolumeGroupUserLabel	The name that you want to give the new volume group in which the mirror repository volume will be located. Enclose the volume group name in double quotation marks (" ").
freeCapacityArea	The index number of the free space in an existing volume group that you want to use to re-create the mirror repository volume. Free capacity is defined as the free capacity between existing volumes in a volume group. For example, a volume group might have the following areas: volume 1, free capacity, volume 2, free capacity, volume 3, free capacity. To use the free capacity following volume 2, you would specify: `freeCapacityArea=2` Run the `show volumeGroup` command to determine if a free capacity area exists.

Parameter	Description
repositoryDriveCount	The number of unassigned drives that you want to use for the mirror repository volume.
driveMediaType	The type of drive media for which you want to retrieve information. The following values are valid types of drive media: • HDD indicates that you have hard disk drives in the drive tray • SSD indicates that have solid state disks in the drive tray • unknown indicates you are note sure of the type of drive media in the drive tray • allMedia indicates that you have all types of media in the drive tray
driveType	The type of drive that you want to use for the mirror repository volume. You cannot mix drive types. You must use this parameter when you have more than one type of drive in your storage array. Valid drive type is: SAS If you do not specify a drive type, the command defaults to fibre.
trayLossProtect	The setting to enforce tray loss protection when you create the mirror repository volume. To enforce tray loss protection, set this parameter to TRUE. The default value is FALSE.
drawerLossProtect	The setting to enforce drawer loss protection when you create the mirror repository volume. To enforce drawer loss protection, set this parameter to TRUE. The default value is FALSE.

Notes

If you enter a value for the storage space of the mirror repository volume that is too small, the controller firmware returns an error message, which states the amount of space that is needed for the mirror repository volume. The command does not try to change the mirror repository volume. You can re-enter the command by using the value from the error message for the storage space value of the mirror repository volume.

The **repositoryDrives** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0, and specify the ID of the slot in which a drive resides.

When you assign the drives, if you set the **trayLossProtect** parameter to TRUE and have selected more than one drive from any one tray, the storage array returns an error. If you set the **trayLossProtect** parameter to FALSE, the storage array performs operations, but the mirror repository volume that you create might not have tray loss protection.

When the controller firmware assigns the drives, if you set the **trayLossProtect** parameter to TRUE, the storage array returns an error if the controller firmware cannot provide drives that result in the new mirror repository volume having tray loss protection. If you set the **trayLossProtect** parameter to FALSE, the storage array performs the operation even if it means that the mirror repository volume might not have tray loss protection.

Data assurance management

The Data Assurance (DA) feature increases data integrity across the storage system. DA enables the storage array to check for errors that might occur when data is moved between the controllers and drives. When this feature is enabled, the storage array appends error-checking codes (also known as cyclic redundancy checks or CRCs) to each block of data in the volume. After a data block is moved, the storage array uses these CRC codes to determine if any errors occurred during transmission. Potentially corrupted data is not written to disk.

If you want to use the DA feature, start with a pool or volume group that includes only drives that support DA. Then, create DA-capable volumes.

Note: When all the drives are DA-capable, you can set the **dataAssurance** parameter to **enabled** and then use DA with certain operations. For example, you can create a volume group that includes DA-capable drives, and then create a volume within that volume group that is DA-enabled. Other operations that use a DA-enabled volume have options to support the DA feature.

If the **dataAssurance** parameter is set to **enabled**, only data assurance capable drives will be considered for volume candidates; otherwise, both data assurance capable and non-data assurance capable drives will be considered. If only data assurance drives are available the new volume group will be created using the enabled data assurance drives.

Remove synchronous mirroring

The `remove syncMirror` command removes the mirror relationship between the primary volume and the secondary volume in a remote-mirrored pair.

Supported Arrays

This command applies to an individual DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
remove syncMirror (localVolume [volumeName] |
localVolumes [volumeName1 ... volumeNameN])
```

Parameters

Parameter	Description
localVolume	The name of the primary volume (the volume on the local storage array) that you want to remove. Enclose the volume name in square brackets ([ ]). If the volume name has special characters or consists only of numbers, you must enclose the volume name in double quotation marks (" ") inside square brackets.
localVolumes	The names of several primary volumes (the volumes on the local storage array) that you want to remove. Enter the names of the primary volumes using these rules: • Enclose all of the names in square brackets ([ ]). • Separate each of the names with a space. If the primary volume names have special characters or consist only of numbers, enter the names using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.

Resume synchronous mirroring

The `resume syncMirror` command resumes a suspended synchronous mirroring operation.

Supported Arrays

This command applies to an individual DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
resume syncMirror (primary [volumeName] |
primaries [volumeName1 ... volumeNameN])
[writeConsistency=(TRUE | FALSE)]
```

Parameters

Parameter	Description
primary	The name of the primary volume for which you want to resume a Synchronous Mirroring operation. Enclose the primary volume name in square brackets ([ ]). If the primary volume name has special characters or numbers, you must enclose the primary volume name in double quotation marks (" ") inside square brackets.
primaries	The names of several primary volumes for which you want to resume a Synchronous Mirroring operation. Enter the names of the primary volumes using these rules: • Enclose all of the names in square brackets ([ ]). • Separate each of the names with a space. If the primary volume names have special characters or consist only of numbers, enter the names using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.
writeConsistency	The setting to identify the volumes in this command that are in a write-consistency group or are separate. For the volumes to be in the same write-consistency group, set this parameter to TRUE . For the volumes to be separate, set this parameter to FALSE .

Notes

If you set the **writeConsistency** parameter to TRUE , the volumes must be in a write-consistency group (or groups). This command resumes all write-consistency groups that contain the volumes. For example, if volumes A, B, and C are in a write-consistency group and they have remote counterparts A', B', and C', the `resume syncMirror volume ["A"] writeConsistency=TRUE` command resumes A-A', B-B', and C-C'.

Set synchronous mirroring

The `set syncMirror` command defines the properties for a remote-mirrored pair.

Supported Arrays

This command applies to an individual DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set syncMirror (localVolume [volumeName] |
localVolumes [volumeName1 ... volumeNameN])
[role=(primary | secondary)]
[syncPriority=(highest | high | medium | low | lowest)]
[autoResync=(enabled | disabled)]
[writeOrder=(preserved | notPreserved)]
[writeMode=(synchronous | asynchronous)]
[force=(TRUE | FALSE)]
```

Parameters

Parameter	Description
localVolume	The name of the local volume for which you want to define properties. Enclose the primary volume name in square brackets ([ ]). If the primary volume name has special characters or numbers, you must enclose the primary volume name in double quotation marks (" ") inside square brackets.
localVolumes	The names of several local volumes for which you want to define properties. Enter the names of the volumes using these rules: • Enclose all of the names in square brackets ([ ]). • Separate each of the names with a space. If the volume names have special characters or consist only of numbers, enter the names using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.
role	The setting for the local volume to act as the primary volume or the secondary volume. To define the volume as the primary volume, set this parameter to primary . To define the volume as the secondary volume, set this parameter to secondary . This parameter applies only when the volume is part of a mirror relationship.
syncPriority	The priority that full synchronization has relative to host I/O activity. Valid values are highest , high , medium , low , or lowest .
autoResync	The settings for automatic resynchronization between the primary volumes and the secondary volumes of a remote-mirrored pair. This parameter has these values: • enabled – Automatic resynchronization is turned on. You do not need to do anything further to resynchronize the primary volume and the secondary volume. • disabled – Automatic resynchronization is turned off. To resynchronize the primary volumes and the secondary volume, you must run the `resume syncMirror` command.
writeOrder	This parameter defines write order for data transmission between the primary volume and the secondary volume. Valid values are preserved or notPreserved .
writeMode	This parameter defines how the primary volume writes to the secondary volume. Valid values are synchronous or asynchronous .
force	The role reversal is forced if the communications link between the storage arrays is down and promotion or demotion on the local side results in a dual-primary condition or a dual-secondary condition. To force a role reversal, set this parameter to TRUE . The default value is FALSE . **Note:** Use the **force** parameter only when using the **role** parameter.

Notes

When you use this command, you can specify one or more of the optional parameters.

Synchronization priority defines the amount of system resources that are used to synchronize the data between the primary volumes and the secondary volumes of a mirror relationship. If you select the highest priority level, the data synchronization uses the most system resources to perform the full synchronization, which decreases the performance for host data transfers.

The **writeOrder** parameter applies only to asynchronous write modes and makes them become part of a consistency group. Setting the **writeOrder** parameter to preserved causes the remote-mirrored pair to transmit data from the primary volume to the secondary volume in the same order as the host writes to the

primary volume. In the event of a transmission link failure, the data is buffered until a full synchronization can occur. This action can require additional system overhead to maintain the buffered data, which slows operations. Setting the **writeOrder** parameter to notPreserved frees the system from having to maintain data in a buffer, but it requires forcing a full synchronization to make sure that the secondary volume has the same data as the primary volume.

Show synchronous mirroring volume candidates

The `show syncMirror candidates` command returns information about the candidate volumes on a remote storage array that you can use as secondary volumes in a Synchronous Mirroring configuration.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Attention: If you are running the command on the DE2000H, DE4000H, DE4000F, DE6000H, and DE6000F storage array, the client type must be set to `symbol`. This command will not execute if they client type is set to `https`.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Syntax

```
show syncMirror candidates primary="volumeName"
remoteStorageArrayName="storageArrayName"
```

Parameters

Parameter	Description
primary	The name of the local volume that you want for the primary volume in the remote-mirrored pair. Enclose the primary volume name in double quotation marks (" ").
remoteStorageArrayName	The remote storage array that contains possible volumes for a secondary volume. If the remote storage array name has special characters, you must also enclose the remote storage array name in double quotation marks (" ").

Show synchronous mirroring volume synchronization progress

The `show syncMirror synchronizationProgress` command returns the progress of data synchronization between the primary volume and the secondary volume in a Synchronous Mirroring configuration.

Supported Arrays

This command applies to an individual DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Context

This command shows the progress as a percentage of data synchronization that has been completed.

Syntax

```
show syncMirror (localVolume [volumeName] |
localVolumes [volumeName1... volumeNameN]) synchronizationProgress
```

Parameter

Parameter	Description
volume	The name of the primary volume of the remote mirrored pair for which you want to check synchronization progress. Enclose the volume name in square brackets ([ ]). If the volume name has special characters or numbers, you must enclose the volume name in double quotation marks (" ") inside square brackets.
volumes	The names of the primary volume of the remote mirrored pair for which you want to check synchronization progress. Enter the names of the volumes using these rules: • Enclose all of the names in square brackets ([ ]). • Separate each of the names with a space. If the volume names have special characters or consist only of numbers, enter the names using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.

Start synchronous mirroring synchronization

The `start syncMirror primary synchronize` command starts synchronous mirroring synchronization.

Supported Arrays

This command applies to an individual DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
start syncMirror primary ["volumeName"] synchronize
```

Parameter

Parameter	Description
primary	The name of the primary volume for which you want to start synchronization. Enclose the primary volume name in double quotation marks (" ") inside of square brackets ([ ]).

Suspend synchronous mirroring

The `suspend syncMirror primaries` command suspends a synchronous mirroring operation.

Supported Arrays

This command applies to an individual DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
suspend syncMirror (primary [primaryVolumeName]
primaries [primaryVolumeName1 ... primaryVolumeNameN])
[writeConsistency=(TRUE | FALSE)]
```

Parameters

Parameter	Description
primary	The name of the primary volume for which you want to suspend operation. Enclose the volume name in square brackets ([ ]). If the volume name has special characters or numbers, you must enclose the volume name in double quotation marks (" ") inside square brackets.
primaries	The names of several primary volumes for which you want to suspend operations. All of the volumes will have the same properties. Enter the names of the volumes using these rules: • Enclose all of the names in square brackets ([ ]). • Separate each of the names with a space. If the volume names have special characters or numbers, enter the names using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.
writeConsistency	This parameter defines whether the volumes identified in this command are in a write-consistency group or are separate. For the volumes in the same write-consistency group, set this parameter to TRUE . For the volumes that are separate, set this parameter to FALSE .

Notes

If you set the **writeConsistency** parameter to TRUE , the volumes must be in a write-consistency group (or groups). This command suspends all write-consistency groups that contain the volumes. For example, if volumes A, B, and C are in a write-consistency group and they have remote counterparts A', B', and C', the command:

```
suspend syncMirror volume ["A"] writeConsistency=TRUE
```

suspends A-A', B-B', and C-C'. If you have a write-consistency group 1={A, B, C} and write-consistency group 2={D, E, F}, the command:

```
suspend syncMirror volumes ["A" "D"] writeConsistency=TRUE
```

suspends both write-consistency groups.

Chapter 13. Performance tuning commands

Automatic load balancing commands

Save auto-load balancing statistics

The `save storageArray autoLoadBalanceStatistics file` command provides automated I/O workload balancing and ensures that incoming I/O traffic from the hosts is dynamically managed and balanced across both controllers.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

This command saves the automatic load balancing statistics of the storage array to a file. These statistics show the ownership change history on each volume in the array.

Note: Send this file to technical support for interpretation.

Syntax

```
 save storageArray autoLoadBalanceStatistics file="filename"
(numberOfDays=numberOfDays);
```

Parameters

Parameter	Description
storageArray	Specifies that this command works on a storage array.
file	The file path and the file name to which you want to save the auto-load balancing statistics. Enclose the file name in double quotation marks (" ").
numberOfDays	The number of days worth of statistics to save. This parameter is optional and the default value is 0, which indicates all available data.

Example

```
SMcli -n Array1 -c "save storageArray autoLoadBalanceStatistics file="filename"
 numberOfDays=30;"
```

Note: An active "Drive Lost Primary Path" condition will result in the Automatic Load Balancing incapable of balancing workloads. This condition must be inactive to ensure workloads are balanced through the Automatic Load Balancing feature.

Set storage array to enable or disable automatic load balancing

The `set storageArray autoLoadBalancingEnable` command enables or disables the Automatic Load Balancing feature.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set storageArray autoLoadBalancingEnable=(TRUE | FALSE)
```

Parameter

Parameter	Description
storageArray	Indicates that this parameter works on a storage array.
autoLoadBalancingEnable	This parameter turns on or turns off Automatic Load Balancing on the controller. Set the parameter to TRUE to turn on Automatic Load Balancing. Set the parameter to FALSE to turn off Automatic Load Balancing.

What is Automatic Load Balancing?

The Automatic Load Balancing feature provides improved I/O resource management by reacting dynamically to load changes over time and automatically adjusting volume controller ownership to correct any load imbalance issues when workloads shift across the controllers.

The workload of each controller is continually monitored and, with cooperation from the multipath drivers installed on the hosts, can be automatically brought into balance whenever necessary. When workload is automatically re-balanced across the controllers, the storage administrator is relieved of the burden of manually adjusting volume controller ownership to accommodate load changes on the storage array.

When Automatic Load Balancing is enabled, it performs the following functions:

- Automatically monitors and balances controller resource utilization.
- Automatically adjusts volume controller ownership when needed, thereby optimizing I/O bandwidth between the hosts and the storage array.

Enabling and disabling Automatic Load Balancing

Automatic Load Balancing is enabled by default on all storage arrays that ship with ThinkSystem SAN OS (controller software) 11.50 or later. Linux, Windows, and VMware multipath drivers can use the Automatic Load Balancing feature.

You might want to disable Automatic Load Balancing on your storage array for the following reasons:

- You do not want to automatically change a particular volume's controller ownership to balance workload.
- You are operating in a highly tuned environment where load distribution is purposefully set up to achieve a specific distribution between the controllers.

In ThinkSystem Storage Manager , select the **Storage Array → Configuration → Automatic Load Balancing** menu option to enable or disable the Automatic Load Balancing feature for an individual storage array.

In ThinkSystem System Manager , select **Settings** ➔ **System** , scroll down to the Additional Settings section, click the **Enable/Disable Automatic Load Balancing** link, and select the **Enable/Disable automatic load balancing** checkbox to enable or disable the feature for an individual storage array.

Examples

```
SMcli -n Array1 -c "set storageArray autoLoadBalancingEnable=true;"

SMcli completed successfully.
```

Note: An active "Drive Lost Primary Path" condition will result in the Automatic Load Balancing incapable of balancing workloads. This condition must be inactive to ensure workloads are balanced through the Automatic Load Balancing feature.

SSD cache commands

Add drives to SSD cache

The `set ssdCache` command increases the capacity of an existing SSD cache by adding more solid state disks (SSDs).

Supported Arrays

This command applies to an individual DE2000H, DE4000H, or DE6000H storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set ssdCache [ssdCacheName]
addDrives=(trayID1,[drawerID1,]slotID1 ... trayIDn,[drawerIDn,]slotIDn)
```

Parameters

Parameter	Description
ssdCache	The name of the SSD cache to which you want to add SSDs. Enclose the name in square brackets ([ ]). If the SSD cache name contains special characters or consists only of numbers, you must enclose the name in double quotation marks (" ") inside square brackets.
addDrives	The drives that you want to add to the SSD cache. For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE6000H controllers have slot ID numbers starting at 0. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).

Notes

The SSD cache can contain any number of SSDs. The maximum size of the SSD cache is 5 TB, but might be less depending on the size of the controller's primary cache.

Change SSD cache application type

The `set ssdCache` command changes the application type associated with the SSD cache. The application type can be web server, database, or multimedia. Changing the application type changes the block size, sub-block size, populate on read threshold, and populate on write threshold for the volumes underlying the SSD cache.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, or DE6000H storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set ssdCache [ssdCacheName] usageHint=(webServer|dataBase|fileSystem)
```

Parameter

Parameter	Description
ssdCache	The name of the SSD cache for which you want to change the application type. Enclose the SSD cache name in square brackets ([ ]). If the SSD cache name contains special characters or consists only of numbers, you must enclose the SSD cache name in double quotation marks (" ") inside square brackets.
usageHint	The values are based on the typical I/O usage pattern of the application that is using the SSD cache. Valid values are webServer , dataBase , or fileSystem .

Create SSD cache

The `create ssdCache` command creates a read cache for a storage array using Solid State Disks (SSDs).

Supported Arrays

This command applies to an individual DE2000H, DE4000H, or DE6000H storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Using high performance SSDs to cache read data improves the application I/O performance and response times, and delivers sustained performance improvement across different workloads, especially for high-IOP workloads. SSD cache maximizes the use of expensive fast SSDs. SSD cache works in addition to the primary cache in the controller DRAM. With controller cache, the data is stored in DRAM after a host read. With SSD cache, the data is copied from user-specified base volumes, and then cached on SSDs.

Syntax

```
create ssdCache userLabel="ssdCacheName"
drives=(trayID1,[drawerID1,]slotID1 ... trayIDn,[drawerIDn,]slotIDn)
[updateExistingVolumes=(TRUE|FALSE)]
[securityType=(none|capable|enabled)]
```

Parameters

Parameter	Description
userLabel	The name that you want to name the new SSD cache. Enclose the SSD cache name in double quotation marks (" ").
drives	The drives that you want to use to create the SSD cache. For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE6000H controllers have slot ID numbers starting at 0. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).
updateExistingVolumes	This optional parameter specifies whether the SSD cache should be enabled for all existing volumes in the storage array. To enable the SSD cache for all existing volumes, set this parameter to TRUE . If you want to enable the SSD cache for individual volumes later, set this parameter to FALSE . The default value is TRUE .
securityType	This optional parameter specifies the security level when creating an SSD cache. These settings are valid: • **none** - The SSD cache is not secure. • **capable** - The SSD cache is capable of having security set, but security has not been enabled. • **enabled** - The SSD cache has security enabled.

Notes

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the name. Names can have a maximum of 30 characters.

A storage array can have only one SSD cache.

Only volumes created using hard disk drives can use the SSD cache. You cannot enable SSD cache on snapshot images.

If all of the SSDs in the SSD cache are data assurance (DA)-capable and the DA feature is enabled, DA is automatically enabled for the SSD cache and cannot be disabled. In addition, you cannot add non-DA capable SSDs to a DA-enabled SSD cache.

Delete SSD cache

The `delete ssdCache` command deletes the SSD cache. All data in the SSD cache is purged.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, or DE6000H storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
delete ssdCache [ssdCacheName]
```

Parameter

Parameter	Description
ssdCache	The name of the SSD cache that you want to delete. Enclose the SSD cache name in square brackets ([ ]). If the SSD cache name contains special characters or consists only of numbers, you must enclose the SSD cache name in double quotation marks (" ") inside square brackets.

Remove drives from SSD cache

The set ssdCache command decreases the capacity of the SSD cache by removing Solid State Disks (SSDs).

Supported Arrays

This command applies to an individual DE2000H, DE4000H, or DE6000H storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set ssdCache [ssdCacheName]
removeDrives=(trayID1,[drawerID1,]slotID1 ... trayIDn,[drawerIDn,]slotIDn)
```

Parameters

Parameter	Description
ssdCache	The name of the SSD cache from which you want to remove SSDs. Enclose the SSD cache name in square brackets ([ ]). If the SSD cache name has special characters or consists only of numbers, you must enclose the SSD cache name in double quotation marks (" ") inside square brackets.
removeDrives	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE6000H controllers have slot ID numbers starting at 0. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).

Notes

You cannot remove all of the SSDs from the SSD cache using this command; at least one SSD must remain in the SSD cache. If you want to completely remove the SSD cache, use the delete ssdCache command instead.

Rename SSD cache

The set ssdCache command changes the name of the SSD cache.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, or DE6000H storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

`set ssdCache [`*old_ssdCacheName*`] userLabel="`*new_ssdCacheName*`"`

Parameter

Parameter	Description
ssdCache	The name of the SSD cache that you want to rename. Enclose the SSD cache name in square brackets ([ ]). If the SSD cache name has special characters or consists only of numbers, you also must enclose the SSD cache name in double quotation marks (" ") inside square brackets.
userLabel	The new name for the SSD cache. Enclose the name in double quotation marks (" "). You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the identifier. Identifiers can have a maximum of 30 characters.

Resume SSD cache

The `resume ssdCache` command restarts the caching for all of the volumes using the SSD cache that was temporarily stopped with the `suspend ssdCache` command.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, or DE6000H storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

`resume ssdCache [`*ssdCacheName*`]`

Parameter

Parameter	Description
ssdCache	The name of the SSD cache for which you want to resume caching operations. Enclose the SSD cache name in square brackets ([ ]). If the SSD cache name has special characters or consists only of numbers, you must enclose the SSD cache name in double quotation marks (" ") inside square brackets.

Set SSD cache for a volume

The `set volume ssdCacheEnabled` command turns on or off caching using the SSD cache feature for a specific volume.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, or DE6000H storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

The volume can be one of these:

- Standard volume, identified by either a name or a WWID
- Snapshot volume
- Consistency group snapshot volume

Syntax applicable to a standard volume

```
set volume ([volumeName] | <"WWID">) ssdCacheEnabled=(TRUE | FALSE)
```

Syntax applicable to a snapshot volume

```
set snapVolume ["snapVolumeName"] ssdCacheEnabled=(TRUE | FALSE)
```

Syntax applicable to a standard volume

```
set volume ([volumeName] | <"WWID">) ssdCacheEnabled=(TRUE | FALSE)
```

Parameters

Parameter	Description
volume	The name of the standard volume for which you want to turn on or turn off the SSD cache. Enclose the name of the volume in square brackets ([ ]). If the name of the volume has special characters or numbers, you must enclose the name of the volume in double quotation marks (" ") inside of square brackets ([ ]).
volume	The World Wide Identifier (WWID) of the standard volume for which you want to turn on or turn off the SSD cache. Enclose the WWID in double quotation marks (" ") inside angle brackets (< >).
snapVolume	The name of the snapshot volume for which you want to turn on or turn off the SSD cache. Enclose the name of snapshot volume in double quotation marks (" ") inside of square brackets ([ ]).
cgSnapVolume	The name of the consistency group snapshot volume for which you want to turn on or turn off the SSD cache. Enclose the name of the consistency group snapshot volume in double quotation marks (" ") inside of square brackets ([ ]).
ssdCacheEnabled	To turn on SSD cache, set this parameter to TRUE . To turn off SSD cache, set this parameter to FALSE .

Notes

You can turn the SSD cache on or off for only one volume at a time.

When you turn off SSD cache for a volume, the SSD cache for that volume is purged.

Show SSD cache

The show ssdCache command displays information about the SSD cache.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, or DE6000H storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
show ssdCache [ssdCacheName]
```

Parameter

Parameter	Description
ssdCache	The name of the SSD cache for which you want to retrieve information. Enclose the SSD cache name in square brackets ([ ]). If the SSD cache name has special characters or numbers, you must enclose the SSD cache name in double quotation marks (" ") inside square brackets.

Notes

This command returns the SSD cache information similar to this example.

```
SSD Cache name: my_cache

Status:                         Optimal
Type:                           Read Only
I/O characteristic type:        File System
Maximum capacity allowed:        1,862.645 GB
Current capacity:                557.792 GB
Additional capacity allowed     1,304.852 GB
Drive capacities:                All 278.896 GB
Quality of Service (QoS) Attributes
   Security capable:            No
   Secure:                       No
   Data Assurance (DA) capable:  No
Associated drives:

Tray     Slot
0        4
0        11
Volumes using SSD cache:            volume_test
```

Show SSD cache statistics

The `show ssdCache` command displays data about the SSD cache usage.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, or DE6000H storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Syntax

```
show ssdCache [ssdCacheName] [ssdCacheStatistics]
[controller=(a|b|both)]
[file="filename"]
```

Parameters

Parameter	Description
ssdCache	The name of the SSD cache for which you want to retrieve information. Enclose the SSD cache name in square brackets ([ ]). If the SSD cache name has special characters or numbers, you must enclose the SSD cache name in double quotation marks (" ") inside square brackets.
ssdCacheStatistics	An optional parameter to the `show ssdCache` command that indicates you want to retrieve cache statistics.
controller	Each controller stores SSD cache metadata for the volumes that it owns. Therefore, the SSD cache statistics are maintained and displayed per controller. Valid controller identifiers are a , b , or both , where a is the controller in slot A , b is the controller in slot B , and both is both controllers. Enclose the controller identifier in square brackets ([ ]). If you do not specify a controller, the default value is both .
file	The file path and the file name to which you want to save the SSD cache statistics. Additional statistics are available when you save the statistics to a file. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\ssdcachestats.csv"` . You can use any file name but you must use the `.csv` extension.

Notes

The following statistics are displayed on the screen:

- **Reads** – total number of host reads of SSD cache-enabled volumes. Compare the Reads relative to Writes. The Reads need to be greater than the Writes for effective SSD cache operation. The greater the ratio of Reads to Writes the better the operation of the cache.

- **Writes** – total number of host writes to SSD cache-enabled volumes.

- **Cache Hits** – a count of the number of cache hits.

- **Cache Hits (%)** – derived from Cache Hits/total reads. The Cache Hit percentage should be greater than 50 percent for effective SSD cache operation. A small number could be indicative of several things:

  – Ratio of Reads to Writes is too small.

  – Reads are not repeated.

  – Cache capacity is too small.

  Note: To help determine the ideal SSD cache capacity, you can run the Performance Modeling Tool using the `start ssdCache [ssdCacheName] performanceModeling` command.

- **Cache Allocation (%)** – The amount of SSD cache storage that is allocated, expressed as a percentage of the SSD cache storage that is available to this controller. Derived from allocated bytes / available bytes. Cache Allocation percentage normally shows as 100 percent. If this number is less than 100 percent, it means either the cache has not been warmed or the SSD cache capacity is larger than all the data being accessed. In the latter case, a smaller SSD cache capacity could provide the same level of performance. Note that this does not indicate that cached data has been placed into the SSD cache, it is simply a preparation step before data can be placed in the SSD cache.

- **Cache Utilization (%)** – The amount of SSD cache storage that contains data from enabled volumes, expressed as a percentage of SSD cache storage that is allocated. This value represents the utilization or density of the SSD cache. Derived from user data bytes / allocated bytes. Cache Utilization percentage normally is lower than 100 percent, perhaps much lower. This number shows the percent of SSD cache capacity that is filled with cache data. The reason this number is lower than 100 percent is that each allocation unit of the SSD cache, the SSD cache cache-block, is divided into smaller units called sub-

blocks, which are filled somewhat independently. A higher number is generally better, but performance gains can be significant even with a smaller number.

These additional statistics are included when you save the data to a file:

- **Read Blocks** – Number of blocks in host reads.

- **Write Blocks** – Number of blocks in host writes.

- **Full Hit Blocks** – Number of block cache hit. The full hit blocks indicate the number of blocks that have been read entirely from SSD cache. The SSD cache is only beneficial to performance for those operations that are full cache hits.

- **Partial Hits** – Number of host reads where at least one block, but not all blocks, were in the SSD cache. This is an SSD cache **miss** where the reads were satisfied from the base volume. Partial cache hits and partial cache hit blocks result from an operation that has only a portion of its data in the SSD cache. In this case, the operation must retrieve the data from the cached HDD volume. The SSD cache offers no performance benefit for this type of hit. If the partial cache hit blocks count is higher than the full cache hit blocks, it is possible that a different I/O characteristic type (file system, database, or web server) could improve the performance.

- **Partial Hits – Blocks** – Number of blocks in Partial Hits. Partial cache hits and partial cache hit blocks result from an operation that has only a portion of its data in the SSD cache. In this case, the operation must retrieve the data from the cached HDD volume. The SSD cache offers no performance benefit for this type of hit. If the partial cache hit blocks count is higher than the full cache hit blocks, it is possible that a different I/O characteristic type (file system, database, or web server) could improve the performance.

- **Misses** – Number of host reads where none of the blocks were in the SSD cache. This is an SSD cache miss where the reads were satisfied from the base volume.

- **Misses – Blocks** – Number of blocks in Misses.

- **Populate Actions (Host Reads)** – Number of host reads where data was copied from the base volume to the SSD cache.

- **Populate Actions (Host Reads) – Blocks** – Number of blocks in Populate Actions (Host Reads).

- **Populate Actions (Host Writes)** – Number of host writes where data was copied from the base volume to the SSD cache. The Populate Actions (Host Writes) count may be zero for the cache configuration settings that do not fill the cache as a result of a Write I/O operation.

- **Populate Actions (Host Writes) – Blocks** – Number of blocks in Populate Actions (Host Writes).

- **Invalidate Actions** – Number of times data was invalidated/removed from the SSD cache. A cache invalidate operation is performed for every host write request, every host read request with Forced Unit Access (FUA), every verify request, and in some other circumstances.

- **Recycle Actions** – Number of times that the SSD cache block has been re-used for another base volume and/or a different LBA range. For effective cache operation, it is important that the number of recycles is small compared to the combined number of read and write operations. If the number of Recycle Actions is close to the combined number of Reads and Writes, then the SSD cache is thrashing. Either the cache capacity needs to be increased or the workload is not favorable for use with SSD cache.

- **Available Bytes** – Number of bytes available in the SSD cache for use by this controller. The available bytes, allocated bytes, and user data bytes are used to compute the Cache Allocation % and the Cache Utilization %.

- **Allocated Bytes** – Number of bytes allocated from the SSD cache by this controller. Bytes allocated from the SSD cache may be empty or they may contain data from base volumes. The available bytes, allocated bytes, and user data bytes are used to compute the Cache Allocation % and the Cache Utilization %.

- **User Data Bytes** – Number of allocated bytes in the SSD cache that contain data from base volumes. The available bytes, allocated bytes, and user data bytes are used to compute the Cache Allocation % and the Cache Utilization %.

Start SSD cache locate

The `start ssdCache locate` command identifies the Solid State Disks (SSDs) that are logically grouped together to form the SSD cache by blinking the indicator lights on the SSDs.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, or DE6000H storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Use the `stop ssdCache locate` command to turn off the indicator lights on the drives.

Syntax

`start ssdCache [`*ssdCacheName*`] locate`

Parameters

Parameter	Description
ssdCache	The name of the SSD cache that you want to locate . Enclose the SSD cache name in square brackets ([ ]). If the SSD cache name contains special characters or consists only of numbers, you must enclose the SSD cache name in double quotation marks (" ") inside square brackets.

Start SSD cache performance modeling

The `start ssdCache performanceModeling` command starts performance modeling for the SSD cache.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, or DE6000H storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Performance modeling monitors and measures I/O activity for a period of time and estimates performance for various SSD cache sizes. Performance is estimated using two metrics: cache hit percentage and average response time. The performance modeling data is not available until you stop the operation using the `stop ssdCache performanceModeling` command.

Syntax

`start ssdCache [`*ssdCacheName*`] performanceModeling`

Parameters

Parameter	Description
ssdCache	The name of the SSD cache for which you want to model performance. Enclose the SSD cache name in square brackets ([ ]). If the SSD cache name contains special characters or consists only of numbers, you must enclose the SSD cache name in double quotation marks (" ") inside square brackets.

Notes

Performance modeling ends and the performance modeling data is available when one of the following conditions occurs:

- Run the `stop ssdCache performanceModeling` command.
- Retrieve the performance modeling data using the storage management software.

Performance modeling ends, but no data is available when one of the following conditions occurs:

- You reboot the controller.
- You make any changes to the SSD cache configuration.
- The state of the SSD cache changes.

Stop SSD cache locate

The `stop ssdCache locate` command turns off the indicator lights on the Solid State Disks (SSDs) that were turned on by the `start ssdCache locate` command.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, or DE6000H storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
stop ssdCache locate
```

Parameters

None.

Stop SSD cache performance modeling

The `stop ssdCache performanceModeling` command stops the performance modeling operation and displays the performance modeling data for the SSD cache.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, or DE6000H storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Before running this command, you must start the performance modeling operation with the `start ssdCache performanceModeling` command. Optionally, you can save the data to a file.

Syntax

```
stop ssdCache [ssdCacheName] performanceModeling [file="filename"]
```

Parameters

Parameter	Description
ssdCache	The name of the SSD cache for which you want to stop modeling performance. Enclose the SSD cache name in square brackets ([ ]). If the SSD cache name has special characters or numbers, you must enclose the SSD cache name in double quotation marks (" ") inside square brackets.
file	The file path and the file name to which you want to save the performance modeling data. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\ssdcacheperf.csv"` You can use any file name, but you must use the `.csv` extension.

Notes

This command returns the performance modeling information similar to this example. The size of your monitor determines how the information wraps and will affect how the information appears.

```
SSD Cache Name: my_cache
Start time: 4/18/12 2:38:26  PM IST
Stop time: 4/18/12 2:38:45 PM IST
Duration : 00:00:19

SSD Cache Performance Modeling Data (Response Time):
```

		SSD Reads		HDD Reads		HDD Writes	
Cache Capacity	Overall Response Time	Avg. Response Time	% of I/Os	Avg. Response Time	% of I/Os	Avg. Response Time	% of I/Os
186 GB	0 ms	0 ms	0.0 %	0 ms	0.0 %	0 ms	0.0 %
372 GB	0 ms	0 ms	0.0 %	0 ms	0.0 %	0 ms	0.0 %
557 GB *	0 ms	0 ms	0.0 %	0 ms	0.0 %	0 ms	0.0 %
558 GB	0 ms	0 ms	0.0 %	0 ms	0.0 %	0 ms	0.0 %
744 GB	0 ms	0 ms	0.0 %	0 ms	0.0 %	0 ms	0.0 %
931 GB	0 ms	0 ms	0.0 %	0 ms	0.0 %	0 ms	0.0 %
1117 GB	0 ms	0 ms	0.0 %	0 ms	0.0 %	0 ms	0.0 %
1303 GB	0 ms	0 ms	0.0 %	0 ms	0.0 %	0 ms	0.0 %
1489 GB	0 ms	0 ms	0.0 %	0 ms	0.0 %	0 ms	0.0 %
1675 GB	0 ms	0 ms	0.0 %	0 ms	0.0 %	0 ms	0.0 %
1862 GB	0 ms	0 ms	0.0 %	0 ms	0.0 %	0 ms	0.0 %

```
* = Current SSD cache physical capacity.


SSD Cache Performance Modeling Data (Cache Hit %):

Cache Capacity     Cache Hit %
186 GB             0 %
372 GB             0 %
557 GB *           0 %
558 GB             0 %
744 GB             0 %
931 GB             0 %
1117 GB            0 %
1303 GB            0 %
1489 GB            0 %
1675 GB            0 %
1862 GB            0 %
```

`* = Current SSD cache physical capacity.`

Suspend SSD cache

The `suspend ssdCache` command temporarily stops caching for all of the volumes that are using the SSD cache.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, or DE6000H storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

While caching is stopped, host reads are serviced from the base volumes instead of from the SSD cache.

Syntax

`suspend ssdCache [`*ssdCacheName*`]`

Parameter

Parameter	Description
ssdCache	The name of the SSD cache that you want to suspend. Enclose the SSD cache name in square brackets ([ ]). If the SSD cache name has special characters or numbers, you must enclose the SSD cache name in double quotation marks (" ") inside square brackets.

Notes

To restart caching, use the `resume ssdCache` command.

Chapter 14. Replication commands

Consistency group commands

Add member to consistency group

The `set consistencyGroup addCGMemberVolume` command adds a new base volume as a member to an existing consistency group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

You can specify an existing repository volume for the new consistency group member, or create a new repository volume. When you create a new repository volume, you identify an existing volume group or an existing disk pool where you want the repository volume.

Syntax for use with an existing repository volume

```
set consistencyGroup ["consistencyGroupName"]
addCGMemberVolume="baseVolumeName"
repositoryVolume="volumeGroupName"
```

Syntax for use when creating a new repository volume in a volume group

```
set consistencyGroup ["consistencyGroupName"]
addCGMemberVolume="baseVolumeName"
repositoryVolume=("volumeGroupName" capacity=capacityValue(KB|MB|GB|TB|bytes))
```

Syntax for use with an existing repository volume

```
set consistencyGroup ["consistencyGroupName"]
addCGMemberVolume="baseVolumeName"
repositoryVolume="volumeGroupName"
```

Parameters

Parameter	Description
consistencyGroup	The name of the consistency group to which you want to add a new member volume. The new member volume is the base volume for snapshot operations. Enclose the consistency group name in double quotation marks (" ") inside square brackets ([ ]).
addCGMemberVolume	The name of a base volume that you want to add. Enclose the volume name in double quotation marks (" "). If the specified volume is an existing repository volume or an existing snapshot volume, the command fails.

Parameter	Description
repositoryVolume	This parameter performs two functions: • In an existing consistency group that has a repository volume, this parameter identifies the repository volume. • When creating a new repository volume this parameter identifies either a volume group or disk pool in which to create the new repository volume. Enclose the volume name in double quotation marks (" ").
capacity	The size of a new repository volume in either a volume group or a disk pool. Size is defined in units of bytes, KB, MB, GB, or TB.

Notes

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the names. Names can have a maximum of 30 characters.

A consistency group is a collection of base volumes that are the source volumes for snapshots. You collect the base volumes in a consistency group so that you can perform the same snapshot operations on each of the base volumes. In the context of this command, the term *member* means a base volume for snapshot operations. You can manipulate snapshot images associated with members of a consistency group through batch-style operations, while maintaining consistency across the snapshot images.

Each member volume must have a corresponding repository volume. You can define the relationship between the member volume and the repository volume using the **repositoryVolume** parameter. The **repositoryVolume** parameter can perform one of these actions:

• Identify an existing repository volume that is connected to the consistency group.

• Identify either a volume group or a disk pool in which you want to create a new repository volume.

Adding a member to a consistency group with an existing repository has two purposes:

• You can create an entirely new repository volume by running the command without the **repositoryVolume** parameter. When you run the command without the **repositoryVolume** parameter, the command creates a new repository volume in the volume group or disk pool in which all the other repository volumes are stored. An example of this command usage is:

```
set consistencyGroup ["First_Images"] addCGMemberVolume="Data_020212"
```

• You can reuse an existing repository volume if that repository volume is empty and is not related to another member volume. You might want to do this if you want to maintain a particular sequence or relationship for the repository volumes. To reuse an existing, empty repository volume you need to know the name of the repository volume. To determine the name of the repository volume use the `show allVolumes summary` command. All repository volume names have the form **repos_XXXX** where **XXXX** is a unique identifier generated by the storage management software. An example of this command usage is:

```
set consistencyGroup ["First_Images"] addCGMemberVolume="Data_020212"

repositoryVolume="repos_0011"
```

You can place the repository volume in a volume group or a disk pool of your choosing. You are not required to have the repository volume in the same location as other repository volumes. To place the repository volume in a volume group or a disk pool of your choice, use the **repositoryVolume** parameter and identify the volume group or the disk pool and a size for the repository volume. An example of this command usage is:

```
set consistencyGroup ["First_Images"] addCGMemberVolume="Data_020212"

repositoryVolume=("12" capacity=2 GB)
```

In this example, " **12** " is the name of an existing volume group or an existing disk pool. The capacity parameter defines the size that you want for the repository volume group.

When you create a new repository volume in either a volume group or a disk pool, you must include parentheses around the volume group name and capacity, or the disk pool name and capacity.

Create consistency group

The `create consistencyGroup` command creates a new, empty consistency group that can contain snapshot groups. You must add the snapshot groups using the `set consistencyGroup addCGMember` command.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
create consistencyGroup userLabel="consistencyGroupName"
[repositoryFullPolicy=(failBaseWrites | purgeSnapImages)]
[repositoryFullLimit=percentValue]
[autoDeleteLimit=numberOfSnapImages]
[enableSchedule=(TRUE | FALSE)]
[schedule (immediate | snapSchedule)]
[rollbackPriority=(lowest | low | medium | high | highest)]
```

Parameters

Parameter	Description
userLabel	The name of the new consistency group that you want to create. Enclose the new consistency group name in double quotation marks (" ").
repositoryFullPolicy	How you want snapshot processing to continue if the snapshot repository volumes are full. You can choose to fail writes to the base volume (failBaseWrites) or delete (purge) the snapshot images (purgeSnapImages). The default action is purgeSnapImages .
repositoryFullLimit	The percentage of repository capacity at which you receive a warning that the snapshot repository volume is nearing full. Use integer values. For example, a value of 70 means 70 percent. The default value is 75.

Parameter	Description
autoDeleteLimit	Each snapshot group can be configured to perform automatic deletion of its snapshot images to keep the total number of snapshot images in the snapshot group at or below a designated level. When this option is enabled, then any time a new snapshot image is created in the snapshot group, the system automatically deletes the oldest snapshot image in the group to comply with the limit value. This action frees repository capacity so it can be used to satisfy ongoing copy-on-write requirements for the remaining snapshot images.
enableSchedule	Whether the ability to schedule a snapshot operation is turned on or turned off. To turn on snapshot scheduling, set this parameter to TRUE . To turn off snapshot scheduling, set this parameter to FALSE .
rollBackPriority	Determines whether system resources should be allocated to the rollback operation at the expense of system performance. A value of high indicates that the rollback operation is prioritized over all other host I/O. A value of low indicates that the rollback operation should be performed with minimal impact to host I/O.

Notes

A consistency group is a logical entity that enables you to manage in batch form all of the snapshot images that you add to the collection. The consistency group is a collection of snapshot groups that have mutual consistency requirements or dependencies for their snapshot images. Any snapshot images that you create and use for this collection must be managed in accordance with the consistency dependencies.

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the names. Names can have a maximum of 30 characters.

The snapshot images in a consistency group can be deduced based on the existence of a snapshot image within a consistency group. All snapshot images that reside within a consistency group share a common time stamp and sequence number.

An operation on a snapshot image consistency group is treated as a single request, and causes all pending I/O operations to the associated base volume of each member to be drained and suspended before creating the snapshot images. If creation of the snapshot images cannot be completed successfully for all of the consistency group members, the operation fails and has no affect (that is, new snapshot images are not created).

Based on this behavior all members for a consistency group usually have the same number of snapshot images. However, when a new member is added to a consistency group, that new member lacks the snapshot images that were previously created on the established members of the consistency group. The lack of snapshot images is not considered an error condition. Ensuing requests for deletion or rollback of snapshot images that only exist on a subset of the consistency group members will only affect the members for which the specified snapshot images actually exists.

Auto delete

You can configure each snapshot group to automatically delete its snapshot images to keep the total number of snapshot images in the snapshot group at or below a maximum number of images. When the number of snapshot images in the snapshot group is at the maximum limit, the **autoDeleteLimit** parameter automatically deletes snapshot images whenever a new snapshot image is created in the snapshot group. The **autoDeleteLimit** parameter deletes the oldest snapshot images in the snapshot group until the maximum number of images defined with the parameter is met. This has the effect of freeing repository capacity so it can be used to satisfy ongoing copy-on-write requirements for the remaining snapshot images.

Scheduling snapshot images in a consistency group

The **enableSchedule** parameter and the **schedule** parameter provide a way for you to schedule snapshots. Using these parameters, you can schedule snapshots daily, weekly, or monthly (by day or by date). The **enableSchedule** parameter turns on or turns off the ability to schedule snapshots. When you enable scheduling, you use the **schedule** parameter to define when you want the snapshots to occur.

This table explains how to use the options for the **schedule** parameter:

Parameter	Description
schedule	Required for specifying schedule parameters.
immediate	Start the operation immediately. This item is mutually exclusive with any other scheduling parameters.
enableSchedule	When set to **true** , scheduling is turned on. When set to **false** , scheduling is turned off. **Note:** The default is **false** .
startDate	A specific date on which to start the operation. The format for entering the date is MM:DD:YY. The default is the current date. An example of this option is `startDate=06:27:11` .
scheduleDay	A day of the week on which to start the operation. Can either be all or one or more of the following values: • **monday** • **tuesday** • **wednesday** • **thursday** • **friday** • **saturday** • **sunday** **Note:** Enclose the value in parentheses. For example, `scheduleDay=(wednesday)` . More than one day can be specified by enclosing the days in a single set of parentheses and separating each day with a space. For example, `scheduleDay=(monday wednesday friday)` . **Note:** This parameter is not compatible with a monthly schedule.
startTime	The time of a day on which to start the operation. The format for entering the time is HH:MM, where HH is the hour and MM is the minute past the hour. Uses a 24-hour clock. For example, 2:00 in the afternoon is 14:00. An example of this option is `startTime=14:27` .
scheduleInterval	An amount of time, in minutes, to have as a minimum between operations. Schedule interval should not be more than 1440 (24 hours) and it should be a multiple of 30. An example of this option is `scheduleInterval=180` .
endDate	A specific date on which to stop the operation. The format for entering the date is MM:DD:YY. If no end date is desired, you can specify **noEndDate** . An example of this option is `endDate=11:26:11` .
timesPerDay	The number of times to perform the operation in a day. An example of this option is `timesPerDay=4` .

Parameter	Description
timezone	Specifies the time zone to be used for the schedule. Can be specified in two ways:
	GMT±HH:MM The time zone offset from GMT. Example: `timezone=GMT-06:00` .
	Text String Standard time zone text string, must be enclosed in quotes. Example: `timezone="America/Chicago"`
scheduleDate	A day of the month on which to perform the operation. The values for the days are numerical and in the range of 1-31. **Note:** This parameter is not compatible with a weekly schedule. An example of the **scheduleDate** option is `scheduleDate=("15")` .
month	A specific month on which to perform the operation. The values for the months are: • **jan** - January • **feb** - February • **mar** - March • **apr** - April • **may** - May • **jun** - June • **jul** - July • **aug** - August • **sep** - September • **oct** - October • **nov** - November • **dec** - December **Note:** Enclose the value in parentheses. For example, `month=(jan)` . More than one month can be specified by enclosing the months in a single set of parentheses and separating each month with a space. For example, `month=(jan jul dec)` . Use this parameter with the **scheduleDate** parameter to perform the operation on a specific day of the month. **Note:** This parameter is not compatible with a weekly schedule.

This table explains how to use the **timeZone** parameter:

Timezone Name	GMT offset
Etc/GMT+12	**GMT-12:00**
Etc/GMT+11	**GMT-11:00**
Pacific/Honolulu	**GMT-10:00**
America/Anchorage	**GMT-09:00**
America/Santa_Isabel	**GMT-08:00**

Timezone Name	GMT offset
America/Los_Angeles	GMT-08:00
America/Phoenix	GMT-07:00
America/Chihuahua	GMT-07:00
America/Denver	GMT-07:00
America/Guatemala	GMT-06:00
America/Chicago	GMT-06:00
America/Mexico_City	GMT-06:00
America/Regina	GMT-06:00
America/Bogota	GMT-05:00
America/New_York	GMT-05:00
Etc/GMT+5	GMT-05:00
America/Caracas	GMT-04:30
America/Asuncion	GMT-04:00
America/Halifax	GMT-04:00
America/Cuiaba	GMT-04:00
America/La_Paz	GMT-04:00
America/Santiago	GMT-04:00
America/St_Johns	GMT-03:30
America/Sao_Paulo	GMT-03:00
America/Buenos_Aires	GMT-03:00
America/Cayenne	GMT-03:00
America/Godthab	GMT-03:00
America/Montevideo	GMT-03:00
Etc/GMT+2	GMT-02:00
Atlantic/Azores	GMT-01:00
Atlantic/Cape_Verde	GMT-01:00
Africa/Casablanca	GMT
Etc/GMT	GMT
Europe/London	GMT
Atlantic/Reykjavik	GMT
Europe/Berlin	GMT+01:00
Europe/Budapest	GMT+01:00
Europe/Paris	GMT+01:00
Europe/Warsaw	GMT+01:00
Africa/Lagos	GMT+01:00
Africa/Windhoek	GMT+01:00

Timezone Name	GMT offset
Asia/Anman	GMT+02:00
Asia/Beirut	GMT+02:00
Africa/Cairo	GMT+02:00
Asia/Damascus	GMT+02:00
Africa/Johannesburg	GMT+02:00
Europe/Kiev	GMT+02:00
Asia/Jerusalem	GMT+02:00
Europe/Istanbul	GMT+03:00
Europe/Minsk	GMT+02:00
Asia/Baghdad	GMT+03:00
Asia/Riyadh	GMT+03:00
Africa/Nairobi	GMT+03:00
Asia/Tehran	GMT+03:30
Europe/Moscow	GMT+04:00
Asia/Dubai	GMT+04:00
Asia/Baku	GMT+04:00
Indian/Mauritius	GMT+04:00
Asia/Tbilisi	GMT+04:00
Asia/Yerevan	GMT+04:00
Asia/Kabul	GMT+04:30
Asia/Karachi	GMT+05:00
Asia//Tashkent	GMT+05:00
Asia/Calcutta	GMT+05:30
Asia/Colombo	GMT+05:30
Asia/Katmandu	GMT+05:45
Asia/Yekaterinburg	GMT+06:00
Asia/Almaty	GMT+06:00
Asia/Dhaka	GMT+06:00
Asia/Rangoon	GMT+06:30
Asia/Novosibirsk	GMT+07:00
Asia/Bangkok	GMT+07:00
Asia/Krasnoyarsk	GMT+08:00
Asia/Shanghai	GMT+08:00
Asia/Singapore	GMT+08:00
Australia/Perth	GMT+08:00
Asia/Taipei	GMT+08:00
Asia/Ulaanbaatar	GMT+08:00

Timezone Name	GMT offset
Asia/Irkutsk	GMT+09:00
Asia/Tokyo	GMT+09:00
Asia/Seoul	GMT+09:00
Australia/Adelaide	GMT+09:30
Australia/Darwin	GMT+09:30
Asia/Yakutsk	GMT+10:00
Australia/Brisbane	GMT+10:00
Australia/Sydney	GMT+10:00
Pacific/Port Moresby	GMT+10:00
Australia/Hobart	GMT+10:00
Asia/Vladivostok	GMT+11:00
Pacific/Guadalcanal	GMT+11:00
Pacific/Auckland	GMT+12:00
Etc/GMT-12	GMT+12:00
Pacific/Fiji	GMT+12:00
Asia/Kamchatka	GMT+12:00
Pacific/Tongatapu	GMT+13:00

The code string for defining a schedule is similar to these examples:

```
enableSchedule=true schedule startTime=14:27
```

```
enableSchedule=true schedule scheduleInterval=180
```

```
enableSchedule=true schedule timeZone=GMT-06:00
```

```
enableSchedule=true schedule timeZone="America/Chicago"
```

If you also use the **scheduleInterval** option, the firmware chooses between the **timesPerDay** option and the **scheduleInterval** option by selecting the lowest value of the two options. The firmware calculates an integer value for the **scheduleInterval** option by dividing 1440 by a the **scheduleInterval** option value that you set. For example, 1440/180 = 8. The firmware then compares the **timesPerDay** integer value with the calculated **scheduleInterval** integer value and uses the smaller value.

To remove a schedule, use the delete volume command with the **schedule** parameter. The delete volume command with the **schedule** parameter deletes only the schedule, not the snapshot volume.

When performing a rollback in a consistency group, the default operation is to rollback all members of the consistency group. If a rollback cannot be started successfully for all of the members in the consistency group, the rollback fails and has no effect. The snapshot image is not rolled back.

Create consistency group snapshot image

The `create cgSnapImage consistencyGroup` command creates a new snapshot image for each base volume that is a member of a snapshot consistency group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
create cgSnapImage consistencyGroup="consistencyGroupName"
```

Parameter

Parameter	Description
consistencyGroup	The name of the consistency group for which you are creating snapshot images. Enclose the consistency group name in double quotation marks (" ").

Notes

You can use any combination of alphanumeric characters, hyphens, and underscores for the names. Names can have a maximum of 30 characters.

The command causes all pending I/O operations to each base volume that is a member of the consistency group to be drained and suspended before creating the snapshot images. If the creation of all of the snapshot images cannot be completed successfully for all of the consistency group members, the operation fails and new snapshot images are not created.

Normally, all members of a snapshot consistency group have the same number of snapshot images. When you add a new member to a snapshot consistency group, that new member lacks the snapshot images that were previously created on the established members of the snapshot consistency group. This is not an error condition. Requests for deletion or rollback of snapshot images that exist on only a subset of the snapshot consistency group members affects only those members for which the specified snapshot image actually exists.

Create consistency group snapshot volume

The `create cgSnapVolume` command creates a snapshot volume of specific images in the base volumes in a consistency group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

You can select one base volume or more than one base volume from the consistency group to include in the snapshot volume. When you create a snapshot volume of a consistency group, you are creating a volume with contents that you can view.

Syntax with user specified base volumes

```
create cgSnapVolume userLabel="cgVolumeName"
cgSnapImageID="snapCGID:imageID"
members=(baseVolume1:repos_XXXX ... baseVolumen:repos_YYYY)
```

Syntax when setting the consistency group snapshot volume to read only

```
create cgSnapVolume userLabel="cgVolumeName"
cgSnapImageID="snapCGID:imageID"
readOnly
```

Syntax with user specified base volumes

```
create cgSnapVolume userLabel="cgVolumeName"
cgSnapImageID="snapCGID:imageID"
members=(baseVolume1:repos_XXXX ... baseVolumen:repos_YYYY)
```

Parameters

Parameter	Description
userLabel	The name that you want to give the consistency group snapshot volume that you are creating. Enclose the consistency group snapshot volume name in double quotation marks (" ").
cgSnapImageID	The name of the snapshot image in a consistency group. The name of a snapshot image is comprised of two parts: • The name of the consistency group • An identifier for the snapshot image in the consistency group The identifier for the snapshot image can be one of the following: • newest - Use this option when you want to show the latest snapshot image created in the consistency group. • oldest - Use this option when you want to show the earliest snapshot image created in the consistency group. Enclose the snapshot image name in double quotation marks (" "). You can enter more than one snapshot image name or sequence number. Enclose all of the snapshot image names inside parentheses. Separate each snapshot image name with a space.
members	The identifier of one base volume or more than one base volume that you want to add. The members identifier is comprised of the base volume name concatenated with the repository volume name. You must use a colon (:) between the two names. Enclose all of the member identifiers in parentheses. If you enter more than one member separated the members with a space. When you do not use the members parameter, all of the members are automatically added to the new consistency group snapshot volume.

Parameter	Description
repositoryVolume	The name of the repository volume that will contain the consistency group member volumes.
	You have two options for defining the name of a repository volume:
	• Use an existing repository volume: name
	• Create a new repository volume when you run this command
	The name of an existing repository volume is comprised of two parts:
	• The term "repos"
	• A four-digit numerical identifier that the storage management software assigns to the repository volume name
	Enclose the name of the existing repository volume in double quotation marks (" ").
	If you want to create a new repository volume when you run this command, you must enter the name of either a volume group or a disk pool in which you want the repository volume. Optionally, you can also define the capacity of the repository volume. If you want to define the capacity you can use these values:
	• An integer value that represents a percentage of the base volume capacity
	• A decimal fraction value that represents a percentage of the base volume capacity
	• A specific size for the repository volume. Size is defined in units of bytes , KB , MB , GB , or TB .
	If you do not use the capacity option, the storage management software sets the capacity to 20 percent of the base volume capacity.
	When you run this command the storage management software creates the repository volume for the snapshot volume.
repositoryFullLimit	The percentage of repository capacity at which the consistency group snapshot repository volume is nearing full. Use integer values. For example, a value of 70 means 70 percent.
readOnly	The setting to determine whether you can write to the snapshot volume or only read from the snapshot volume. To write to the snapshot volume, do not include this parameter. To prevent writing to the snapshot volume, include this parameter.

Notes

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the names. Names can have a maximum of 30 characters.

The name of a snapshot image has two parts separated by a colon (:):

• The identifier of the snapshot group

• The identifier of the snapshot image

If you do not specify the **repositoryVolumeType** or **readOnly** parameters, the storage management software selects the repositories for the consistency group snapshot volume. If the volume group or disk pool where the base volume resides does not have enough space, this command fails.

The `create cgSnapVolume` command has unique forms that are explained by these examples:

- Creating a read/write consistency group snapshot volume on a snapshot consistency group named "snapCG1" that has three members: cgm1, cgm2, and cgm3. The repository volumes already exist and are selected by the user in this command.

```
create cgSnapVolume userLabel="cgSnapVolume1"
cgSnapImageID="snapCG1:oldest"

members=(cgm1:repos_0010 cgm2:repos_0011 cgm3:repos_0007);
```

Note the use of the colon (:) in the name of the snapshot image to be included in the consistency group snapshot volume. The colon is a delimiter that separates the name of the snapshot volume from a particular snapshot image that you might want to use. You can use one of these options following the colon:

– An integer value that is the actual sequence number of the snapshot image.

– **newest** - Use this option when you want to show the latest consistency group snapshot image.

– **oldest** - Use this option when you want to show the earliest snapshot image created.

The use of the colon following the names of the members of the snapshot consistency group define the mapping between the member and a repository volume. For example, in **cgm1:repos_10** , member cgm1 maps to repository volume repos_0010.

- Creating a read/write consistency group snapshot volume on a snapshot consistency group named "snapCG1" of only members cgm1 and cgm2:

```
create cgSnapVolume userLabel="cgSnapVolume2"
cgSnapImageID="snapCG1:14214"

members=(cgm1:repos_1000 cgm2:repos_1001);
```

- Creating a read-only consistency group snapshot volume on a snapshot consistency group named snapCG1 that has three members: cgm1, cgm2, and cgm3:

```
create cgSnapVolume userLabel="cgSnapVolume3"
cgSnapImageID="snapCG1:oldest"
 readOnly;
```

- Creating a consistency group snapshot volume that has a repository full limit set to 60 percent on a snapshot consistency group named snapCG1 that has three members: cgm1, cgm2, and cgm3:

```
create cgSnapVolume userLabel="cgSnapVolume3"
cgSnapImageID="snapCG1:oldest"

repositoryFullLimit=60;
```

- Creating a read/write consistency group snapshot volume with automatic repository selection on a snapshot consistency group named snapCG1 that has three members: cgm1, cgm2, and cgm3:

```
create cgSnapVolume userLabel="cgSnapVolume4"
cgSnapImageID="snapCG1:oldest";
```

Create consistency group snapshot volume mapping

The `create mapping cgSnapVolume` command creates a logical mapping from a consistency group snapshot volume to a host or a host group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
create mapping cgSnapVolume="snapVolumeName"
(host="hostName" | hostGroup=("hostGroupName" | defaultGroup))
```

Parameters

Parameter	Description
cgSnapVolume	The name of the consistency group snapshot volume for which you want to create a logical mapping. Enclose the consistency group snapshot volume name in double quotation marks (" ").
host	The name of a host to which you want to create a logical mapping. Enclose the host name in double quotation marks (" ").
hostGroup	The name of a host group to which you want to create a logical mapping. Enclose the host group name in double quotation marks (" "). If you use the **defaultGroup** keyword, do not enclose it in quotation marks.

Notes

A host is a computer that is attached to the storage array and accesses the volumes on the storage array through the host ports. You can define specific mappings to an individual host. You also can assign the host to a host group that shares access to one or more volumes.

A host group is an optional topological element that you can define if you want to designate a collection of hosts that share access to the same volumes. The host group is a logical entity. Define a host group only if you have two or more hosts that share access to the same volumes.

Delete consistency group

The `delete consistencyGroup` command deletes a snapshot consistency group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

This command works in two ways:

- You can delete both the consistency group and the repository volumes contained by the consistency group.
- You can delete only the consistency group and leave the repository volumes that are contained by the consistency group intact.

Syntax

```
delete consistencyGroup ["consistencyGroupName"]
[deleteRepositoryMembers=(TRUE | FALSE)]
```

Parameter

Parameter	Description
consistencyGroup	The name of the snapshot consistency group that you want to delete. Enclose the snapshot consistency group name in double quotation marks (" ") inside square brackets ([ ]).
deleteRepositoryMembers	The setting to delete on or retain the repository volumes. To delete the repository volumes, set this parameter to TRUE . To retain the repository volumes, set this parameter to FALSE . The default setting is FALSE .

Delete consistency group snapshot image

The `delete cgSnapImage consistencyGroup` command deletes the snapshot images in a consistency group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
delete cgSnapImage consistencyGroup="consistencyGroupName"
[deleteCount=numberOfSnapImages]
[retainCount=numberOfSnapImages]
[ignoreSnapVolume=(TRUE | FALSE)]
```

Parameters

Parameter	Description
consistencyGroup	The name of the consistency group from which you want to delete the snapshot images. Enclose the consistency group name in double quotation marks (" ").
deleteCount	The number of snapshot images that you want to delete from the consistency group. Use integer values. This parameter deletes the oldest snapshot image first and continues to delete the oldest snapshot images until reaching the number that you enter.
retainCount	The number of snapshot images that you want to keep in the consistency group. Use integer values. This parameter keeps the most recent snapshot images in the consistency group.
ignoreSnapVolume	Determines whether the associated consistency group snapshot volume is kept or deleted. This parameter applies only if the consistency group snapshot image is associated with a consistency group snapshot volume. To keep the snapshot volume, set this parameter to TRUE . To delete the snapshot volume, set this parameter to FALSE . The default value is FALSE .

Notes

If the snapshot images cannot be deleted for all of the relevant member volumes of the consistency group, the operation fails and none of the snapshot images are deleted.

When you delete a consistency group snapshot image that is associated with a consistency group snapshot volume, the corresponding snapshot volume member in the consistency group snapshot volume are transitioned to the Stopped state. A snapshot volume member in the Stopped state no longer has a relationship to the snapshot group of the deleted snapshot image. However, a snapshot volume member in the Stopped state keeps its relationship to its consistency group snapshot volume.

Delete consistency group snapshot volume

The `delete sgSnapVolume` command deletes the snapshot volume of a consistency group. Optionally, you can also delete the repository members.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
delete cgSnapVolume ["snapVolumeName"]
[deleteRepositoryMembers=(TRUE | FALSE)]
```

Parameters

Parameter	Description
cgSnapVolume	The name of the consistency group snapshot volume that you want to delete. Enclose the name of the consistency group snapshot volume in double quotation marks (" ") inside square brackets ([ ]).
deleteRepositoryMembers	The parameter to save or delete the member volumes. To save the member volumes, set this parameter to TRUE . To delete the member volumes, set this parameter to FALSE . The default value is TRUE .

Remove member volume from consistency group

The `set consistencyGroup` command removes a member volume from an existing snapshot consistency group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Optionally, you can delete the repository volume members from the consistency group.

Syntax

```
set consistencyGroup ["consistencyGroupName"]
removeCGMemberVolume="memberVolumeName"
[deleteRepositoryMembers=(TRUE | FALSE)]
```

Parameters

Parameter	Description
consistencyGroupName	The name of the consistency group from which you want to remove a member. Enclose the consistency group name in double quotation marks (" ") inside square brackets ([ ]).
removeCGMemberVolume	The name of the member volume that you want to remove. Enclose the member group name in double quotation marks (" ").
deleteRepositoryMembers	Determines whether to remove all of the repository members from the consistency group.

Resume consistency group snapshot volume

The `resume cgSnapVolume` command restarts a copy-on-write operation for creating a consistency group snapshot volume that you stopped using the **stop cgSnapVolume** command.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
resume cgSnapVolume ["snapVolumeName"]
cgSnapImage="snapImageName"
```

Parameters

Parameter	Description
cgSnapVolume	The name of the consistency group snapshot volume that you want to resume. Enclose the name of the consistency group snapshot volume in double quotation marks (" ") inside square brackets ([ ]).
cgSnapImage	The name of the snapshot image in a consistency group that you are restarting. The name of a snapshot image is comprised of two parts: • The name of the consistency group • An identifier for the snapshot image in the consistency group The identifier for the snapshot image can be one of these: • An integer value that is the sequence number of the snapshot in the consistency group. • NEWEST - Use this option when you want to show the latest snapshot image created in the consistency group. • OLDEST - Use this option when you want to show the earliest snapshot image created in the consistency group. Enclose the snapshot image name in double quotation marks (" ").

Notes

The name of a snapshot image has two parts separated by a colon (:):

- The identifier of the consistency group
- The identifier of the snapshot image

For example, if you want to restart a copy-on-write operation for snapshot image 12345, which is in snapshot consistency group snapgroup1 in a consistency group snapshot volume that has the name snapVol1, you would use this command:

```
resume cgSnapVolume ["snapVol1"] cgSnapImage=["snapgroup1:12345"]
```

Set consistency group attributes

The `set consistencyGroup` command defines the properties for a snapshot consistency group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set consistencyGroup ["consistencyGroupName"]
[userLabel="consistencyGroupName"]
[repositoryFullPolicy=(failBaseWrites | purgeSnapImages)]
[repositoryFullLimit=percentValue]
[autoDeleteLimit=numberOfSnapImages]
[rollbackPriority=(lowest | low | medium | high | highest)]
```

Parameters

Parameter	Description
consistencyGroupName	The name of the consistency group for which you are setting properties. Enclose the consistency group name in double quotation marks (" ") inside square brackets ([ ]).
userLabel	The new name that you want to give to the snapshot consistency group. Enclose the new consistency group name in double quotation marks (" ").
repositoryFullPolicy	How you want snapshot processing to continue if the snapshot repository volumes are full. You can choose to fail writes to the base volume (failBaseWrites) or delete (purge) the snapshot images (purgeSnapImages). The default action is purgeSnapImages .
repositoryFullLimit	The percentage of repository capacity at which you receive a warning that the snapshot repository volume is nearing full. Use integer values. For example, a value of 70 means 70 percent. The default value is 75.
autoDeleteLimit	Each consistency group can be configured to perform automatic deletion of its snapshot images to keep the total number of snapshot images in the snapshot group at or below a designated level. When this option is enabled, then any time a new snapshot image is created in the snapshot group, the system automatically deletes the oldest snapshot image in the group to comply with the limit value. This action frees repository capacity so it can be used to satisfy ongoing copy-on-write requirements for the remaining snapshot images.
rollBackPriority	The priority for rollback operations for a consistency group while the storage array is operational. Valid values are highest , high , medium , low , or lowest .

Notes

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the names. Names can have a maximum of 30 characters.

When you use this command, you can specify one or more of the parameters. You do not, however, need to use all of the parameters.

The rollback priority defines the amount of system resources that should be allocated to the rollback operation at the expense of system performance. A value of high indicates that the rollback operation is prioritized over all other host I/O. A value of low indicates that the rollback operation should be performed with minimal impact to host I/O.

Auto delete

You can configure each snapshot group to perform automatic deletion of its snapshot images to keep the total number of snapshot images in the snapshot group at or below a maximum number of images. When the number of snapshot images in the snapshot group is at the maximum limit, the **autoDeleteLimit** parameter automatically deletes snapshot images whenever a new snapshot image is created in the snapshot group. The **autoDeleteLimit** parameter deletes the oldest snapshot images in the snapshot group until the maximum number of images defined with the parameter is met. Deleting snapshot images in this way frees repository capacity so it can be used to satisfy ongoing copy-on-write requirements for the remaining snapshot images.

Set consistency group snapshot volume

The `set cgSnapVolume` command creates a unique name for a snapshot volume of a consistency group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set cgSnapVolume [cgSnapVolumeName]
userLabel="cgSnapVolumeName"
```

Parameters

Parameter	Description
cgSnapVolume	The name of the consistency group volume that you want to rename. Enclose the name of the consistency group snapshot volume in square brackets ([ ]).
userLabel	The new name that you want to give to the snapshot volume in the consistency group. Enclose the new snapshot volume name in double quotation marks (" ").

Notes

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the names. Names can have a maximum of 30 characters.

Show consistency group

The `show consistencyGroup` command returns information about one or more consistency groups.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
show (allConsistencyGroups | consistencyGroup [consistencyGroupName] |
consistencyGroups [consistencyGroupName1 ... consistencyGroupNameN])
[(summary | schedule)]
```

Parameters

Parameter	Description
allConsistencyGroups	This setting returns information about all of the consistency groups in the storage array.
consistencyGroup	The name of the consistency group for which you are retrieving information. Enclose the consistency group name in square brackets ([ ]). If the consistency group name has special characters or numbers, you must enclose the consistency group name in double quotation marks (" ") inside square brackets.
consistencyGroups	The names of several consistency groups for which you are retrieving information. All of the volumes will have the same properties. Enter the names of the volumes using these rules: • Enclose all of the names in square brackets ([ ]). • Separate each of the names with a space. If the volume names have special characters or consist only of numbers, enter the names using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.
summary	This setting returns a concise list of information about the consistency groups.
schedule	This parameter returns information about any schedules for a consistency group.

Show consistency group snapshot image

The `show CGSnapImage` command shows one snapshot image or several snapshot images that are in one or more snapshot consistency groups.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
show ((CGSnapImage [(CGSnapImageName | CGSnapImageSequenceNumber)]) |
(CGSnapImages [(CGSnapImageNumber1 ... CGSnapImageNumbern |
```

```
CGSnapImageSequenceNumber1  ...  CGSnapImageSequenceNumbern)]) |
allCGSnapImages
[summary]
```

Parameters

Parameter	Description
CGSnapImage or **CGSnapImages**	The name of the snapshot image in a consistency group. The name of a snapshot image is comprised of two parts: • The name of the consistency group • An identifier for the snapshot image in the consistency group. The identifier for the snapshot image can be one of these: • An integer value that is the sequence number of the snapshot in the consistency group. • NEWEST – Use this option when you want to show the latest snapshot image created in the consistency group. • OLDEST – Use this option when you want to show the earliest snapshot image created in the consistency group. Enclose the snapshot image name in double quotation marks (" ") inside square brackets ([ ]). You can enter more than one snapshot image name or sequence number. Enclose all of the snapshot image names in one set of double quotation marks (" ") inside square brackets ([ ]). Separate each snapshot image name with a space.
allCGSnapImages	The setting to return all of the snapshot images from the consistency groups.
summary	The setting to return a concise list of information about all of the snapshot images in the storage array.

Notes

The name of a snapshot image has two parts separated by a colon (:):

• The identifier of the snapshot consistency group

• The identifier of the snapshot image

For example, if you want to show snapshot image 12345 in a snapshot consistency group that has the name snapCGroup1, you would use this command:

```
show CGsnapImage ["snapCGroup1:12345"];
```

To show the most recent snapshot image in a snapshot consistency group that has the name snapCGroup1, you would use this command:

```
show CGsnapImage ["snapCGroup1:newest"];
```

To show the snapshot images in several snapshot consistency groups that have the names snapCGroup1, snapCGroup2, and snapCGroup3, you would use this command:

```
show CGsnapImages ["snapCGroup1:12345 snapCGroup2:newest snapCGroup3:oldest"];
```

Note that in these examples the snapshot consistency group name is separated from the snapshot image identifier by a colon (:).

Start consistency group snapshot rollback

The `start cgSnapImage rollback` command starts a rollback operation to the member base volumes in a snapshot consistency group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

The content of the base volumes changes immediately to match the point-in-time content of the consistency group snapshot volume. The base volumes immediately becomes available for read/write requests after the rollback operation has successfully completed.

The repository volume that is associated with the consistency group snapshot volume continues to track any new changes between the base volume and the consistency group snapshot volume that occur after the rollback operation is completed.

To stop a rollback operation to the member base volumes use the `stop cgSnapImage rollback` command.

Syntax

```
start cgSnapImage ["snapCGID:imageID"] rollback
memberVolumeSet ("memberVolumeName1" ... "memberVolumeNameN")
```

Parameter

Parameter	Description
cgSnapImage	The name of the consistency group snapshot image for which you want to start a rollback operation. The name of a snapshot image is comprised of two parts: • The name of the snapshot group • An identifier for the snapshot image in the snapshot group. The identifier for the snapshot image can be one of these: • An integer value that is the sequence number of the snapshot in the snapshot group. • NEWEST – Use this option when you want to show the latest snapshot image created in the snapshot group. • OLDEST – Use this option when you want to show the earliest snapshot image created in the snapshot group. Enclose the snapshot image name in double quotation marks (" ") inside square brackets ([ ]).
memberVolumeSet	The name of one or more member base volumes in a consistency group that you want to rollback. Enclose each member base volume name in double quotation marks (" ") inside parentheses. You can enter more than one volume name. Enclose all of the volume names in one set of square brackets ([ ]). Enclose each volume name in double quotation marks (" "). Separate each volume name with a space. When the **memberVolumeSet** parameter is not used the rollback process applies to all member volumes of the consistency group.

Notes

The name of a snapshot image has two parts separated by a colon (:):

• The identifier of the snapshot group

• The identifier of the snapshot image

For example, if you want to start a roll back operation for the newest snapshot image in an entire consistency group that has the name CG1, you would use this command:

```
start cgSnapImage ["CG1:newest"] rollback;
```

To start a roll back operation for the snapshot image 12345 for base volume members memVol1, memVol2, and memVol3 in a consistency group that has the name CG2, you would use this command:

```
start cgSnapImage ["CG2:12345"] rollback memberVolumeset=("memVol1 memVol2
 memVol3");
```

Stop consistency group snapshot rollback

The `stop cgSnapImage rollback` command stops a rollback operation to member base volumes in a snapshot consistency group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Note: Canceling a consistency group snapshot rollback operation leaves the base volume in an indeterminate state with potentially invalid or inconsistent data. The related consistency group snapshot volume becomes disabled and unusable.

Syntax

```
stop cgSnapImage["snapCGID:imageID"] rollback
memberVolumeSet ("memberVolumeName1" ... "memberVolumeNamen")
```

Parameter

Parameter	Description
cgSnapImage	The name of the consistency group snapshot image for which you want to stop a rollback operation. The name of a snapshot image is comprised of two parts: • The name of the snapshot group • An identifier for the snapshot image in the snapshot group The identifier for the snapshot image can be one of these: • An integer value that is the sequence number of the snapshot in the snapshot group. • NEWEST – Use this option when you want to show the latest snapshot image created in the snapshot group. • OLDEST – Use this option when you want to show the earliest snapshot image created in the snapshot group. Enclose the snapshot image name in double quotation marks (" ") inside square brackets ([ ]).
memberVolumeSet	The name of one or more member base volumes in a consistency group that you want to stop a rollback operation. Enclose each member base volume name in double quotation marks (" ") inside parentheses. You can enter more than one member base volume name. Enclose all of the member base volume names in one set of square brackets ([ ]). Enclose each member base volume name in double quotation marks (" "). Separate each member base volume name with a space. When the **memberVolumeSet** parameter is not used stopping the rollback process applies to all member volumes of the consistency group.

Notes

The name of a snapshot image has two parts separated by a colon (:):

• The identifier of the snapshot group

- The identifier of the snapshot image

For example, if you want to stop a roll back operation for the newest snapshot image in an entire consistency group that has the name CG1, you would use this command:

```
stop cgSnapImage ["CG1:newest"] rollback;
```

To stop a roll back operation for the snapshot image 12345 for base volume members memVol1, memVol2, and memVol3 in a consistency group that has the name CG2, you would use this command:

```
stop cgSnapImage ["CG2:12345"] rollback memberVolumeset=("memVol1 memVol2
 memVol3");
```

Stop consistency group snapshot volume

The `stop cgSnapVolume` command stops the copy-on-write operation for creating a consistency group snapshot volume.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

To restart the copy-on-write operation use the `resume cgSnapVolume` command.

Note: This command does not delete a consistency group snapshot volume. To delete a consistency group snapshot volume use the `delete cgSnapVolume` command.

Syntax

```
stop cgSnapVolume [snapVolumeName]
```

Parameter

Parameter	Description
cgSnapVolume	The name of the consistency group snapshot volume that you want to stop creating. Enclose the volume name in square brackets ([ ]). If the volume name has special characters or numbers, you must enclose the name in double quotation marks (" ") inside square brackets.

Stop pending snapshot images on consistency group

The `stop consistencyGroup pendingSnapImageCreation` command stops all of the pending snapshot images that are to be created on a snapshot consistency group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

If the snapshot consistency group does not have any pending snapshot images, the storage management software displays an error message and does not run the command.

Syntax

```
stop consistencyGroup [consistencyGroupName] pendingSnapImageCreation
```

Parameters

Parameter	Description
consistencyGroupName	The name of the consistency group for which you want to stop any pending snapshot operation. Enclose the name of the consistency group in square brackets ([ ]). If the consistency group name has special characters or numbers, you must enclose the consistency group name in double quotation marks (" ") inside square brackets.

Repository volume analysis commands (Replication)

Check repository consistency

The `check repositoryConsistency` command produces a report based on analysis of the data in a specified object's underlying repository volume.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Syntax

```
check (snapGroup [snapGroupName] repositoryConsistency |
snapVolume [snapVolumeName] repositoryConsistency |
volume [volumeName] repositoryConsistency |
volumeCopy target [targetName] repositoryConsistency |
asyncMirrorGroup [asyncMirrorGroupName]
repositoryConsistency localVolume="localVolumeName"]
file="filePath"
```

Parameters

Parameter	Description
repositoryConsistency	Specifies that the snapshot group, snapshot volume, volume, or asynchronous mirror group (depending on which is specified by the corresponding parameter) is checked for consistency.
snapGroup	The name of the snapshot group on which to run a consistency check. Enclose the snapshot group name in square brackets ([ ]). If the snapshot group name contains special characters or consists only of numbers, you also must enclose the name in double quotation marks (" ") inside square brackets.

Parameter	Description
snapVolume	The name of the snapshot volume on which to run a consistency check. Enclose the snapshot volume name in square brackets ([ ]). If the snapshot volume name contains special characters or consists only of numbers, you also must enclose the name in double quotation marks (" ") inside square brackets.
volume	The name of the thin volume on which to run a consistency check. Enclose the thin volume name in square brackets ([ ]). If the thin volume name contains special characters or consists only of numbers, you also must enclose the name in double quotation marks (" ") inside square brackets.
volumeCopy	Specifies that the target of a volume copy relationship is checked for consistency.
target	Use only in conjunction with the **volumeCopy** parameter to specify the name of the volume that is the target of the volume copy relationship. If the volume name contains special characters or consists only of numbers, you also must enclose the name in double quotation marks (" ") inside square brackets.
asyncMirrorGroup	The name of the asynchronous mirror group on which to run a consistency check. Enclose the asynchronous mirror group name in square brackets ([ ]). If the asynchronous mirror group name contains special characters or consists only of numbers, you also must enclose the name in double quotation marks (" ") inside square brackets.
localVolume	Use only with the **asyncMirrorGroup** parameter to specify the name of a local volume that participates in the mirror relationship. You can specify a local volume that is either the source or the destination on a mirror relationship. Enclose the local volume name in double quotation marks (" ").
file	The file path and the file name to which you want to save the report that results from the consistency check. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\repoConsistency.txt"` This parameter must appear last, after any of the optional parameters.

Notes

The report generated by this command is intended for use by technical support to analyze problems.

Snapshot group commands

Create snapshot group

The `create snapGroup` command creates a new snapshot group and the associated repository volume.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

A snapshot group contains a sequence of snapshot images of an associated base volume. A snapshot group has a repository volume that is used to save data for all of the snapshot images that are part of the snapshot group.

Note: Before you create a snapshot group, make sure a volume group with free capacity is available.

Syntax

```
create snapGroup userLabel="snapGroupName" sourceVolume="volumeName"
[(repositoryVolume="repos_xxxx" |
repositoryVolume=(volumeGroupName [capacity=capacityValue]) |
repositoryVolume=(diskPoolName [capacity=capacityValue]))]
[repositoryFullPolicy=(failBaseWrites | purgeSnapImages)]
[rollbackPriority=(highest | high | medium | low | lowest)]
[repositoryFullLimit=percentValue]
[autoDeleteLimit=numberOfSnapImages]|
[enableSchedule=(TRUE | FALSE)]
[schedule (immediate | snapshotSchedule)]
```

Parameters

Parameter	Description
userLabel	The name that you want to give the new snapshot group. Enclose the snapshot group identifier in double quotation marks (" ").
sourceVolume	The name of the volume that you want to use as the source for your snapshot images. Enclose the source volume name in double quotation marks (" ").

Parameter	Description
repositoryVolume	The name of the repository volume that will contain the changed data of the snapshot group.
	You have two options for defining the name of a repository volume:
	• Use an existing repository volume: name
	• Create a new repository volume when you run this command
	The name of an existing repository volume is comprised of two parts:
	• The term "repos"
	• A four digit numerical identifier that the storage management software assigns to the repository volume name
	Enclose the name of the existing repository volume in double quotation marks (" ").
	If you want to create a new repository volume when you run this command you must enter the name of either a volume group or a disk pool in which you want the repository volume. Optionally, you also can define the capacity of the repository volume. If you want to define the capacity you can use these values:
	• An integer value that represents a percentage of the base volume capacity
	• A decimal fraction value that represents a percentage of the base volume capacity
	• A specific size for the repository volume. Size is defined in units of bytes , KB , MB , GB , or TB .
	If you do not use the capacity option, the storage management software sets the capacity to 20 percent of the base volume capacity.
	When you run this command the storage management software creates the repository volume for the snapshot volume.
repositoryFullPolicy	Defines how snapshot image processing continues if the snapshot group repository volume is full. You can choose to fail I/O writes to the base volume (failBaseWrites) or delete (purge) the snapshot images (purgeSnapImages) in the repository volume. The purgeSnapImages option deletes the oldest snapshot images to free up space. The default action is purgeSnapImages .
rollBackPriority	Determines whether system resources should be allocated to the rollback operation at the expense of system performance. A value of high indicates that the rollback operation is prioritized over all other host I/O. A value of low indicates that the rollback operation should be performed with minimal impact to host I/O. The default value is medium .
repositoryFullLimit	The percentage of repository capacity at which you receive a warning that the snapshot group repository volume is nearing full. Use integer values. For example, a value of 70 means 70 percent. The default value is 75.
autoDeleteLimit	Each snapshot group can be configured to perform automatic deletion of its snapshot images to keep the total number of snapshot images in the snapshot group at or below a designated level. When this option is enabled, then any time a new snapshot image is created in the snapshot group, the system automatically deletes the oldest snapshot image in the group to comply with the limit value. This action frees repository capacity so it can be used to satisfy ongoing copy-on-write requirements for the remaining snapshot images.
enableSchedule	Use this parameter to turn on or to turn off the ability to schedule a snapshot operation. To turn on snapshot scheduling, set this parameter to TRUE . To turn off snapshot scheduling, set this parameter to FALSE .

Notes

Each snapshot group name must be unique. You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the user label. User labels can have a maximum of 30 characters.

To create a snapshot group, you must have an associated repository volume in which you store the snapshot images. You can either use an existing repository volume or create a new repository volume. You can create the repository volume when you create the snapshot group. A snapshot group repository volume is an expandable volume that is structured as a concatenated collection of up to 16 standard volume entities. Initially, an expandable repository volume has only a single element. The capacity of the expandable repository volume is exactly that of the single element. You can increase the capacity of an expandable repository volume by attaching additional standard volumes to it. The composite expandable repository volume capacity then becomes the sum of the capacities of all of the concatenated standard volumes.

A snapshot group has a strict ordering of snapshot images based on the time that each snapshot image is created. A snapshot image that is created after another snapshot image is a *successor* relative to that other snapshot image. A snapshot image that is created before another snapshot image is a *predecessor* relative to that other one.

A snapshot group repository volume must satisfy a minimum capacity requirement that is the sum of the following:

- 32 MB to support fixed overhead for the snapshot group and for copy-on-write processing.
- Capacity for rollback processing, which is 1/5000th of the capacity of the base volume.

The minimum capacity is enforcement by the controller firmware and the storage management software.

When you first create a snapshot group, it does not contains any snapshot images. When you create snapshot images, you add the snapshot images to a snapshot group. Use the `create snapImage` command to create snapshot images and add the snapshot images to a snapshot group.

A snapshot group can have one of these states:

- **Optimal** – The snapshot group is operating normally.
- **Full** – The snapshot group repository is full. Additional copy-on-write operations can not be performed. This state is possible only for snapshot groups that have the Repository Full policy set to Fail Base Writes. Any snapshot group in a Full state causes a Needs-Attention condition to be posted for the storage array.
- **Over Threshold** – The snapshot group repository volume usage is at or beyond its alert threshold. Any snapshot group in this state causes a Needs-Attention condition to be posted for the storage array.
- **Failed** – The snapshot group has encountered a problem that has made all snapshot images in the snapshot group unusable. For example, certain types of repository volume failures can cause a Failed state. To recover from a Failed state use the `revive snapGroup` command.

Automatic snapshot image deletion

You can configure each snapshot group to automatically delete the snapshot images by using the **autoDeleteLimit** parameter. Automatically deleting the snapshot images enables you to avoid having to routinely, manually delete the images that you do not want and that might prevent the creation of future snapshot images because the repository volume is full. When you use the **autoDeleteLimit** parameter it causes the storage management software to automatically delete snapshot images, starting with the oldest. The storage management software deletes snapshot images until it reaches a number of snapshot images that is equal to the number that you enter with **autoDeleteLimit** parameter. When new snapshot images are added to the repository volume, the storage management software deletes the oldest snapshot images until the **autoDeleteLimit** parameter number is reached.

Scheduling snapshots

The **enableSchedule** parameter and the **schedule** parameter provide a way for you to schedule creating snapshot images for a snapshot group. Using these parameters, you can schedule snapshots daily, weekly, or monthly (by day or by date). The **enableSchedule** parameter turns on or turns off the ability to schedule snapshots. When you enable scheduling, you use the **schedule** parameter to define when you want the snapshots to occur.

This table explains how to use the options for the **schedule** parameter:

Parameter	Description
schedule	Required for specifying schedule parameters.
immediate	Start the operation immediately. This item is mutually exclusive with any other scheduling parameters.
enableSchedule	When set to **true** , scheduling is turned on. When set to **false** , scheduling is turned off. **Note:** The default is **false** .
startDate	A specific date on which to start the operation. The format for entering the date is MM:DD:YY. The default is the current date. An example of this option is `startDate=06:27:11` .
scheduleDay	A day of the week on which to start the operation. Can either be all or one or more of the following values: • **monday** • **tuesday** • **wednesday** • **thursday** • **friday** • **saturday** • **sunday** **Note:** Enclose the value in parentheses. For example, `scheduleDay=`(`wednesday`) . More than one day can be specified by enclosing the days in a single set of parentheses and separating each day with a space. For example, `scheduleDay=`(`monday wednesday friday`) . **Note:** This parameter is not compatible with a monthly schedule.
startTime	The time of a day on which to start the operation. The format for entering the time is HH:MM, where HH is the hour and MM is the minute past the hour. Uses a 24-hour clock. For example, 2:00 in the afternoon is 14:00. An example of this option is `startTime=14:27` .
scheduleInterval	An amount of time, in minutes, to have as a minimum between operations. Schedule interval should not be more than 1440 (24 hours) and it should be a multiple of 30. An example of this option is `scheduleInterval=180` .
endDate	A specific date on which to stop the operation. The format for entering the date is MM:DD:YY. If no end date is desired, you can specify **noEndDate** . An example of this option is `endDate=11:26:11` .
timesPerDay	The number of times to perform the operation in a day. An example of this option is `timesPerDay=4` .

Parameter	Description

timezone	Specifies the time zone to be used for the schedule. Can be specified in two ways:
	
	GMT±HH:MM
	    The time zone offset from GMT. Example: `timezone=GMT-06:00` .
	
	Text String
	    Standard time zone text string, must be enclosed in quotes. Example: `timezone="America/Chicago"`

scheduleDate	A day of the month on which to perform the operation. The values for the days are numerical and in the range of 1-31. **Note:** This parameter is not compatible with a weekly schedule. An example of the **scheduleDate** option is `scheduleDate=("15")` .
month	A specific month on which to perform the operation. The values for the months are: • **jan** - January • **feb** - February • **mar** - March • **apr** - April • **may** - May • **jun** - June • **jul** - July • **aug** - August • **sep** - September • **oct** - October • **nov** - November • **dec** - December **Note:** Enclose the value in parentheses. For example, `month=(jan)` . More than one month can be specified by enclosing the months in a single set of parentheses and separating each month with a space. For example, `month=(jan jul dec)` . Use this parameter with the **scheduleDate** parameter to perform the operation on a specific day of the month. **Note:** This parameter is not compatible with a weekly schedule.

This table explains how to use the **timeZone** parameter:

Timezone Name	GMT offset
Etc/GMT+12	**GMT-12:00**
Etc/GMT+11	**GMT-11:00**
Pacific/Honolulu	**GMT-10:00**
America/Anchorage	**GMT-09:00**
America/Santa_Isabel	**GMT-08:00**

Timezone Name	GMT offset
America/Los_Angeles	GMT-08:00
America/Phoenix	GMT-07:00
America/Chihuahua	GMT-07:00
America/Denver	GMT-07:00
America/Guatemala	GMT-06:00
America/Chicago	GMT-06:00
America/Mexico_City	GMT-06:00
America/Regina	GMT-06:00
America/Bogota	GMT-05:00
America/New_York	GMT-05:00
Etc/GMT+5	GMT-05:00
America/Caracas	GMT-04:30
America/Asuncion	GMT-04:00
America/Halifax	GMT-04:00
America/Cuiaba	GMT-04:00
America/La_Paz	GMT-04:00
America/Santiago	GMT-04:00
America/St_Johns	GMT-03:30
America/Sao_Paulo	GMT-03:00
America/Buenos_Aires	GMT-03:00
America/Cayenne	GMT-03:00
America/Godthab	GMT-03:00
America/Montevideo	GMT-03:00
Etc/GMT+2	GMT-02:00
Atlantic/Azores	GMT-01:00
Atlantic/Cape_Verde	GMT-01:00
Africa/Casablanca	GMT
Etc/GMT	GMT
Europe/London	GMT
Atlantic/Reykjavik	GMT
Europe/Berlin	GMT+01:00
Europe/Budapest	GMT+01:00
Europe/Paris	GMT+01:00
Europe/Warsaw	GMT+01:00
Africa/Lagos	GMT+01:00
Africa/Windhoek	GMT+01:00

Timezone Name	GMT offset
Asia/Anman	GMT+02:00
Asia/Beirut	GMT+02:00
Africa/Cairo	GMT+02:00
Asia/Damascus	GMT+02:00
Africa/Johannesburg	GMT+02:00
Europe/Kiev	GMT+02:00
Asia/Jerusalem	GMT+02:00
Europe/Istanbul	GMT+03:00
Europe/Minsk	GMT+02:00
Asia/Baghdad	GMT+03:00
Asia/Riyadh	GMT+03:00
Africa/Nairobi	GMT+03:00
Asia/Tehran	GMT+03:30
Europe/Moscow	GMT+04:00
Asia/Dubai	GMT+04:00
Asia/Baku	GMT+04:00
Indian/Mauritius	GMT+04:00
Asia/Tbilisi	GMT+04:00
Asia/Yerevan	GMT+04:00
Asia/Kabul	GMT+04:30
Asia/Karachi	GMT+05:00
Asia//Tashkent	GMT+05:00
Asia/Calcutta	GMT+05:30
Asia/Colombo	GMT+05:30
Asia/Katmandu	GMT+05:45
Asia/Yekaterinburg	GMT+06:00
Asia/Almaty	GMT+06:00
Asia/Dhaka	GMT+06:00
Asia/Rangoon	GMT+06:30
Asia/Novosibirsk	GMT+07:00
Asia/Bangkok	GMT+07:00
Asia/Krasnoyarsk	GMT+08:00
Asia/Shanghai	GMT+08:00
Asia/Singapore	GMT+08:00
Australia/Perth	GMT+08:00
Asia/Taipei	GMT+08:00
Asia/Ulaanbaatar	GMT+08:00

Timezone Name	GMT offset
Asia/Irkutsk	**GMT+09:00**
Asia/Tokyo	**GMT+09:00**
Asia/Seoul	**GMT+09:00**
Australia/Adelaide	**GMT+09:30**
Australia/Darwin	**GMT+09:30**
Asia/Yakutsk	**GMT+10:00**
Australia/Brisbane	**GMT+10:00**
Australia/Sydney	**GMT+10:00**
Pacific/Port Moresby	**GMT+10:00**
Australia/Hobart	**GMT+10:00**
Asia/Vladivostok	**GMT+11:00**
Pacific/Guadalcanal	**GMT+11:00**
Pacific/Auckland	**GMT+12:00**
Etc/GMT-12	**GMT+12:00**
Pacific/Fiji	**GMT+12:00**
Asia/Kamchatka	**GMT+12:00**
Pacific/Tongatapu	**GMT+13:00**

The code string for defining a schedule is similar to these examples:

```
enableSchedule=true schedule startTime=14:27
```

```
enableSchedule=true schedule scheduleInterval=180
```

```
enableSchedule=true schedule timeZone=GMT-06:00
```

```
enableSchedule=true schedule timeZone="America/Chicago"
```

If you also use the **scheduleInterval** option, the firmware chooses between the **timesPerDay** option and the **scheduleInterval** option by selecting the lowest value of the two options. The firmware calculates an integer value for the **scheduleInterval** option by dividing 1440 by the **scheduleInterval** option value that you set. For example, 1440/180 = 8. The firmware then compares the **timesPerDay** integer value with the calculated **scheduleInterval** integer value and uses the smaller value.

To remove a schedule, use the `delete volume` command with the **schedule** parameter. The `delete volume` command with the **schedule** parameter deletes only the schedule, not the snapshot volume.

Delete snapshot group

The `delete snapGroup` command an entire snapshot group and optionally the associated repository volumes.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Attention: Possible damage to the storage array configuration – All of the data in the snapshot group is lost as soon as you run this command.

Syntax

```
delete snapGroup ["snapGroupName"]
[deleteRepositoryMembers=(TRUE | FALSE)]
```

Parameters

Parameter	Description
snapGroup	The name of the snapshot group that you want to delete. Enclose the snapshot group name in double quotation marks (" ") inside square brackets ([ ]).
deleteRepositoryMembers	The parameter to delete or save the repository volumes. To delete the repository volumes, set this parameter to TRUE . To save the repository volumes, set this parameter to FALSE . The default value is FALSE .

Notes

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the user label. User labels can have a maximum of 30 characters.

You can delete a snapshot group if it is empty or if it contains snapshot images. All of the snapshot images in the snapshot group are deleted along with the snapshot group. If any existing snapshot image within the snapshot group has an associated snapshot volume, each snapshot volume is stopped and detached from the snapshot image. When you delete a snapshot group the associated repository volume is also deleted. By default, all member volumes in the repository volume are retained as unused, unmapped standard volumes. To remove the member volumes set the **deleteRepositoryMembers** parameter to **TRUE** , or do not use this parameter. To keep the member volumes, set the **deleteRepositoryMembers** parameter to **FALSE** .

Revive snapshot group

The `revive snapGroup` command forces the specified snapshot group to the Optimal state.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Context

If the snapshot group is not in a Failed state, the firmware displays an error message and does not run this command.

Syntax

```
revive snapGroup [snapGroupName]
```

Parameter

Parameter	Description
snapGroup	The name of the snapshot group that you want to set to the Optimal state. Enclose the snapshot group name in square brackets ([ ]). If the snapshot group name has special characters or consists only of numbers, you must enclose the snapshot group name in double quotation marks (" ") inside square brackets.

Notes

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the names. Names can have a maximum of 30 characters.

Set snapshot group attributes

The `set snapGroup` command defines the properties for a snapshot group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set snapGroup ["snapGroupName"]
[userLabel="snapGroupName"] |
[repositoryFullPolicy=(failBaseWrites | purgeSnapImages) |
[repositoryFullLimit=percentValue |
[autoDeleteLimit=numberOfSnapImages] |
[rollbackPriority=(lowest | low | medium | high | highest)]
```

Parameters

Parameter	Description
snapGroup	The name of the snapshot group for which you are setting properties. Enclose the snapshot group name in double quotation marks (" ") inside of square brackets ([ ]).
userLabel	The new name that you want to give to the snapshot group. Use this parameter when you want to rename the snapshot group. Enclose the new snapshot group name in double quotation marks (" ").
repositoryFullPolicy	How you want snapshot image processing to continue if the repository volumes for the snapshot image group are full. You can choose to fail writes to the base volume (failBaseWrites) or delete (purge) the snapshot images (purgeSnapImages). The default action is purgeSnapImages .

Parameter	Description
repositoryFullLimit	The percentage of repository volume capacity at which you receive a warning that the snapshot image repository volume is nearing full. Use integer values. For example, a value of 70 means 70 percent. The default value is 75.
autoDeleteLimit	The maximum number of snapshot images that you want to automatically delete if you have selected to purge the snapshot images for a repository full policy. Use integer values. The default value is 32.
rollBackPriority	Use this parameter to determine whether system resources should be allocated to the rollback operation at the expense of system performance. Valid values are highest , high , medium , low , or lowest A value of high indicates that the rollback operation is prioritized over all other host I/O. A value of lowest indicates that the rollback operation should be performed with minimal impact to host I/O.

Notes

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the names. Names can have a maximum of 30 characters.

When you use this command, you can specify one or more of the parameters. You do not, however, need to use all of the parameters.

Set snapshot group media scan

The `set snapGroup mediaScanEnabled` command runs a media scan on a snapshot group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set snapGroup ["snapGroupName"]
mediaScanEnabled=(TRUE | FALSE)
redundancyCheckEnabled=(TRUE | FALSE)
```

Parameters

Parameter	Description
snapGroup	The name of the snapshot group on which you want to run a media scan. Enclose the snapshot group name in double quotation marks (" ") inside of square brackets ([ ]).
mediaScanEnabled	The setting to turn on or turn off media scan for the volume. To turn on media scan, set this parameter to TRUE . To turn off media scan, set this parameter to FALSE . (If media scan is disabled at the storage array level, this parameter has no effect.)
redundancyCheckEnabled	The setting to turn on or turn off redundancy checking during a media scan. To turn on redundancy checking, set this parameter to TRUE . To turn off redundancy checking, set this parameter to FALSE .

Notes

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the names. Names can have a maximum of 30 characters.

Set snapshot group repository volume capacity

The `set snapGroup increase/decreaseRepositoryCapacity` command increases or decreases the capacity of a snapshot group repository volume.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax for increasing capacity

```
set snapGroup ["snapGroupName"] increaseRepositoryCapacity
(repositoryVolumes="repos_xxxx" | repositoryVolumes=((volumeGroupName
[capacity=capacityValue])) | repositoryVolumes=((diskPoolName
[capacity=capacityValue])))
```

Syntax for decreasing capacity

```
set snapGroup ["snapGroupName"]
decreaseRepositoryCapacity
count=numberOfVolumes
```

Parameters

Parameter	Description
snapGroup	The name of the snapshot group for which you want to increase capacity or decrease capacity. Enclose the snapshot group name in double quotation marks (" ") inside of square brackets ([ ]).
repositoryVolume	The name of the repository volume for which you want to increase capacity. An available standard volume is added to the repository volume to increase the capacity of the repository volume. You have two options for defining the name of a repository volume: • Use an existing repository volume: name • Create a new repository volume when you run this command The name of an existing repository volume consists of two parts: • The term "repos" • A four digit numerical identifier that the storage management software assigns to the repository volume name Enclose the name of the existing repository volume in double quotation marks (" "). If you want to create a new repository volume when you run this command you must enter the name of either a volume group or a disk pool in which you want the repository volume. Optionally, you can also define the capacity of the repository volume. If you want to define the capacity you can use these values: • An integer value that represents a percentage of the base volume capacity • A decimal fraction value that represents a percentage of the base volume capacity • A specific size for the repository volume. Size is defined in units of bytes , KB , MB , GB , or TB . If you do not use the capacity option, the storage management software sets the capacity to 20 percent of the base volume capacity. When you run this command the storage management software creates the repository volume for the snapshot volume.
count	The number of repository volumes that you want to remove from the snapshot group. Use integer values.

Notes

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the user label. User labels can have a maximum of 30 characters.

The repository volume name is automatically created by the storage management software and the firmware when you create a new snapshot group. You cannot rename the repository volume because renaming the repository volume breaks the linkage with the snapshot images.

A snapshot group repository volume is an expandable volume that is structured as a concatenated collection of up to 16 standard volume entities. Initially, an expandable repository volume has only a single element. The capacity of the expandable repository volume is exactly that of the single element. You can increase the capacity of an expandable repository volume by attaching additional standard volumes to it. The composite expandable repository volume capacity then becomes the sum of the capacities of all of the concatenated standard volumes.

A snapshot group repository volume must satisfy a minimum capacity requirement that is the sum of the following:

- 32 MB to support fixed overhead for the snapshot group and for copy-on-write processing.
- Capacity for rollback processing, which is 1/5000th of the capacity of the base volume.

The minimum capacity is enforcement by the controller firmware and the storage management software.

Set snapshot group schedule

The `set snapGroup enableSchedule` command defines the schedule for taking snapshot images for a snapshot group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set snapGroup ["snapGroupName"]
enableSchedule=(TRUE | FALSE)
schedule (immediate | snapshotSchedule)
```

Parameters

Parameter	Description
snapGroup	The name of the snapshot group for which you are setting properties. Enclose the snapshot group name in double quotation marks (" ") inside of square brackets ([ ]).
enableSchedule	Use this parameter to turn on or to turn off the ability to schedule a snapshot operation. To turn on snapshot scheduling, set this parameter to TRUE . To turn off snapshot scheduling, set this parameter to FALSE .

Notes

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the names. Names can have a maximum of 30 characters.

Scheduling snapshots

The **enableSchedule** parameter and the **schedule** parameter provide a way for you to schedule creating snapshot images for a snapshot group. Using these parameters, you can schedule snapshots daily, weekly, or monthly (by day or by date). The **enableSchedule** parameter turns on or turns off the ability to schedule snapshots. When you enable scheduling, you use the **schedule** parameter to define when you want the snapshots to occur.

This list explains how to use the options for the **schedule** parameter:

- immediate – As soon as you enter the command, a snapshot image is created, and a copy-on-write operation begins.
- startDate – A specific date on which you want to create a snapshot image and perform a copy-on-write operation. The format for entering the date is MM:DD:YY . If you do not provide a start date, the current date is used. An example of this option is **startDate=06:27:11** .

- scheduleDay – A day of the week on which you want to create a snapshot image and perform a copy-on-write operation. You can enter these values: monday , tuesday , wednesday , thursday , friday , saturday , sunday , and all . An example of this option is **scheduleDay=wednesday** .

- startTime – The time of a day that you want to create a snapshot image and start performing a copy-on-write operation. The format for entering the time is HH:MM , where HH is the hour and MM is the minute past the hour. Use a 24-hour clock. For example, 2:00 in the afternoon is 14:00. An example of this option is **startTime=14:27** .

- scheduleInterval – An amount of time, in minutes, that you want to have as a minimum between copy-on-write operations. You can possibly create a schedule in which you have overlapping copy-on-write operations because of the duration of a copy operation. You can make sure that you have time between copy-on-write operations by using this option. The maximum value for the **scheduleInterval** option is 1440 minutes. An example of this option is **scheduleInterval=180** .

- endDate – A specific date on which you want to stop creating a snapshot image and end the copy-on-write operation. The format for entering the date is MM:DD:YY . An example of this option is **endDate= 11:26:11** .

- noEndDate – Use this option if you do not want your scheduled copy-on-write operation to end. If you later decide to end the copy-on-write operations you must re-enter the `set snapGroup` command and specify an end date.

- timesPerDay – The number of times that you want the schedule to run in a day. An example of this option is **timesPerDay=4** .

- timeZone – Use this parameter to define the time zone in which the storage array is operating. You can define the time zone in one of two ways:

  - GMT±HH:MM – The time zone offset from GMT. Enter the offset in hours and minutes. For example GMT-06:00 is the central time zone in the United States.

  - Text string – Standard time zone text strings. For example: "America/Chicago" or "Australia/Brisbane". Time zone text strings are case sensitive. If you enter an incorrect text string, GMT time is used. Enclose the text string in double quotation marks.

The code string for defining a schedule is similar to these examples:

```
enableSchedule=true schedule startTime=14:27
```

```
enableSchedule=true schedule scheduleInterval=180
```

```
enableSchedule=true schedule timeZone=GMT-06:00
```

```
enableSchedule=true schedule timeZone="America/Chicago"
```

If you also use the **scheduleInterval** option, the firmware chooses between the **timesPerDay** option and the **scheduleInterval** option by selecting the lowest value of the two options. The firmware calculates an integer value for the **scheduleInterval** option by dividing 1440 by the **scheduleInterval** option value that you set. For example, 1440/180 = 8. The firmware then compares the **timesPerDay** integer value with the calculated **scheduleInterval** integer value and uses the smaller value.

To remove a schedule, use the `delete volume` command with the **schedule** parameter. The `delete volume` command with the **schedule** parameter deletes only the schedule, not the snapshot volume.

Set SSD cache for a volume

The `set volume ssdCacheEnabled` command turns on or off caching using the SSD cache feature for a specific volume.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, or DE6000H storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

The volume can be one of these:

- Standard volume, identified by either a name or a WWID
- Snapshot volume
- Consistency group snapshot volume

Syntax applicable to a standard volume

`set volume ([`*volumeName*`] | <"WWID">) ssdCacheEnabled=(TRUE | FALSE)`

Syntax applicable to a snapshot volume

`set snapVolume ["`*snapVolumeName*`"] ssdCacheEnabled=(TRUE | FALSE)`

Syntax applicable to a standard volume

`set volume ([`*volumeName*`] | <"WWID">) ssdCacheEnabled=(TRUE | FALSE)`

Parameters

Parameter	Description
volume	The name of the standard volume for which you want to turn on or turn off the SSD cache. Enclose the name of the volume in square brackets ([ ]). If the name of the volume has special characters or numbers, you must enclose the name of the volume in double quotation marks (" ") inside of square brackets ([ ]).
volume	The World Wide Identifier (WWID) of the standard volume for which you want to turn on or turn off the SSD cache. Enclose the WWID in double quotation marks (" ") inside angle brackets (< >).
snapVolume	The name of the snapshot volume for which you want to turn on or turn off the SSD cache. Enclose the name of snapshot volume in double quotation marks (" ") inside of square brackets ([ ]).
cgSnapVolume	The name of the consistency group snapshot volume for which you want to turn on or turn off the SSD cache. Enclose the name of the consistency group snapshot volume in double quotation marks (" ") inside of square brackets ([ ]).
ssdCacheEnabled	To turn on SSD cache, set this parameter to TRUE . To turn off SSD cache, set this parameter to FALSE .

Notes

You can turn the SSD cache on or off for only one volume at a time.

When you turn off SSD cache for a volume, the SSD cache for that volume is purged.

Show snapshot group

The `show snapGroup` command returns information about one or more snapshot image groups.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
show (allSnapGroups | snapGroup [snapGroupName] |
snapGroups ["snapGroupName1" ... "snapGroupNamen"])
[summary | schedule]
```

Parameters

Parameter	Description
allSnapGroups	The parameter to return information about all of the snapshot groups in the storage array.
snapGroup	The name of the snapshot group for which you want to retrieve information. Enclose the snapshot group name in square brackets ([ ]). If the snapshot group name has special characters or numbers, you must enclose the snapshot group name in double quotation marks (" ") inside square brackets.
snapGroups	The names of several snapshot groups for which you want to retrieve information. Enter the names of the snapshot groups using these rules: • Enclose all of the names in square brackets ([ ]). • Separate each of the names with a space. If the snapshot group names have special characters or consist only of numbers, enter the names using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.
summary	The parameter to return a concise list of information about the snapshot groups.
schedule	The parameter to return a concise list of information about the schedules for the snapshot group copy operations.

Notes

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the names. Names can have a maximum of 30 characters.

This command returns snapshot group information as shown in this example:

```
SNAPSHOT GROUP DETAILS
```

```
   SNAPSHOT GROUPS----------------------------

   SUMMARY


     Total Snapshot Groups: 1
     Total Snapshot Images: 0
     Enabled Snapshot Image Schedules: 0
     Status: 1 Optimal, 0 Non Optimal

     Name       Type          Status     Associated Base Volume
     2_SG_01    Standard     Optimal    2
     Total Repository Capacity  Available Repository Capacity  Snapshot Image Limit
     10.318 GB                  10.318 GB (100%)               0


     Snapshot Images    Scheduled
     0                  No
   DETAILS

     Snapshot Group "2_SG_01"

      Status:  Optimal
      Type:    Standard
      Associated base volume: 2
      Cluster size: 65,536 bytes

      Repository

       Total repository volumes: 3
       Aggregate repository status: Optimal
       Total repository capacity:   10.318 GB
       Used capacity:           0.000 MB (0%)
       Available repository capacity: 10.318 GB (100%)
       Repository full policy:    Auto-purge Snapshot Images
       Utilization alert threshold: 75%

      Snapshot images

       Total Snapshot images: 0
       Auto-delete Snapshot images: Disabled
       Snapshot image schedule:   Not Applicable
```

Stop snapshot group pending snapshot images

The `stop pendingSnapImageCreation` command cancels all of the pending snapshot images that are to be created on a snapshot or snapshot consistency group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

If the snapshot group does not have any pending snapshot images, the firmware displays an error message and does not run the command. You can run this command on a snapshot group or a snapshot consistency group.

Syntax

```
stop (snapGroup [snapGroupName] |
consistencyGroup [snapConsistencyGroupName])
pendingSnapImageCreation
```

Parameters

Parameter	Description
snapGroup	The name of the snapshot group for which you want to stop pending snapshot images. Enclose the snapshot group name in square brackets ([ ]). If the snapshot group name has special characters or numbers, you must enclose the snapshot group name in double quotation marks (" ") inside square brackets.
consistencyGroup	The name of the snapshot consistency group for which you want to stop pending snapshot images. Enclose the snapshot consistency group name in square brackets ([ ]). If the snapshot consistency group name has special characters or numbers, you must enclose the snapshot group name in double quotation marks (" ") inside square brackets.

Snapshot image commands

Create snapshot image

The `create snapImage` command creates a new snapshot image in one or more existing snapshot groups.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Before you can create a snapshot image, you must first have at least one snapshot group into which you can place the snapshot image. To create a snapshot group use the `create snapGroup` command.

Syntax

```
create snapImage (snapGroup="snapGroupName" |
snapGroups=("snapGroupName1"... "snapGroupNamen"))
```

Parameters

Parameter	Description
snapGroup	The name of the snapshot group that will contain the snapshot image. Enclose the name of the snapshot group in double quotation marks (" ").
snapGroups	The names of several snapshot groups that will contain the snapshot image. Enter the names of the snapshot groups using these rules: • Enclose all of the names in parentheses. • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.

Notes

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the names. Names can have a maximum of 30 characters.

A snapshot image is a logical point-in-time image of the contents of an associated *base* volume. The snapshot image is created instantly and records the state of the base volume at that moment. Every snapshot image is created in the context of exactly one *snapshot group* . A snapshot group is a sequence of snapshot images of the associated base volume. A snapshot group has one *repository volume* used to save all of the data from the snapshot images. The snapshot images in a snapshot group have a specific order. The specific order of the snapshot images enables you to manage the snapshot images, such as restoring a specific snapshot image to the base volume or deleting the snapshot images that you no longer need.

The result of creating a snapshot image of a consistency group is a snapshot image of every member volume of the consistency group.

Delete snapshot image

The `delete snapImage` command deletes one or more snapshot images from a snapshot group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
delete snapImage (snapGroup="snapGroupName" |
snapGroups=("snapGroupName1"
... "snapGroupNamen"))
[deleteCount=numberOfSnapImages]
[retainCount=numberOfSnapImages]
[ignoreSnapVolume=(TRUE | FALSE)]
[snapImageID=OLDEST]
```

Parameters

Parameter	Description
snapGroup	The name of the snapshot group that has the snapshot image that you want to delete. Enclose the name of the snapshot group in double quotation marks (" ").
snapGroups	The names of several snapshot groups that has the snapshot image that you want to delete. Enter the names of the snapshot groups using these rules: • Enclose all of the names in parentheses. • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.
deleteCount	The number of snapshot images that you want to delete from the snapshot group. Use integer values. This parameter deletes the oldest snapshot image first and continues to delete the oldest snapshot images until reaching the number that you enter. If the number that you enter is greater than the actual number of all of the snapshot images in the snapshot group, all of the snapshot images will be deleted. The snapshot group is left empty.

Parameter	Description
retainCount	The number of snapshot images that you want to keep in the snapshot group. Use integer values. This parameter keeps the most recent snapshot images in the snapshot group and deletes older snapshot images. If the number of existing snapshot images in the snapshot group is less than the number that you enter, none of the snapshot images are deleted.
ignoreSnapVolume	Use this parameter to make sure that you do not delete a snapshot image that has a snapshot volume associated with the snapshot image. You can use one of these values: • TRUE - Use this value to delete the snapshot image even though the snapshot image has an associated snapshot volume. • FALSE - Use this value to keep the snapshot image when the snapshot image has an associated snapshot volume. The default value is TRUE .
snapImageID	The **snapImageID** parameter accepts only the OLDEST option. This parameter deletes the earliest snapshot image created.

Notes

You can delete the oldest snapshot image from a snapshot group repository volume. The definition of a snapshot image that you delete is removed from the system. The space occupied by the snapshot image that you delete from the snapshot group repository volume is released and made available for reuse within the snapshot group.

If you do not use any other parameters with the **snapGroup** parameter or **snapGroups** parameter, by default the oldest snapshot image is deleted.

Any snapshot volumes that exist for a snapshot image transition to the Stopped state when the snapshot image is deleted.

This command will not run when the controller is in Lock-down mode.

Resume snapshot image rollback

The `resume snapImage rollback` command resumes a rollback operation that has entered a paused state.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

A rollback operation can enter a paused state due to processing errors, which causes a Needs Attention condition for the storage array.

If the rollback operation cannot be resumed, the selected snapshot image reverts to a paused state, and the Needs Attention condition is displayed.

Note: You cannot use this command for snapshot images involved in online volume copy.

Syntax

```
resume snapImage [snapImageName] rollback
```

Parameter

Parameter	Description
snapImage	The name of the snapshot image for which you want to restart a rollback operation. The name of a snapshot image is comprised of two parts: • The name of the snapshot group • An identifier for the snapshot image in the snapshot group The identifier for the snapshot image can be one of these: • An integer value that is the sequence number of the snapshot in the snapshot group. • NEWEST - Use this option when you want to show the latest snapshot image created in the snapshot group. • OLDEST - Use this option when you want to show the earliest snapshot image created in the snapshot group. Enclose the snapshot image name in double quotation marks (" ") inside square brackets ([ ]).

Notes

The name of a snapshot image has two parts separated by a colon (:):

• The identifier of the snapshot group
• The identifier of the snapshot image

For example, if you want to restart a rollback operation for snapshot image 12345 in a snapshot group that has the name snapgroup1, you would use this command:

```
resume snapImage ["snapgroup1:12345"] rollback;
```

Show snapshot image

The show snapImage command returns information about the snapshot images that a user had previously created.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax for showing a specific snapshot image

```
show (allSnapImages | snapImage ["snapImageName"] |
snapImages ["snapImageName1" ... "snapImageNamen"])
[summary]
```

Parameters

Parameter	Description
allSnapImages	The parameter to return information about all of the snapshot images in the storage array.
snapImage	The name of a snapshot image for which you want to retrieve information. The name of a snapshot image is comprised of two parts: • The name of the snapshot group • An identifier for the snapshot image in the snapshot group The identifier for the snapshot image can be one of these: • An integer value that is the sequence number of the snapshot in the snapshot group. • NEWEST – Use this option when you want to show the latest snapshot image created in the snapshot group. • OLDEST – Use this option when you want to show the earliest snapshot image created in the snapshot group. Enclose the snapshot image name in double quotation marks (" ") inside square brackets ([ ]).
snapImages	The names of several snapshot images for which you want to retrieve information. Enter the names of the snapshot images using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.
summary	This parameter returns a concise list of information about the snapshot images.

Notes

The name of a snapshot image has two parts separated by a colon (:):

• The identifier of the snapshot group
• The identifier of the snapshot image

For example, if you want to show snapshot image 12345 in a snapshot group that has the name snapGroup1, you would use this command:

```
show snapImage ["snapGroup1:12345"];
```

To show the most recent snapshot image in a snapshot group that has the name snapGroup1, you would use this command:

```
show snapImage ["snapGroup1:newest"];
```

To show the snapshot images in several snapshot consistency groups that has the names snapGroup1, snapGroup2, and snapGroup3, you would use this command:

```
show snapImages ["snapGroup1:12345 snapGroup2:newest snapGroup3:oldest"];
```

Start snapshot image rollback

The `start snapImage rollback` command starts a rollback operation for a set of snapshot images.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

The content of the base volume changes immediately to match the point-in-time content of the selected snapshot image volume. The base volume immediately becomes available for read/write requests after the rollback operation has successfully completed. To stop a snapshot image rollback operation, use the `stop rollback snapImage` command.

The repository volume that is associated with the snapshot image continues to track any new changes between the base volume and the snapshot image volume that occur after the rollback operation is completed.

Note: You cannot use this command for snapshot images involved in online volume copy.

Syntax

```
start snapImage ["snapImageName"] rollback
```

Parameter

Parameter	Description
snapImage	The name of the snapshot image. The name of a snapshot image is comprised of two parts: • The name of the snapshot group • An identifier for the snapshot image in the snapshot group The identifier for the snapshot image can be one of these: • An integer value that is the sequence number of the snapshot in the snapshot group. • NEWEST – Use this option when you want to show the latest snapshot image created in the snapshot group. • OLDEST – Use this option when you want to show the earliest snapshot image created in the snapshot group. Enclose the snapshot image name in double quotation marks (" ") inside square brackets ([ ]).

Notes

The name of a snapshot image has two parts separated by a colon (:):

• The identifier of the snapshot group
• The identifier of the snapshot image

For example, if you want to start a rollback operation for snapshot image 12345 in a snapshot group that has the name snapGroup1, you would use this command:

```
start snapImage ["snapGroup1:12345"] rollback;
```

To start a rollback operation for the most recent snapshot image in a snapshot group that has the name snapGroup1, you would use this command:

```
start snapImage ["snapGroup1:newest"]rollback;
```

Stop snapshot image rollback

The `stop snapImage rollback` command stops a snapshot image rollback operation that was initiated by the `start snapImage rollback` command.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Note: Canceling a snapshot image rollback operation leaves the base volume in an indeterminate state with potentially invalid or inconsistent data. The related snapshot image volume becomes disabled and unusable.

Syntax

```
stop snapImage [snapCGID:imageID] rollback
```

Parameter

Parameter	Description
snapImage	The name of the snapshot image for which you want to stop a rollback operation. The name of a snapshot image is comprised of two parts: • The name of the snapshot group • An identifier for the snapshot image in the snapshot group The identifier for the snapshot image can be one of these: • An integer value that is the sequence number of the snapshot in the snapshot group. • NEWEST – Use this option when you want to show the latest snapshot image created in the snapshot group. • OLDEST – Use this option when you want to show the earliest snapshot image created in the snapshot group. Enclose the snapshot image name in double quotation marks (" ") inside square brackets ([ ]).

Notes

The name of a snapshot image has two parts separated by a colon (:):

- The identifier of the snapshot group
- The identifier of the snapshot image

For example, if you want to stop a rollback operation for snapshot image 12345 in a snapshot group that has the name snapGroup1, you would use this command:

```
stop snapImage ["snapGroup1:12345"] rollback;
```

To stop a rollback operation for the most recent snapshot image in a snapshot group that has the name snapGroup1, you would use this command:

```
stop snapImage ["snapGroup1:newest"] rollback;
```

Snapshot volume commands

Create read-only snapshot volume

The `create snapVolume` command creates a read-only snapshot volume for the snapshot images of a base volume. To change a read-only snapshot volume to a read/write volume, use the `set snapVolume convertToReadWrite` command.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Note: You cannot use this command for a snapshot image that is used in online volume copy.

Syntax

```
create snapVolume userLabel="snapVolumeName"
snapImageID="snapCGID:imageID"
readOnly
```

Parameters

Parameter	Description
userLabel	The name that you want to give to a snapshot volume. Enclose the snapshot volume name in double quotation marks (" ").
snapImageID	The name of a snapshot image that you want to add to the new read-only snapshot volume. The name of a snapshot image is comprised of two parts: • The name of the snapshot group • An identifier for the snapshot image in the snapshot group The identifier for the snapshot image can be one of these: • An integer value that is the sequence number of the snapshot in the snapshot group. • NEWEST - Use this option when you want to show the latest snapshot image created in the snapshot group. • OLDEST - Use this option when you want to show the earliest snapshot image created in the snapshot group. Enclose the snapshot image name in double quotation marks (" ").
readOnly	This parameter sets the snapshot volume to read-only. This parameter is actually a Boolean; however, in the context of this command, the Boolean value is always TRUE . **Note:** With the **readOnly** parameter, snapshot volumes are not created.

Notes

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the names. Names can have a maximum of 30 characters.

The identifier of a snapshot image has two parts separated by a colon (:):

• The name of the snapshot group
• The identifier of the snapshot image

For example, if you want to create a read-only volume named engData1 using the most recent snapshot image in a snapshot group that has the name snapGroup1, you would use this command:

```
create snapVolume userLabel="engData1" snapImageID="snapGroup1:newest"
 readOnly;
```

Create snapshot volume

The `create snapVolume` command creates a snapshot volume with read-write capabilities for snapshot images of a base volume.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

You can map the snapshot volume to a host and all of the host writes reside in the repository volume associated with the snapshot volume. You can assign the new snapshot volume to an existing repository volume, or you can create a new repository volume in a volume group or disk pool.

Note: You cannot use this command for a snapshot image that is used in online volume copy.

Syntax

```
create snapVolume userLabel="snapVolumeName" snapImageID="snapCGID:imageID"
[(repositoryVolume="repos_xxxx"]
[repositoryVolume=(volumeGroupName [capacity=capacityValue]]
[repositoryVolume=(diskPoolName [capacity=capacityValue])]
[repositoryFullLimit=percentValue]
```

Parameters

Parameter	Description
userLabel	The name that you want to give to a snapshot volume. Enclose the snapshot volume name in double quotation marks (" ").
snapImageID	The alphanumeric identifier of a snapshot image that you want to add to the new snapshot volume. The identifier of a snapshot image is comprised of two parts: • The name of the snapshot group • An identifier for the snapshot image in the snapshot group The identifier for the snapshot image can be one of these: • An integer value that is the sequence number of the snapshot in the snapshot group. • NEWEST - Use this option when you want to show the latest snapshot image created in the snapshot group. • OLDEST - Use this option when you want to show the earliest snapshot image created in the snapshot group. Enclose the snapshot image name in double quotation marks (" ").

Parameter	Description
repositoryVolume	The name of the repository volume that holds changed data from the snapshot image. You have two options for defining the name of a repository volume: • Use an existing repository volume name • Create a new repository volume when you run this command The name of an existing repository volume is comprised of two parts: • The term "repos" • A four digit numerical identifier that the storage management software assigns to the repository volume name Enclose the name of the existing repository volume in double quotation marks (" "). If you want to create a new repository volume when you run this command you must enter the name of either a volume group or a disk pool in which you want the repository volume. Optionally, you can also define the capacity of the repository volume. If you want to define the capacity you can use these values: • An integer value that represents a percentage of the base volume capacity • A decimal fraction value that represents a percentage of the base volume capacity • A specific size for the repository volume. Size is defined in units of bytes , KB , MB , GB , or TB . If you do not use the capacity option, the storage management software sets the capacity to 20 percent of the base volume capacity. When you run this command the storage management software creates the repository volume for the snapshot volume.
repositoryFullLimit	The percentage of repository capacity at which you receive a warning that the snapshot repository volume is nearing full. Use integer values. For example, a value of 70 means 70 percent. The default value is 75.

Notes

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the names. Names can have a maximum of 30 characters.

The identifier of a snapshot image has two parts separated by a colon (:):

• The name of the snapshot group
• The identifier of the snapshot image

For example, if you want to create a snapshot volume named snapData1 using the most recent snapshot image in a snapshot group that has the name snapGroup1 with a maximum fill limit of 80 percent for the repository volume, you would use this command:

```
create snapVolume userLabel="snapData1" snapImageID="snapGroup1:newest"

repositoryVolume="repos_1234" repositoryFullLimit=80;
```

The repository volume identifier is automatically created by the storage management software and the firmware when you create a new snapshot group. You cannot rename the repository volume because renaming the repository volume breaks the linkage with the snapshot images.

Delete snapshot volume

The `delete snapVolume` command deletes a snapshot volume and optionally the associated snapshot repository members.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Note: You cannot use this command for snapshot images involved in online volume copy.

Syntax

```
delete snapVolume ["snapVolumeName"]
[deleteRepositoryMembers=(TRUE | FALSE)]
```

Parameters

Parameter	Description
snapVolume	The name of the snapshot volume that you want to delete. Enclose the snapshot volume name in double quotation marks (" ") inside square brackets ([ ]).
deleteRepositoryMembers	The parameter to save or delete the repository members. To save the repository members, set this parameter to FALSE . To delete the repository members, set this parameter to TRUE . The default value is TRUE . If you do not use this parameter, the repository members are automatically deleted.

Rename snapshot volume

The `set snapVolume` command renames an existing snapshot volume.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set snapVolume ["snapVolumeName"] userLabel="snapImageVolumeName"
```

Parameters

Parameter	Description
snapVolume	The name of the snapshot volume that you want to rename. Enclose the snapshot volume name in double quotation marks (" ") inside of square brackets ([ ]).
userLabel	A new name that you want to give to the snapshot volume. Enclose the new snapshot volume name in double quotation marks (" ").

Notes

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the names. Names can have a maximum of 30 characters.

Resume snapshot volume

The `resume snapVolume` command resumes a snapshot volume operation that was stopped.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

`resume snapVolume ["snapVolumeName"] snapImage="snapCGID:imageID"`

Parameters

Parameter	Description
snapVolume	The name of the snapshot volume for which you want to resume operations. Enclose the snapshot volume name in double quotation marks (" ") inside square brackets ([ ]).
snapImage	The name of the snapshot image for which you want to resume snapshot volume operations. The name of a snapshot image is comprised of two parts: • The name of the snapshot group • An identifier for the snapshot image in the snapshot group The identifier for the snapshot image can be one of these: • An integer value that is the sequence number of the snapshot in the snapshot group. • NEWEST - Use this option when you want to show the latest snapshot image created in the snapshot group. • OLDEST - Use this option when you want to show the earliest snapshot image created in the snapshot group. Enclose the snapshot image name in double quotation marks (" ").

Notes

The name of a snapshot image has two parts separated by a colon (:):

• The identifier of the snapshot group
• The identifier of the snapshot image

For example, if you want to resume snapshot volume operations for snapshot image 12345 in a snapshot group that has the name snapGroup1, you would use this command:

```
resume snapVolume ["snapVol1"] snapImage="snapGroup1:12345";
```

To resume snapshot volume operations for the most recent snapshot image in a snapshot group that has the name snapGroup1, you would use this command:

```
resume snapVolume ["snapVol1"] snapImage="snapGroup1:newest";
```

Revive snapshot volume

The `revive snapVolume` command forces a specified snapshot volume to the Optimal state.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Context

The snapshot volume can be one of the following:

- A standalone snapshot volume
- A snapshot volume that is a member of a consistency group

If the snapshot volume is not in a Failed state, the firmware displays an error message and does not run this command.

Note: You cannot use this command for a snapshot volume that is used in online volume copy.

Syntax

```
revive snapVolume [snapVolumeName]
```

Parameter

Parameter	Description
snapVolume	The name of the snapshot volume that you want to set to the Optimal state. Enclose the snapshot volume name in square brackets ([ ]). If the snapshot volume name has special characters or consists only of numbers, you must enclose the snapshot volume name in double quotation marks (" ") inside square brackets.

Notes

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the names. Names can have a maximum of 30 characters.

Set read-only snapshot volume to read/write volume

The `set snapVolume convertToReadWrite` command changes a snapshot volume that is a read-only volume to a snapshot volume that is read/write volume.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

You also can use this command to identify a new repository volume for the read/write volume, or to set a full limit warning level for the repository volume.

Syntax

```
set snapVolume ["snapImageVolumeName"] convertToReadWrite
[(repositoryVolume="repos_xxxx" |
repositoryVolume=(volumeGroupName [capacity=capacityValue])
repositoryVolume=(diskPoolName [capacity=capacityValue]))]
[repositoryFullLimit=percentValue]
```

Parameters

Parameter	Description
snapVolume	The name of the snapshot volume that you want to change from read-only to read/write. Enclose the snapshot volume identifier in double quotation marks (" ") inside of square brackets ([ ]).
repositoryVolume	The name of the repository volume that you want to use for the read/write volume. You have two options for defining the name of a repository volume: • Use an existing repository volume: name • Create a new repository volume when you run this command The name of an existing repository volume is comprised of two parts: • The term "repos" • A four-digit numerical identifier that the storage management software assigns to the repository volume name Enclose the name of the existing repository volume in double quotation marks (" "). If you want to create a new repository volume when you run this command you must enter the name of either a volume group or a disk pool in which you want the repository volume. Optionally, you can also define the capacity of the repository volume. If you want to define the capacity you can use these values: • An integer value that represents a percentage of the base volume capacity • A decimal fraction value that represents a percentage of the base volume capacity • A specific size for the repository volume. Size is defined in units of bytes , KB , MB , GB , or TB . If you do not use the capacity option, the storage management software sets the capacity to 20 percent of the base volume capacity. When you run this command the storage management software creates the repository volume for the snapshot volume.
repositoryFullLimit	The percentage of repository volume capacity at which you receive a warning that the snapshot image repository volume is nearing full. Use integer values. For example, a value of 70 means 70 percent. The default value is 75.

Notes

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the user label. User labels can have a maximum of 30 characters.

The repository volume name is automatically created by the storage management software and the firmware when you create a new snapshot group. You cannot rename the repository volume because renaming the repository volume will break the linkage with the snapshot images.

A snapshot group repository volume is an expandable volume that is structured as a concatenated collection of up to 16 standard volume entities. Initially, an expandable repository volume has only a single element. The capacity of the expandable repository volume is exactly that of the single element. You can increase the capacity of an expandable repository volume by attaching additional standard volumes to it. The composite expandable repository volume capacity then becomes the sum of the capacities of all of the concatenated standard volumes.

A snapshot group repository volume must satisfy a minimum capacity requirement that is the sum of the following:

- 32 MB to support fixed overhead for the snapshot group and for copy-on-write processing.
- Capacity for rollback processing, which is 1/5000th of the capacity of the base volume.

The minimum capacity is enforcement by the controller firmware and the storage management software.

Set snapshot volume media scan

The `set snapVolume mediaScanEnabled` command runs a media scan on the drives used for a snapshot volume.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Optionally, you also can perform a redundancy check on the data.

Syntax

```
set snapVolume ["snapVolumeName"]
mediaScanEnabled=(TRUE | FALSE)
[redundancyCheckEnabled=(TRUE | FALSE)]
```

Parameters

Parameter	Description
snapVolume	The name of the snapshot volume for which you are setting properties. Enclose the snapshot volume identifier in double quotation marks (" ") inside of square brackets ([ ]).
mediaScanEnabled	The setting to turn on or turn off media scan for the snapshot volume. To turn on media scan, set this parameter to TRUE . To turn off media scan, set this parameter to FALSE . (If media scan is disabled at the storage array level, this parameter has no effect.)
redundancyCheckEnabled	The setting to turn on or turn off redundancy checking during a media scan. To turn on redundancy checking, set this parameter to TRUE . To turn off redundancy checking, set this parameter to FALSE .

Notes

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the names. Names can have a maximum of 30 characters.

Set snapshot volume repository volume capacity

The `set snapVolume increase/decreaseRepositoryCapacity` command increases or decreases the capacity of a snapshot volume repository volume.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax for increasing capacity

```
set snapVolume["snapVolumeName"] increaseRepositoryCapacity
(repositoryVolumes="repos_xxxx" |
repositoryVolumes=(volumeGroupName [capacity=capacityValue] |
repositoryVolumes=(diskPoolName [capacity=capacityValue])
```

Syntax for decreasing capacity

```
set snapVolume ["snapVolumeName"] decreaseRepositoryCapacity
count=numberOfVolumes
```

Parameters

Parameter	Description
snapVolume	The name of the snapshot volume for which you are setting properties. Enclose the snapshot volume identifier in double quotation marks (" ") inside of square brackets ([ ]).
repositoryVolume	The name of the repository volume for which you want to increase capacity. An available standard volume is added to the repository volume to increase the capacity of the repository volume. You have two options for defining the name of a repository volume: • Use an existing repository volume: name • Create a new repository volume when you run this command The name of an existing repository volume is comprised of two parts: • The term "repos" • A four digit numerical identifier that you assign to the repository volume name Enclose the name of the existing repository volume in double quotation marks (" "). If you want to create a new repository volume when you run this command you must enter the name of either a volume group or a disk pool in which you want the repository volume. Optionally, you can also define the capacity of the repository volume. If you want to define the capacity you can use these values: • An integer value that represents a percentage of the base volume capacity • A decimal fraction value that represents a percentage of the base volume capacity • A specific size for the repository volume. Size is defined in units of bytes , KB , MB , GB , or TB . If you do not use the capacity option, the storage management software sets the capacity to 20 percent of the base volume capacity. Enclose the name of the new repository volume in parentheses.
count	The number of volumes that you want to remove. Use integer values.

Notes

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the names. Names can have a maximum of 30 characters.

A snapshot repository volume is an expandable volume that is structured as a concatenated collection of up to 16 standard volume entities. Initially, an expandable repository volume has only a single element. The capacity of the expandable repository volume is exactly that of the single element. You can increase the capacity of an expandable repository volume by attaching additional standard volumes to it. The composite expandable repository volume capacity then becomes the sum of the capacities of all of the concatenated standard volumes.

A snapshot group repository volume must satisfy a minimum capacity requirement that is the sum of the following:

* 32 MB to support fixed overhead for the snapshot group and for copy-on-write processing.
* Capacity for rollback processing, which is 1/5000th of the capacity of the base volume.

The minimum capacity is enforcement by the controller firmware and the storage management software.

Set SSD cache for a volume

The `set volume ssdCacheEnabled` command turns on or off caching using the SSD cache feature for a specific volume.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, or DE6000H storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

The volume can be one of these:

* Standard volume, identified by either a name or a WWID
* Snapshot volume
* Consistency group snapshot volume

Syntax applicable to a standard volume

```
set volume ([volumeName] | <"WWID">) ssdCacheEnabled=(TRUE | FALSE)
```

Syntax applicable to a snapshot volume

```
set snapVolume ["snapVolumeName"] ssdCacheEnabled=(TRUE | FALSE)
```

Syntax applicable to a standard volume

```
set volume ([volumeName] | <"WWID">) ssdCacheEnabled=(TRUE | FALSE)
```

Parameters

Parameter	Description
volume	The name of the standard volume for which you want to turn on or turn off the SSD cache. Enclose the name of the volume in square brackets ([ ]). If the name of the volume has special characters or numbers, you must enclose the name of the volume in double quotation marks (" ") inside of square brackets ([ ]).
volume	The World Wide Identifier (WWID) of the standard volume for which you want to turn on or turn off the SSD cache. Enclose the WWID in double quotation marks (" ") inside angle brackets (< >).
snapVolume	The name of the snapshot volume for which you want to turn on or turn off the SSD cache. Enclose the name of snapshot volume in double quotation marks (" ") inside of square brackets ([ ]).
cgSnapVolume	The name of the consistency group snapshot volume for which you want to turn on or turn off the SSD cache. Enclose the name of the consistency group snapshot volume in double quotation marks (" ") inside of square brackets ([ ]).
ssdCacheEnabled	To turn on SSD cache, set this parameter to TRUE . To turn off SSD cache, set this parameter to FALSE .

Notes

You can turn the SSD cache on or off for only one volume at a time.

When you turn off SSD cache for a volume, the SSD cache for that volume is purged.

Show snapshot volumes

The `show snapVolume` command returns information about one or more snapshot volumes.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
show (allSnapVolumes | snapVolume ["snapVolumeName"] |
snapVolumes ["snapVolumeName1" ... "snapVolumeNamen"])
[summary]
```

Parameters

Parameter	Description
allSnapVolumes	The parameter to return information about all of the snapshot volumes in the storage array.
snapVolume	The name of a snapshot volume about which you want to retrieve information. Enclose the snapshot volume name in double quotation marks (" ") inside of square brackets ([ ]).

Parameter	Description
snapVolumes	The names of several snapshot volumes for which you want to retrieve information. Enter the names of the snapshot volumes using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.
summary	The parameter to return a concise list of information about the snapshot volumes.

Notes

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the names. Names can have a maximum of 30 characters.

This command returns snapshot volume information as shown in this example:

```
SNAPSHOT VOLUME (SNAPSHOT-IMAGE BASED) SUMMARY


SUMMARY

 Total Snapshot Volumes: 1
   Most Recent Snapshot Volume: Day month date hh:mm:ss yyyy
   Status: 1 Optimal, 0 Non Optimal

   Name         Type        Status      Capacity      Associated Base Volume
   2_SV_0001    Standard    Optimal     3.000 GB      2


   Snapshot Volume Timestamp    Snapshot Image Timestamp     Mode
   1/23/12 6:44:31 PM IST       1/23/12 6:27:36 PM IST       Read Write


   Total Repository Capacity    Available Repository Capacity
   1.199 GB                     0.125 MB (0%)
```

The size of your monitor determines how the information wraps and will affect how the information appears.

Stop snapshot volume

The `stop snapVolume` command stops a snapshot volume operation.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

stop snapVolume ["*snapVolumeName*"]

Parameters

Parameter	Description
snapVolume	The name of the snapshot volume that you want to stop. Enclose the snapshot volume name in double quotation marks (" ") inside square brackets ([ ]).

Notes

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the names. Names can have a maximum of 30 characters.

Volume copy commands

Create volume copy

The `create volumeCopy` command creates a volume copy and starts the volume copy operation. This command is valid for snapshot image volume copy pairs.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Attention: Starting a volume copy operation overwrites all existing data on the target volume, makes the target volume read-only to hosts, and fails all snapshot image volumes associated with the target volume, if any exist. If you have used the target volume as a copy before, be sure you no longer need the data or have it backed up.

This command creates volume copies in two ways:

- Volume copy without snapshot image, also called *offline* volume copy
- Volume copy with snapshot image, also called *online* volume copy

If you use volume copy without snapshot image, you cannot write to the source volume until the copy operation is complete. If you want to be able to write to the source volume before the copy operation is complete, use volume copy with snapshot image. You can select volume copy with snapshot image through the optional parameters in the command syntax.

After completion of the volume copy with snapshot image operation, the snapshot image is deleted and the snapshot volume is disabled.

Note: You can have a maximum of eight volume copies in progress at one time. If you try to create more than eight volume copies at one time, the controllers return a status of Pending until one of the volume copies that is in progress finishes and returns a status of Complete.

Syntax

```
create volumeCopy source="sourceName"
target="targetName"
[copyPriority=(highest | high | medium | low | lowest)]
[targetReadOnlyEnabled=(TRUE | FALSE)]
[copyType=(offline | online)]
[repositoryPercentOfBase=(20 | 40 | 60 | 120 | default)]
```

```
[repositoryGroupPreference=(sameAsSource | otherThanSource | default)]
```

Parameters

Parameter	Description
source	The name of an existing volume that you want to use as the source volume. Enclose the source volume name in double quotation marks (" ").
target	The name of an existing volume that you want to use as the target volume. Enclose the target volume name in double quotation marks (" ").
copyPriority	The priority that volume copy has relative to host I/O activity. Valid values are highest , high , medium , low , or lowest .
targetReadOnlyEnabled	The setting so that you can write to the target volume or only read from the target volume. To write to the target volume, set this parameter to FALSE . To prevent writing to the target volume, set this parameter to TRUE .
copyType	Use this parameter to create a volume copy with a snapshot image. Creating a volume copy with a snapshot image enables you to continue to write to the source volume while creating the volume copy. To create a volume copy with a snapshot image, set this parameter to online . To create a volume copy without a snapshot image, set this parameter to offline . If you do not use this parameter, the volume copy is created without a snapshot image.
repositoryPercentOfBase	This parameter determines the size of the repository volume for the snapshot image when you are creating a volume copy with a snapshot image. The size of the repository volume is expressed as a percentage of the source volume, which is also called the base volume. Valid values for this parameter are 20 , 40 , 60 , 120 , and default . The default value is 20. If you do not use this parameter, the firmware uses a value of 20 percent. You must use the **copyType** parameter with the **repositoryPercentOfBase** parameter.
repositoryGroupPreference	This parameter determines to which volume group the snapshot image repository volume is written. You have these choices: • sameAsSource – The snapshot image volume is written to the same volume group as the source volume if space is available. • default – The snapshot image repository volume is written to any volume group that has space. For best performance, use the sameAsSource option. You must use the **copyType** parameter with the **repositoryGroupPreference** parameter.

Notes

You can use any combination of alphanumeric characters, happens, and underscores for the names. Names can have a maximum of 30 characters.

Copy priority defines the amount of system resources that are used to copy the data between the source volume and the target volume of a volume copy pair. If you select the highest priority level, the volume copy

uses the most system resources to perform volume copy, which decreases performance for host data transfers.

Recopy volume copy

The `recopy volumeCopy target` command reinitiates a volume copy operation using an existing volume copy pair.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

This command is valid for snapshot image volume copy pairs.

This command works with volume copy pairs that you created with a snapshot image volume.

Attention: Starting a volume copy operation overwrites all existing data on the target volume, makes the target volume read-only to hosts, and fails all snapshot image volumes associated with the target volume, if any exist. If you have used the target volume as a copy before, be sure you no longer need the data or have it backed up.

Syntax

```
recopy volumeCopy target [targetName]
[source [sourceName]]
[copyPriority=(highest | high | medium | low | lowest)]
[targetReadOnlyEnabled=(TRUE | FALSE)]
```

Parameters

Parameter	Description
target	The name of the target volume for which you want to reinitiate a volume copy operation. Enclose the target volume name in square brackets ([ ]). If the target volume name has special characters, you must enclose the target volume name in double quotation marks (" ") inside square brackets.
source	The name of the source volume for which you want to reinitiate a volume copy operation. Enclose the source volume name in square brackets ([ ]). If the source volume name has special characters, you must enclose the source volume name in double quotation marks (" ") inside square brackets.
copyPriority	The priority that the volume copy has relative to host I/O activity. Valid values are highest , high , medium , low , or lowest .
targetReadOnlyEnabled	The setting so that you can write to the target volume or only read from the target volume. To write to the target volume, set this parameter to FALSE . To prevent writing to the target volume, set this parameter to TRUE .

Notes

Copy priority defines the amount of system resources that are used to copy the data between the source volume and the target volume of a volume copy pair. If you select the highest priority level, the volume copy uses the most system resources to perform the volume copy, which decreases performance for host data transfers.

Remove volume copy

The `remove volumeCopy target` command removes a volume copy pair.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

This command is valid for snapshot volume copy pairs.

Syntax

`remove volumeCopy target [`*targetName*`] [source [`*sourceName*`]]`

Parameters

Parameter	Description
target	The name of the target volume that you want to remove. Enclose the target volume name in square brackets ([ ]). If the target volume name has special characters or consists only of numbers, you must enclose the target volume name in double quotation marks (" ") inside square brackets.
source	The name of the source volume that you want to remove. Enclose the source volume name in square brackets ([ ]). If the source volume name has special characters or consists only of numbers, you must enclose the source volume name in double quotation marks (" ") inside square brackets.

Set volume copy

The `set volumeCopy target` command defines the properties for a volume copy pair.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

This command is valid for snapshot volume copy pairs.

Syntax

```
set volumeCopy target [targetName]
source [sourceName]
[copyPriority=(highest | high | medium | low | lowest)]
[targetReadOnlyEnabled=(TRUE | FALSE)]
[copyType=(online | offline)]
```

Parameters

Parameter	Description
target	The name of the volume to which the data will be copied. Enclose the target volume name in square brackets ([ ]). If the target volume name has special characters or numbers, you must enclose the target volume name in double quotation marks (" ") inside square brackets.
source	The name of the volume from which the data will be copied. Enclose the source volume name in square brackets ([ ]). If the source volume name has special characters or numbers, you must enclose the source volume name in double quotation marks (" ") inside square brackets.
copyPriority	The priority that the volume copy has relative to host I/O activity. Valid values are highest , high , medium , low , or lowest .
targetReadOnlyEnabled	The setting so that you can write to the target volume or only read from the target volume. To write to the target volume, set this parameter to FALSE . To prevent writing to the target volume, set this parameter to TRUE .

Notes

When you use this command, you can specify one or more of the optional parameters.

Show volume copy

The show volumeCopy command returns information about volume copy operations.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Context

This command returns this information about volume copy operations:

- The copy status
- The start time stamp
- The completion time stamp
- The copy priority
- The source volume World Wide Identifier (WWID) or the target volume WWID
- The target volume Read-Only attribute setting

You can retrieve information about a specific volume copy pair or all of the volume copy pairs in the storage array. This command is valid for snapshot volume copy pairs.

Syntax

```
show volumeCopy (allVolumes | source ["sourceName"] |
target ["targetName"])
```

Parameters

Parameter	Description
allVolumes	The setting to return information about volume copy operations for all of the volume copy pairs.
source	The name of the source volume about which you want to retrieve information. Enclose the source volume name in double quotation marks (" ") inside of square brackets ([ ]).
target	The name of the target volume about which you want to retrieve information. Enclose the target volume name in double quotation marks (" ") inside of square brackets ([ ]).

Show volume copy source candidates

The `show volumeCopy sourceCandidates` command returns information about the candidate volumes that you can use as the source for a volume copy operation. This command is valid for snapshot volume copy pairs.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Syntax

```
show volumeCopy sourceCandidates
```

Parameters

None.

Notes

This command returns volume copy source information as shown in this example.

```
Volume Name: finance
    Capacity: 4.0 GB
    Volume Group: 1
Volume Name: engineering
    Capacity: 4.0 GB
    Volume Group: 2
```

Show volume copy target candidates

The `show volumeCopy source targetCandidates` command returns information about the candidate volumes that you can use as the target for a volume copy operation. This command is valid for snapshot volume copy pairs.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Syntax

```
show volumeCopy source ["sourceName"] targetCandidates
```

Parameter

Parameter	Description
source	The name of the source volume for which you are trying to find a candidate target volume. Enclose the volume name in square brackets ([ ]). If the volume name has special characters or numbers, you must enclose the volume name in double quotation marks (" ") inside square brackets.

Stop volume copy

The `stop volumeCopy target source` command stops a volume copy operation. This command is valid for snapshot volume copy pairs.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

`stop volumeCopy target [targetName] source [sourceName]`

Parameters

Parameter	Description
target	The name of the target volume for which you want to stop a volume copy operation. Enclose the target volume name in square brackets ([ ]). If the target volume name has special characters or numbers, you must enclose the target volume name in double quotation marks (" ") inside square brackets.
source	The name of the source volume for which you want to stop a volume copy operation. Enclose the source volume name in square brackets ([ ]). If the source volume name has special characters or numbers, you must enclose the source volume name in double quotation marks (" ") inside square brackets.

Chapter 15. Security commands

Audit log management commands

Delete audit log records

The `delete auditLog` command deletes some or all of the records in the audit log.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
delete auditLog (all | (endRecord=timestamp | endDate=date) |
 (retentionCount=integer))
```

Parameters

Parameter	Description
all	Allows you to delete all audit log records.
endRecord	Allows you to specify the ending record to delete, starting from the oldest record. The value is the integral value that represents the time stamp of the last audit log record, inclusive.
endDate	Allows you to specify the ending date to delete, starting from the oldest record. The format for entering the date is MM:DD:YY in the client time zone. **Note:** The audit log records, including the date specified, will be deleted.
retentionCount	Allows you to specify the number of the newest audit log records to be retained.

Examples

```
SMcli -n Array1 -c "delete auditLog all;"

SMcli -n Array1 -c "delete auditLog endRecord=1493070393313;"

SMcli -n Array1 -c "delete auditLog endDate=04:30:17;"

SMcli -n Array1 -c "delete auditLog retentionCount=1000;"

SMcli completed successfully.
```

Save audit log records

The `save auditLog` command retrieves the audit log records.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
save auditLog (all | (beginDate=date | endDate=date)
|(beginRecord=timestamp | endRecord=timestamp)) file="filename"
```

Parameters

Parameter	Description
all	Allows you to retrieve all audit log records.
beginDate	Allows you to specify the beginning date to retrieve. The format for entering the date is MM:DD:YY in the client time zone. The first audit log record retrieved will be the first record that was posted on or after the specified date. **Note:** The midnight-to-midnight range is based on the client's time zone.
endDate	Allows you to specify the ending date to retrieve. If not specified, then the last record in the log will be retrieved. The format for entering the date is MM:DD:YY in the client time zone. The last audit log record retrieved will be the last record that was posted on or before the specified date. **Note:** The midnight-to-midnight range is based on the client's time zone.
beginRecord	Allows you to specify the beginning record to retrieve. The value is the integral value that represents the time stamp of the first audit log record, inclusive. If not specified, the first record in the log will be retrieved.
endRecord	Allows you to specify the ending record to retrieve. The value is the integral value that represents the time stamp of the last audit log record, inclusive. If not specified, then the last record in the log will be retrieved.
file	Allows you to specify the audit log's output filename. **Note:** The audit log records are saved in the file in descending order, from newest to oldest.

Examples

```
SMcli -n Array1 -c "save auditLog all file="myAuditLog.txt";"

SMcli -n Array1 -c "save auditLog endRecord=1493070393313 file="myAuditLog.txt";"

SMcli -n Array1 -c "save auditLog beginDate=12:12:16 endDate=04:01:17 file="myAuditLog.txt";"


SMcli completed successfully.
```

Set audit log settings

The `set auditLog` command configures the audit log settings.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
set auditLog (logLevel={all | writeOnly} |
    fullPolicy={overwrite | preventSystemAccess} |
    maxRecords=n | warningThreshold=n)
```

Parameters

Parameter	Description
logLevel	Allows you to specify the level of logging. Valid choices are: **all** and **writeOnly** . The default value is **writeOnly** .
fullPolicy	Allows you to specify the policy when the log is full. Valid choices are: **overwrite** and **preventSystemAccess** .
maxRecords	Allows the user to specify the maximum number of records to be stored where *n* is an integer starting at 30000 and ending at 50000.
warningThreshold	Allows you to specify the percentage at which a warning alert will be sent to indicate that the audit log is nearing full when full policy is set to **preventSystemAccess** . Use integer values between 0 to 100. Setting this parameter to 0 (zero) disables the warning alerts.

Examples

```
SMcli -n Array1 -c "set auditLog logLevel=writeOnly fullPolicy=preventSystemAccess maxRecords=40000 warningThreshold=90;"

SMcli completed successfully.
```

Show audit log configuration

The `show auditLog configuration` command shows the audit log configuration settings for the storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
show auditLog configuration
```

Parameters

None.

Examples

```
SMcli -n Array1 -c "show auditLog configuration;"

Logging level: All
Full policy: Overwrite
Maximum records: 30,000 count
Warning threshold: 90 percent
```

```
SMcli completed successfully.
```

Show audit log summary

The `show auditLog summary` command displays the audit log summary information.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
show auditLog summary
```

Parameters

None.

Examples

```
SMcli -n Array1 -c "show auditLog summary;"

Total log records: 1,532
First log record: 1493070393313 (2017-04-24T16:46:33.313-0500)
Last log record: 1493134565128 (2017-04-25T10:36:05.128-0500)

SMcli completed successfully.
```

Authentication commands

Getting started with authentication

Authentication requires that users access the system with assigned login credentials. Each user login is associated with a user profile that includes specific roles and access permissions.

Administrators can implement system authentication as follows:

- Using RBAC (role-based access control) capabilities enforced in the storage array, which include pre-defined users and roles.
- Connecting to an LDAP (Lightweight Directory Access Protocol) server and directory service, such as Microsoft's Active Directory, and then mapping the LDAP users to the storage array's embedded roles.
- Connecting with an Identity Provider (IdP) using the Security Assertion Markup Language (SAML) 2.0, and then mapping users to the storage array's embedded roles.

    Note: SAML is an embedded feature in the storage array (firmware level 8.42 and above), and is only configurable from the ThinkSystem System Manager user interface.

Create storage array directory server

The `create storageArray directoryServer` command allows you to add a new directory server to be used for authenticating and authorizing users.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
create storageArray directoryServer
      [domainId="domainId"]
      domainNames=("domainName1"..."domainNameN")
      serverUrl="serverUrl"
      [bindAccount="username" bindPassword="password"]
      searchBaseDN="distinguishedName"
      usernameAttribute="attributeName"
      groupAttributes=("attrName1"..."attrNameN")
       [skipConfigurationTest={true | false}]
```

Parameters

Parameter	Description
domainId	Allows you to specify a unique ID for this domain. If not specified, a unique GUID will be generated.
domainNames	Allows you to specify one or more valid domain names for the directory server. If you enter more than one name, separate the values with a space.
serverUrl	Allows you to specify the URL to access the LDAP server in the form of ldap[s]:// hostAddress:port. If the LDAPS protocol is used, ensure that the root/intermediate certificate(s) to validate the directory server's signed certificate is imported using the certificate commands.
bindAccount	Allows you to specify the username or bind ID to be used as the binding account.
bindPassword	Allows you to specify the password to be used as the binding password.
searchBaseDN	Allows you to specify the search base Distinguished Name to search for LDAP user objects for determining group membership.
usernameAttribute	Allows you to specify the attribute to be used to search for user objects for determining group membership. If specified, the string must contain the variable {uid} that will be replaced with the username used during login. Example: `sAMAccountName={uid}`
groupAttributes	Allows you to set one or more group attributes to be used to look for group Distinguished Names. Distinguished names are used to determine group membership for role mapping. **Note:** If you enter more than one group, separate the values with a space. **Note:** Using this parameter will clear out existing groups.
skipConfigurationTest	Allows you to skip the configuration test before the configuration is saved. The default is **false** .

Examples

```
SMcli -n Array1 -c "create storageArray directoryServer
domainNames=("company.com") serverUrl="ldap://hqldap.company.com:389"
bindAccount="dummyBindDN" bindPassword="dummyPassword"
searchBaseDN="OU=_Users,DC=hq, DC=company,DC=com"
usernameAttributes="sAMAccountName={uid}" groupAttributes="memberOf";"
```

```
SMcli completed successfully.
```

Delete storage array directory server

The `delete storageArray directoryServers` command allows you to delete one or more directory servers.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
delete storageArray (allDirectoryServers |
 directoryServers ["domainId1" ... "domainIdN"])
```

Parameters

Parameter	Description
allDirectoryServers	Allows you to delete all directory servers.
directoryServers	Allows you to specify one or more directory servers to delete, each identified with the domain ID. **Note:** Enclose the IDs in square brackets ([ ]). If you supplied more than one, then separate them with a space.

Examples

```
SMcli -n Array1 -c "delete storageArray directoryServers ["domain1" "domain3"];"

SMcli -n Array1 -c "delete storageArray allDirectoryServers;"

SMcli completed successfully.
```

Delete storage array login banner

The `delete storageArray loginBanner` command allows you to delete the login banner text file that was previously uploaded and saved.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
delete storageArray loginBanner
```

Parameters

None.

Display storage array user session

The `show storageArray userSession` command allows you to view the session timeout period for System Manager .

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin or Storage Monitor role.

Parameters

None.

Syntax

```
show storageArray userSession
```

Remove storage array directory server role mapping

The `remove storageArray directoryServer` command removes the defined role mappings for the specified directory server.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
remove storageArray directoryServer [domainId]
    (allGroupDNs | groupDNs=(groupDN1 ... groupDNN))
```

Parameters

Parameter	Description
directoryServer	Allows you to specify the domain, using the domain ID, for which to remove the mapping.
allGroupDNs	Allows you to remove all group Distinguished Name mappings from the domain.
groupDNs	Allows you to specify the groups' distinguished name (DN) to be removed. **Note:** If you enter more than one group, separate the values with a space.

Examples

```
SMcli -n Array1 -c "remove storageArray directoryServer ["domain1"]
                groupDNs=("CN=company-distlist,OU=Managed,
                OU=MyCompanyGroups,DC=hq,DC=mycompany,DC=com");"

SMcli -n Array1 -c "remove storageArray directoryServer ["domain1"]
                allGroupDNs;"

SMcli completed successfully.
```

Save storage array login banner

The `save storageArray loginBanner` command allows you to save a login banner to your local machine. The banner text can include an advisory notice and consent message, which is presented to users before they establish sessions.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

A user with any role can execute this command.

Syntax

```
save storageArray loginBanner file="file_name"
```

Parameters

Parameter	Description
file	The name for the login banner file.

Set storage array directory server

The `set storageArray directoryServer` command updates the directory server configuration.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
set storageArray directoryServer ["domainId"]
    (domainNames=("domainName1"..."domainNameN") |
     addDomainNames=("domainName1"..."domainNameN") |
     serverUrl="serverUrl" |
     bindAccount="username" bindPassword="password" |
     searchBaseDN="distinguishedName" |
     usernameAttribute="attributeName" |
     groupAttributes=("attrName1"..."attrNameN") |
     addGroupAttributes=("attrName1"..."attrNameN"))
    [skipConfigurationTest={true | false}]
```

Parameters

Parameter	Description
directoryServer	Allows you to specify the domain ID to update the settings.
domainNames	Allows you to set one or more valid domain names for the directory server. If you enter more than one name, separate the values with a space. Using this set option will clear out existing domain names.
addDomainNames	Allows you to add one or more valid domain names for the directory server. If you enter more than one name, separate the values with a space.
serverUrl	Allows you to specify the server URL.

Parameter	Description
bindAccount	Allows you to specify the username to be used as the binding account.
bindPassword	Allows you to specify the password to be used as the binding password.
searchBaseDN	Allows you to specify the search base distinguished name to search for LDAP user objects for determining group membership.
usernameAttribute	Allows you to specify the attribute to be used to search for user objects for determining group membership. If specified, the string must contain the variable `{uid}` that will be replaced with the username used during login. Example: `sAMAccountName={uid}`
groupAttributes	Allows you to set one or more group attributes to be used to look for group Distinguished Names. Distinguished names are used to determine group membership for role mapping. **Note:** If you enter more than one group, separate the values with a space. **Note:** Using this parameter will clear out existing groups.
addGroupAttributes	Allows you to add one or more group attributes to be used to look for group Distinguished Names. Distinguished names are used to determine group membership for the purposes of role mapping. **Note:** If you enter more than one group, separate the values with a space.
skipConfigurationTest	Allows you to skip the configuration test before the configuration is saved. The default is **false** .

Examples

```
SMcli -n Array1 -c "set storageArray directoryServer ["domain1"]
     serverUrl="ldaps://hqldap.eng.mycompany.com:636";"

SMcli -n Array1 -c "set storageArray directoryServer ["domain1"]
                  bindAccount="bindDN2" bindPassword="thePassword2"
                  searchBaseDN="OU=_Users,DC=hq,DC=mycompany,DC=com"
                  usernameAttribute="sAMAccountName" groupAttributes=("memberOf");"

SMcli completed successfully.
```

Set storage array directory server role mapping

The `set storageArray directoryServer roles` command allows you to define role mappings for a specified directory server. These role mappings are used to authenticate users that attempt to execute various SMcli commands.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Before you begin

The following roles are available to be mapped:

- **Storage admin** – Full read/write access to the storage objects (for example, volumes and disk pools), but no access to the security configuration.
- **Security admin** – Access to the security configuration in Access Management, certificate management, audit log management, and the ability to turn the legacy management interface (SYMbol) on or off.

- **Support admin** – Access to all hardware resources on the storage array, failure data, MEL events, and controller firmware upgrades. No access to storage objects or the security configuration.
- **Monitor** – Read-only access to all storage objects, but no access to the security configuration.

Syntax

```
set storageArray directoryServer ["domainId"]
    groupDN="groupDistinguishedName" roles=("role1"..."roleN")
```

Parameters

Parameter	Description
directoryServer	Allows you to specify the domain by its ID for which you want to set up role mappings.
groupDN	Allows you to specify the group's distinguished name (DN) to be added to the mapping list.
roles	Allows you to specify one or more roles for the user(s) in the defined group. If you enter more than one role, separate the values with a space. Valid choices are: • storage.monitor • storage.admin • security.admin • support.admin

Examples

```
SMcli -n Array1 -c "set storageArray directoryServer ["domain1"]
                    groupDN="CN=ng-hsg-bc-madridsecurity,OU=Managed,
                    OU=MyCompanyGroups,DC=hq,DC=mycompany,DC=com"
                    roles=("storage.monitor" "security.admin" "storage.admin");"

SMcli -n Array1 -c "set storageArray directoryServer ["domain1"]
                    groupDN="CN=ng-epg-engr-manageability,OU=Managed,
                    OU=MyCompanyGroups,DC=hq,DC=mycompany,DC=com"
                    roles=("support.admin");"

SMcli completed successfully.
```

Set storage array local user password or SYMbol password

The `set storageArray localUsername` command and the `set storageArray symbol` command allow you to set a local user name password or a SYMbol password for a particular role.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin, Support Admin, Security Admin, or Storage Monitor role.

Syntax

```
set storageArray (localUsername={ admin | storage | security | support | monitor}
| symbol [userRole={admin | monitor}])
password="string" adminPassword="string"
```

Parameters

Parameter	Description
localUsername	Allows you to specify the user to change the password. Valid choices are: **admin**, **storage**, **support**, **monitor**, and **security**.
symbol	Allows you to change the SYMbol password. Valid choices are: **admin** and **monitor**. **Note:** This is the replacement command for the deprecated `set storageArray password` command.
password	Allows you to specify the password for the role.
adminPassword	Allows you to specify the admin password, which is required to set any new password.

Examples

```
SMcli -n Array1 -c "set storageArray localUsername=storage password="newPassword" adminPassword="theAdminPassword";"
SMcli -n Array1 -c "set storageArray localUsername=admin password="newAdminPassword" adminPassword="theAdminPassword";"
SMcli -n Array1 -c "set storageArray symbol userRole=admin password="newSymbolPassword" adminPassword="theAdminPassword";"

SMcli completed successfully.
```

Set storage array login banner

The `set storageArray loginBanner` command allows you to upload a text file to be used as a login banner. The banner text can include an advisory notice and consent message, which is presented to users before they establish sessions in ThinkSystem System Manager or before they run commands.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
set storageArray loginBanner file="path_to_login_banner"
```

Context

After you load the text file, it is saved to the storage array. The banner text appears before the ThinkSystem System Manager login screen or before you run commands.

Parameters

Parameter	Description
file	The file path and the file name where the login banner text file is stored. **Important:** The login banner file cannot be empty and must be 5 KB or smaller.

Set storage array management interface

The `set storageArray managementInterface` command changes the management interface of the controller. Change the management interface type to enforce confidentiality between the storage array and its management software or to access external tools.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
set storageArray managementInterface restOnly={true | false}
```

Parameters

Parameter	Description
restOnly	When set to `true` , indicates that the RESTful interface is the only management interface allowed. This interface enforces an encrypted connection between the storage array and the management software. When set to `false` , indicates that the legacy interface between the storage array and the management software is allowed. This interface is not encrypted. Some tools that communicate directly with the legacy management interface, such as the OnCommand Insight (OCI), will not work unless the **restOnly** parameter is set to `false` . Contact technical support for more information.

Examples

```
SMcli -n Array1 -c "set storageArray managementInterface restOnly=true;"

SMcli completed successfully.
```

Set storage array password length

The `set storageArray passwordlength` command allows the admin user to set a minimum length for all new or updated passwords on the storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
set storageArray passwordLength=<INTEGER>
```

Parameters

Parameter	Description
password length	Allows you to set the minimum required length for all new or updated passwords.
INTEGER	Allows you to set the minimum required length, between 0 and 30, for all new or updated passwords.

Examples

```
SMcli <array_ip> -u <username> -p <password> -c "set storageArray passwordLength=0;"

SMcli completed successfully.
```

Set storage array user session

The `set storageArray userSession` command allows you to set a timeout in System Manager , so that users' inactive sessions are disconnected after a specified time.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

Use this command to perform one of these operations:

- Set a timeout in seconds for user sessions. The minimum timeout value is 900 seconds (15 minutes).
- Turn off session timeouts by setting the value to 0.

Parameters

None.

Syntax

```
set storageArray userSession sessionTimeout=n
```

Show storage array directory services summary

The `show storageArray directoryServices summary` command displays the directory services configuration summary.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
show storageArray directoryServices summary
```

Parameters

None.

Examples

```
SMcli -n Array1 -c "show storageArray directoryServices summary;"

Directory Servers:
  DomainId1
```

```
      Domain name(s): company.com, name2, name3
      Server URL: ldaps://hqldap.test.eng.company.com:636
      Bind account: CN=prnldap,OU=securedsvcaccounts,OU=systemaccounts,DC=hq,DC=company,DC=com
      Bind password: ******
      Login base: %s@company.com
      Search base DN: OU=_Users,DC=hq,DC=company,DC=com
      Username attribute: sAMAccountName
      Group attribute(s): memberOf, attributeX
      Default role: Monitor
      Roles Mapping
        Group DN
        CN=ng-hsg-bc-madridsecurity,OU=Managed,OU=CompanyGroups,DC=hq,DC=company,DC=com
          Roles
          storage.monitor, security.admin, storage.admin
        Group DN
        OU=Managed,OU=CompanyGroups,DC=hq,DC=company,DC=com
          Roles
          storage.monitor
  DomainId2
    Domain name(s): aj.MadridSecurity
    Server URL: ldap://10.113.90.166:389
    Search base DN: CN=Users,DC=aj,DC=madridsecurity
    Username attribute: sAMAccountName
    Group attribute(s): memberOf
    Default role: None
    Roles Mapping
      Group DN
      CN=Administrators,CN=Builtin,DC=aj,DC=MadridSecurity
        Roles
        storage.monitor, storage.admin

SMcli completed successfully.
```

Test storage array directory server

The `start storageArray directoryServices test` command checks communication with all configured directory servers and validates the server domain configurations.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

This command returns an error if at least one directory server has not already been added to the domain.

Syntax

```
start storageArray directoryServices test
```

Parameters

None.

Examples

```
SMcli -n Array1 -c "start storageArray directoryServices test;"
```

<test results for each domain configured are returned>

```
SMcli completed successfully.
```

Certificate management commands for the controller in the management domain

A certificate authority (CA) is a trusted entity that issues electronic documents, called digital certificates, for Internet security. These certificates identify website owners, which allows for secure connections between clients and servers

Generate web server Certificate Signing Request (CSR)

The `save controller arrayManagementCSR` command generates a Certificate Signing Request (CSR) for the controller.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

The CSR must be signed by a Certificate Authority (CA). The resulting signed certificate is installed on the controller's web server so that browsers can automatically trust the controller's web server when trying to manage the array. Perform this action for each controller.

Syntax

```
save controller [(a|b)] arrayManagementCSR
      commonName="ipOrDnsName"
      [alternateIPAddresses=(ipvX1...ipvXN)]
      [alternateDnsNames=("dnsName1"..."dnsNameN")]
      organization="organizationName"
      [organizationalUnit="organizationalUnitName"]
      locality="cityOrLocality"
      [stateProvince="stateOrRegion"]
      country="string"
      file="filename"
```

Parameters

Parameter	Description
controller	Allows you to specify the controller on which you want to create the CSR for. Valid controller identifiers are a or b, where a is the controller in slot A, and b is the controller in slot B. Enclose the controller identifier in square brackets ([ ]).
commonName	Allows you to specify the IP address or DNS name of the controller. This must match exactly what will be typed in the browser to access System Manager (do not include http:// nor https://) or there will be a name mismatch error.
alternateIPAddresses	Allows you to specify additional IP addresses or aliases for the controller. Enclose all the IP addresses in parentheses. If you enter more than one IP address, separate the them with a space.

Parameter	Description
alternateDnsNames	Allows you to specify additional DNS names for the controller. Enclose all the DNS names in parentheses. If you enter more than one name, separate them with a space.
organization	Allows you to specify the organization's full legal name that the storage array belongs to. Do not abbreviate it and include any suffixes such as Inc, Corp, or LLC.
organizationalUnit	Allows the user to specify the organization's division that handles the certificate.
locality	Allows you to specify the city or locality where the storage array is located.
stateProvince	Allows you to specify the state or region where the storage array is located. This should not be abbreviated.
country	Allows you to specify your country's two-digit ISO (International Organization for Standardization) code, such as US.
file	Allows you to specify the file for which to save the controller's CSR file.

Examples

```
SMcli -n Array1 -c "save controller [a] arrayManagementCSR
    commonName="ictd0702s05c01-a.ict.englab.xyz.com"
    alternateIPAddresses=(10.113.174.190 10.113.174.191)
    alternateDnsNames=("ictd0702s05c01-b.ict.englab.xyz.com")
    organization="Company"
    locality="Wichita"
    stateProvince="Kansas"
    country="US"
    file="C:\storage_array_csr.csr";"

SMcli completed successfully.
```

Install server signed certificate

The `download controller arrayManagementServerCertificate` command installs the server certificate on the controller.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

Perform this action for each controller using the signed certificate that is applicable to the controller. The signed certificate must include the controller's IPs/DNS names.

Syntax

```
download controller [(a|b)] arrayManagementServerCertificate file="filename"
```

Parameters

Parameter	Description
controller	Allows the user to specify the controller on which you want to install the server signed certificate for. Valid controller identifiers are a or b, where a is the controller in slot A, and b is the controller in slot B. Enclose the controller identifier in square brackets ([ ]).
file	Allows the user to specify the file path and filename that contains the signed certificate. The acceptable extensions are .cer, .crt, .der.

Examples

```
SMcli -n Array1 -c "download controller [a] arrayManagementServerCertificate
    file="C:\serverSignedCertificateA.cer";"

SMcli -n Array1 -c "download controller [b] arrayManagementServerCertificate
    file="C:\serverSignedCertificateB.cer";"

SMcli completed successfully.
```

Install root/intermediate CA certificates

The `download controller caCertificate` command installs the root/intermediate CA certificates on the controllers' web servers to validate the web server signed certificate.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

Perform this action for each controller.

Syntax

```
download controller[(a|b)] caCertificate [alias="string"]
        file="filename"
```

Parameters

Parameter	Description
controller	Allows you to specify the controller on which you want to install the root/intermediate signed certificate. Valid controller identifiers are a or b, where a is the controller in slot A, and b is the controller in slot B. Enclose the controller identifier in square brackets ([ ]).
alias	Allows you to specify an alias to represent the root/intermediate certificate. This alias is used to look up information about the root/intermediate certificates or to delete them. An alias is associated to a root/intermediate certificate and must be unique.
file	Allows you to specify the file that contains the root/intermediate CA certificate. The acceptable extensions are .pem, .cer, .crt, and .der.

```
SMcli -n Array1 -c "download controller[a] caCertificate alias="myAlias" file="C:\rootCA1.cer";"
SMcli -n Array1 -c "download controller[b] caCertificate file="C:\rootCA1.cer";"

SMcli completed successfully.
```

Install trusted CA certificates

The `download controller trustedCertificate` command installs the trusted CA certificates on the controllers' web servers to validate the LDAP server signed certificate.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

Perform this action only if the CA who signed the certificates is not well known or commonly trusted. The command installs the CA certificate on both controllers.

Syntax

```
download storageArray trustedCertificate [alias=string] file="filename"
```

Parameters

Parameter	Description
alias	Allows you to specify an alias to represent the trusted CA certificate. This alias is used to look up information about the trusted CA certificates or to delete them. An alias is associated to a trusted certificate and must be unique.
file	Allows you to specify the file that contains the trusted CA certificate. The acceptable extensions are .pem, .cer, .crt, and .der.

Examples

```
SMcli -n Array1 -c "download storageArray trustedCertificate alias="myAlias"
    file="C:\rootCA1.cer";"
SMcli -n Array1 -c "download storageArray trustedCertificate
    file="C:\rootCA1.cer";"

SMcli completed successfully.
```

Remove installed trusted CA certificates

The `delete storageArray trustedCertificate` command removes the specified user installed CA certificates from the array's web servers.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
delete storageArray trustedCertificate [(allUserInstalled |
aliases=("alias1" … "aliasN"))]
```

Parameters

Parameter	Description
allUserInstalled	Allows you to specify the removal of all user installed certificates.
aliases	Allows you to specify one or more CA certificates to be deleted using the alias names or specify all. The aliases can be from any controllers. Enclose all the aliases in parentheses. If you enter more than one alias, separate them with a space.

Examples

```
SMcli -n Array1 -c "delete storageArray trustedCertificate allUserInstalled;"

SMcli -n Array1 -c "delete storageArray trustedCertificate
   aliases=("19527b38-8d26-44e5-8c7f-5bf2ca9db7cf" "04bf744c-413a-49f1-9666-88d74189591d");"

SMcli completed successfully.
```

Remove installed root/intermediate CA certificates

The `delete controller caCertificate` command removes the installed root/intermediate CA certificate from the specified controller.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
delete controller [(a|b)] caCertificate aliases=("alias1" … "aliasN")
```

Parameters

Parameter	Description
controller	Allows you to specify the controller on which you want to delete the signed certificate from. Valid controller identifiers are a or b, where a is the controller in slot A, and b is the controller in slot B. Enclose the controller identifier in square brackets ([ ]).
aliases	Allows you to specify one or more CA certificates to be deleted using the alias names or specify all. The aliases must be from the controller for which the certificate is being deleted. Enclose all the aliases in parentheses. If you enter more than one alias, separate them with a space.

Examples

```
SMcli -n Array1 -c "delete controller[a] caCertificate aliases=("myAlias" "anotherAlias");"

SMcli completed successfully.
```

Reset installed signed certificate

The `reset controller arrayManagementSignedCertificate` command resets the installed signed certificate and root/intermediate certificates on the controller. All root and intermediate certificates as well as any signed certificates will be replaced by a single self-signed certificate.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
reset controller [(a|b)] arrayManagementSignedCertificate
```

Parameters

Parameter	Description
controller	Allows the user to specify the controller on which you want to retrieve the root/intermediate certificates. Valid controller identifiers are a or b, where a is the controller in slot A, and b is the controller in slot B. Enclose the controller identifier in square brackets ([ ]).

Examples

```
SMcli -n Array1 -c "reset controller [a] arrayManagementSignedCertificate;"

SMcli completed successfully.
```

Retrieve installed CA certificates

The `save controller caCertificate` command retrieves the installed CA certificates from the specified controller. Included in the retrieved certificates are any requested CA certificates from the controller's web server.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
save controller[(a|b)] caCertificate [all | aliases=("alias1" ... "aliasN")]
 path="fileLocation"
```

Parameters

Parameter	Description
controller	Allows you to specify the controller on which you want to retrieve the root/ intermediate certificates. Valid controller identifiers are a or b, where a is the controller in slot A, and b is the controller in slot B. Enclose the controller identifier in square brackets ([ ]).
all	Allows you to specify the retrieval of all certificates that were imported to resolve the signed certificate chain. User-installed certificates include key management certificates.
aliases	Allows you to specify which user installed root/intermediate certificate to retrieve by alias. Enclose all the aliases in parentheses. If you enter more than one alias, separate them with a space.
path	Allows you to specify the local location to save the controllers' root/intermediate certificates.

Examples

```
SMcli -n Array1 -c "save controller[a] caCertificate all path="C:\";"

SMcli -n Array1 -c "save controller[b] caCertificate aliases=("myAlias" "anotherAlias") path="C:\";"

SMcli completed successfully.
```

Retrieve installed server certificate

The `save controller arrayManagementSignedCertificate` command retrieves the installed server certificate for the controller so you can view certificate details.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
save controller [(a|b)] arrayManagementSignedCertificate
     file="filename"
```

Parameters

Parameter	Description
controller	Allows you to specify the controller on which you want to download the signed certificate from. Valid controller identifiers are a or b, where a is the controller in slot A, and b is the controller in slot B. Enclose the controller identifier in square brackets ([ ]).
file	Allows you to specify the file for which to save the controller's signed certificate file.

Examples

```
SMcli -n Array1 -c "save controller [a] arrayManagementSignedCertificate
```

```
        file="C:\controllerAcertificate.cer";"

SMcli -n Array1 -c "save controller [b] arrayManagementSignedCertificate
        file="C:\controllerBcertificate.cer";"

SMcli completed successfully.
```

Retrieve installed trusted CA certificates

The `save storageArray trustedCertificate` command retrieves the installed trusted CA certificates for the array. Included in the retrieved files are any requested CA certificates from the array's web servers.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
save storageArray trustedCertificate [allUserInstalled |
aliases=("alias1" ... "aliasN")] path="fileLocation"
```

Parameters

Parameter	Description
allUserInstalled	Allows you to specify the retrieval of user installed certificates. The default option is **allUserInstalled** if you didn't specify any aliases.
aliases	Allows you to specify which user installed trusted certificate to retrieve by alias. Enclose all the aliases in parentheses. If you enter more than one alias, separate them with a space.
path	Allows you to specify the local location for which to save the controller's trusted certificates.

Examples

```
SMcli -n Array1 -c "save storageArray trustedCertificate allUserInstalled path="C:\";"

SMcli -n Array1 -c "save storageArray trustedCertificate aliases=("myAlias" "anotherAlias") path="C:\";"

SMcli completed successfully.
```

Set certificate revocation check settings

The `set storageArray revocationCheckSettings` command allows you to enable or disable revocation checking, and configure an Online Certificate Status Protocol (OCSP) server.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

The OCSP server checks for any certificates that the Certificate Authority (CA) has revoked before their scheduled expiration date. You might want to enable revocation checking in cases where the CA improperly issued a certificate or if a private key is compromised.

Note: Make sure a DNS server is configured on both controllers, which allows you to use a fully qualified domain name for the OCSP server.

After you enable revocation checking, the storage array denies an attempted connection to a server with a revoked certificate.

Syntax

```
set storageArray revocationCheckSettings ([revocationCheckEnable = boolean] &| [ocspResponderUrl=stringLiteral])
```

Parameters

Parameter	Description
revocationCheckEnable	Set to **true** to enable certificate revocation checking.
ocspResponderUrl	The URL of the OCSP responder server to be used for the certificate revocation check. **Note:** Specifying an OCSP responder address overrides the OCSP address found in the certificate file.

Show certificate revocation check settings

The `show storageArray revocationCheckSettings` command allows you to view the certificate revocation settings for the storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Parameters

None.

Syntax

```
show storageArray revocationCheckSettings
```

Example

```
SMcli -n Array1 c "show storageArray revocationCheckSettings;"
Revocation Checking: Disabled
OCSP Responder Server URL: https://ocspResponderURL.com
SMcli completed successfully.
```

Show installed root/intermediate CA certificates summary

The `show controller caCertificate` command displays the installed CA certificates summary from the specified controller. This command is useful to use before performing the `delete controller caCertificate` command so that you know the alias names of the certificates to delete.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
show controller [(a|b)] caCertificate [all | aliases=("alias1" ... "aliasN")] summary
```

Parameters

Parameter	Description
controller	Allows the user to specify the controller on which you want to retrieve the root/intermediate certificates. Valid controller identifiers are a or b, where a is the controller in slot A, and b is the controller in slot B. Enclose the controller identifier in square brackets ([ ]).
all	Allows the user to specify the retrieval of all root/intermediate certificates.
aliases	Allows the user to specify which root/intermediate certificate to retrieve by alias. Enclose all the aliases in parentheses. If you enter more than one alias, separate them with a space.

Examples

```
SMcli -n Array1 -c "show controller[a] caCertificate all summary;"

SMcli -n Array1 -c "show controller[b] caCertificate alias=("myAlias" "anotherAlias") summary;"
============================
Controller A Authority Certificates
============================
Alias:        19527b38-8d26-44e5-8c7f-5bf2ca9db7cf
Subject DN:   CN=My Corp Issuing CA 1
Issuer DN:    CN=My Corp Root CA
Start:        date
Expire:       date
--------------------
Alias:        myAliasName
Subject DN:   CN=My Corp Issuing CA 1
Issuer DN:    CN=My Corp Root CA
Start:        date
Expire:       date

SMcli completed successfully.
```

Show installed trusted CA certificates summary

The `show storageArray trustedCertificate summary` command displays the trusted installed CA certificates summary from the array. This command is useful to use before performing the `delete storageArray trustedCertificate` command so that you know the alias names of the certificates to delete.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
show storageArray trustedCertificate [all | allUserInstalled|
 aliases=("alias1" ... "aliasN")] summary
```

Parameters

Parameter	Description
all	Allows you to specify the retrieval of all certificates, including pre-installed and user installed certificates.
allUserInstalled	Allows you to specify the retrieval of all user installed certificates. This is the default option.
aliases	Allows the user to specify which pre-installed or user installed trusted certificate to retrieve by alias. Enclose all the aliases in parentheses. If you enter more than one alias, separate them with a space.

Examples

Sample output may be different than illustrated below.

```
SMcli -n Array1 -c "show storageArray trustedCertificate allUserInstalled summary;"
============================
Trusted Certificates
============================
Alias:        19527b38-8d26-44e5-8c7f-5bf2ca9db7cf
Type:          Pre-installed | User installed
Subject DN:   CN=Corp Issuing CA 1
Issuer DN:    CN=Corp Root CA
Start:        date
Expire:       date
--------------------
Alias:        myAliasName
Type:          Pre-installed | User installed
Subject DN:   CN=Corp Issuing CA 1
Issuer DN:    CN=Corp Root CA
Start:        date
Expire:       date

SMcli completed successfully.
```

Show signed certificate

The `show controller arrayManagementSignedCertificate summary` command displays the current signed certificate summary from the specified controller.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
show controller [(a|b)] arrayManagementSignedCertificate summary
```

Parameters

Parameter	Description
controller	Allows you to specify the controller on which you want to retrieve the root/intermediate certificates. Valid controller identifiers are a or b, where a is the controller in slot A, and b is the controller in slot B. Enclose the controller identifier in square brackets ([ ]).

Example

Sample output may be different than illustrated below.

```
SMcli -n Array1 -c "show controller[a] arrayManagementSignedCertificate all
 summary;"

===========================
Controller A Signed Certificate

===========================
Subject DN:    CN=Corp Issuing CA 1
Issuer DN:
 CN=Corp Root CA
Start:         <date>
Expire:        <date>

SMcli completed
 successfully.
```

Start OCSP server URL test

The `start storageArray ocspResponderUrl test` command checks for an open connection to the specified URL of the Online Certificate Status Protocol (OCSP) server.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Parameters

Parameter	Description
url	The literal string of the OCSP server's URL. **Note:** If you do not specify a URL, the command uses the OCSP responder URL found in the certificate revocation settings.

Syntax

```
start storageArray ocspResponderUrl test (url=stringLiteral)
```

Database commands

Clear storage array configuration

The `clear storageArray configuration` command clears an entire storage array configuration or part of a storage array configuration, or clears volume group and volume configuration only.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Use this command to perform one of these operations:

- Clear the entire storage array configuration, and return it back to the initial installation state.
- Clear the configuration except for security information and identification information.
- Clear volume group configuration information and volume configuration information only.

Attention: Possible damage to the storage array configuration – As soon as you run this command, the existing storage array configuration is deleted.

Syntax

```
clear storageArray configuration (all | volumeGroups)
clear storageArray configuration factoryReset
```

Parameters

Parameter	Description
None	If you do not enter a parameter, this command removes all configuration information for the storage array, except for information related to security and identification.
all	The setting to remove the entire configuration of the storage array, including security information and identification information. Removing all configuration information returns the storage array to its initial state.
volumeGroups	The setting to remove the volume configuration and the volume group configuration. The rest of the configuration stays intact.
factoryReset	This setting removes the entire configuration of the storage array (the same function as the **all** parameter), but also resets network configuration and any password information stored in the controller.
supportReset	**Attention:** This command is for technical support use only. This setting behaves like the **factoryReset** parameter, but also clears all bundle keys.

Notes

With this command, you can clear the configuration of the storage array in a number of different ways. When you clear the storage array for volume groups, recovery mode automatically starts. In recovery mode, onboard (cache) backups (if they exist on the platform) are retained. When the storage array is in recovery mode, you can, optionally, restore the storage array configuration from a host-based backup file or from one of the onboard (cache) backups.

This command also resets the storage array identifier. Any premium features enabled with a key file are invalidated, and new premium feature keys must be created and applied. Contact technical support.

When you run this command, the storage array becomes unresponsive, and all script processing is canceled.

Clear storage array recovery mode

The `clear storageArray recoveryMode` command forces a storage array to exit recovery mode.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

`clear storageArray recoveryMode`

Parameters

None.

Notes

Note: Recovery mode is entered during start-of-day operations when the system configuration is cleared and a valid on board backup is available. This mode is exited by either restoring the system configuration from a backup location, or by clearing the existing on board backups. While recovery mode is in force, a **needs attention** condition is raised and the Recovery Guru is available from the user interface. However, the system configuration is empty during recovery mode.

Attention: If you want to return the storage array to a previous configuration, you must restore the configuration from the backup before clearing recovery mode. You must perform validation checks or check with technical support to make sure that the restore was successful. After determining that the restore was successful, recovery mode can be cleared.

Load storage array DBM database

The `load storageArray dbmDatabase` command restores a Database Management (DBM) database image by retrieving the image from a file or from cache.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

This command restores a storage array DBM database to the exact configuration that existed when the database image was captured using the `save storageArray dbmDatabase` command. The data in a file includes data for RAID configuration, volume groups and disk pools.

Before using this command with the file option, you must first obtain a validator string (a security code) from technical support. To obtain a validator, use the `save storageArray dbmValidatorInfo` command to generate an XML file that contains validator information. Technical support uses the XML file to generate the validator string required for this command.

Syntax

```
load storageArray dbmDatabase
((file="filename" validator="validatorValue") | sourceLocation=onboard)
[controller [(a|b)]]
[contentType= all]
```

Parameters

Parameter	Description
file	The file path and the file name of the DBM database you want to upload. Enclose the file name in double quotation marks (" "). For example: `file="C:\Array Backups\DBMbackup_03302010.dbm"` This command does not automatically append a file extension to the saved file. You must specify a file extension when entering the file name.
validator	The alphanumeric security code that is required to restore a storage array to an existing configuration. You must get the validator from technical support. To get the validator, generate the required validation information XML file by running the `save storageArray dbmValidatorInfo` command. After the validation information XML file is available, contact technical support to get the validator. Enclose the validator in double quotation marks (" ").
sourceLocation	This parameter specifies the location from which to retrieve backup database information. The parameter must be included for consistency, but the only allowed value is onboard .
controller	This parameter specifies the controller from which data will be exclusively retrieved. Enclose the controller identifier in square brackets ([ ]). If the **controller** parameter is not specified, data might be retrieved from either controller. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B .
contentType	This parameter specifies the content type of the data that will be retrieved. This parameter is set to all by default, so that all of the data including disk pool configuration data is retrieved.

Notes

Depending on the size of the database image, restoring the database might take up as much as 30 minutes. The host software will not show the controllers in an Optimal state until after all actions for loading the database image are completed on the controllers.

Save storage array DBM database

The `save storageArray dbmDatabase` command backs up RAID configuration data or all data to a file on the host. You can specify multiple data locations and controllers.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
save storageArray dbmDatabase
[sourceLocation=(disk | onboard)]
[controller [(a|b)]]
[contentType= all]
 file="fileName"
```

Parameters

Parameter	Description
file	The file path and the file name to which you want to save the database. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\dbmdata.zip"` This parameter must appear last, after any of the optional parameters. This command creates a .zip file and you do not need to specify a file extension.
sourceLocation	This parameter specifies the location from which to obtain backup database information. • disk indicates that data comes directly from the database on the drive • onboard indicates that data comes from the RPA memory location The default location is onboard .
controller	This parameter specifies the controller from which data will be exclusively retrieved, if **sourceLocation** is set to onboard . If the **controller** parameter is not specified, data might be retrieved from either controller. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B .
contentType	This parameter specifies the content type of the data that will be retrieved. This parameter is set to all by default, so that all of the data including disk pool configuration data is retrieved.

Notes

The data that you save to the host using this command can, if needed, be restored to the controller. A validator, however, is required to restore data from the file on the host.

Save storage array DBM validator information file

The `save storageArray dbmValidatorInfo` command saves the database management (DBM) validation information for a storage array in an XML file.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

Technical support can use this XML file to generate a validator string (a security code). The validator string must be included in the `load storageArray dbmDatabase` command when restoring a storage array back to a pre-existing configuration.

Syntax

```
save storageArray dbmValidatorInfo file="filename" dbmDatabase="filename"
```

Parameters

Parameter	Description
file	The file path and the file name of the DBM validator required for technical support. Enclose the file name in double quotation marks (" "). For example: `file="C:\Array Backups \DBMvalidator.xml"` This command does not automatically append a file extension to the saved file. You must specify the .xml file extension when you enter the file name.
dbmDatabase	The file path and the file name of the DBM database from which you want to generate the XML information file. Enclose the file name in double quotation marks (" "). For example: `dbmDatabase="C:\Array Backups \DBMbackup_03302010.dbm"` This command does not automatically append a file extension to the saved file. You must specify the .dbm file extension when you enter the file name.

Notes

If you are generating the XML information file to obtain a validator string, you must run this command while you are connected to the controller where you intend to restore the database. The following example show the format of the XML file:

```
<?xml version="1.0" encoding="utf-8"?>
<DbmImageMetadata>
<Controllers>

<A>1ITOnnnnnnnnnnABCD</A>
<B>1TOnnnnnnnnnnABCD</B>
</Controllers>
<Header>

<ImageVersion>1</ImageVersion>
<TimeStamp>1269388283</TimeStamp>
</Header>

<Trailer>
<CRC>nnnnnnnnnn</CRC><
/Trailer>
</DbmImageMetadata>
```

Show storage array DBM database

The `show storageArray dbmDatabase` command retrieves and shows metadata for the on-board backup locations of a storage array. When there are multiple backup locations, metadata is shown for each location.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Syntax

```
show storageArray dbmDatabase
```

Parameters

None.

Notes

This command returns the configuration database information in a format similar to this example.

Configuration Database MetadataLast Host Backup: <date stamp>						
CTL	LOCATION	REVISION	ID	GEN NUMBER	STATUS	ACCESS MODE
A	Cache	X.Y	999999	999999	R/W	Optimal
B	Cache	X.Y	999999	999999	R/W	Optimal
N/A	Disk	X.Y	999999	999999	R/W	Optimal

Start storage array configuration database diagnostic

The `start storageArray configDbDiagnostic` command runs a consistency check against a configuration database.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
start storageArray configDbDiagnostic
[sourceLocation=(disk | onboard) |
diagnosticType=(fileSystem | mirror) |
controller[(a|b)]]
```

Parameters

Parameter	Description
sourceLocation	This parameter specifies the location of the database. • `disk` indicates that data comes directly from the database on the drive • `onboard` indicates that data comes from the RPA memory location The default location is `disk` .
diagnosticType	The level of diagnostic testing that you want to run on the database. You can run one of these levels of testing: `fileSystem` – This option checks the structural integrity of the database. `mirror` – The tests run using this option vary according to the value of the **sourceLocation** parameter: • When the **sourceLocation** parameter is set to `disk` , the peer controller initiates a block check. • When the **sourceLocation** parameter is set to `onboard` , the peer controller initiates a record check. **Note:** You can run the `mirror` option only from a command line or from the Script editor. This option is not available through the storage management software GUI. The `mirror` option starts a long running operation that you cannot stop. The default value is `fileSystem` .
controller	The controller that has the database on which you want to run the diagnostic tests. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . Enclose the controller identifier in square brackets ([ ]).

Notes

This command runs a consistency check against a configuration database. All database records are checked. Error data is written to a file in the data folder on disk automatically. You do not need to specify an output file.

Note: Running a consistency check with the `diagnosticType` parameter set to `mirror` and with the `sourceLocation` parameter set to `onboard` can cause the operation to run for a long time. This can have adverse effects on host I/O processing. This operation should be done only under direction from the support organization.

Upon completion of the diagnostic test, the controller firmware returns one of these results:

• `Diagnosis completed without errors. No ZIP file created.`
• `Diagnosis completed with errors. Refer to the ZIP file created at:`

  `...\Install_dir\data\FirmwareUpgradeReports\timestamp_buildNo.zip`

If the diagnostic test detects an inconsistency in the configuration database, the controller firmware performs these actions:

• Returns a description of the inconsistency
• Saves a ZIP file containing raw binary data

The controller firmware saves the ZIP file to this location:

```
...\Install_dir\data\FirmwareUpgradeReports\timestamp_buildNo.zip
```

You can use the binary data to help determine the cause of the problem, or you can send the file containing the binary data to technical support.

To stop the database configuration diagnostic test, use the `stop storageArray configDbDiagnostic` command.

In addition, you can start the database configuration diagnostic test through the storage management software GUI; however, you cannot stop the database configuration diagnostic test through the storage management software GUI. If you want to stop a running diagnostic test, you must use the `stop storageArray configDbDiagnostic` command.

Stop storage array configuration database diagnostic

The `stop storageArray configDbDiagnostic` command stops the diagnostic test to validate the configuration database in the controller firmware that was started by the `start storageArray configDbDiagnostic` command.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
stop storageArray configDbDiagnostic
```

Parameters

None.

Notes

The controller firmware returns a confirmation that the diagnostic test was cancelled.

In addition, you can start the database configuration diagnostic test through the storage management software GUI; however, you cannot stop the database configuration diagnostic test through the storage management software GUI. If you want to stop a running diagnostic test, you must use the `stop storageArray configDbDiagnostic` command.

If you try to use the `stop storageArray configDbDiagnostic` command after validation of the storage array configuration has finished, you do not receive any message that the validation has finished. This behavior is expected.

Key management commands for drive security

Getting started with external key management

A security key is a string of characters, which is shared between the secure-enabled drives and controllers in a storage array. When using external key management, you create and maintain security keys on a key management server

See ThinkSystem System Manager online help for conceptual information on using external key management servers and security keys. The following graphic shows the basic workflow for implementing external security keys:

```
┌─────────────────────────┐
│  Generate a Certificate │
│     Signing Request     │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│  Get client and server  │
│     certificates from   │
│      the KMIP server    │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│    Install the client   │
│        certificate      │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│    Install the server   │
│        certificate      │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│   Set the IP address and│
│      port number of     │
│      the KMIP server    │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│    Test communication   │
│     with KMIP server    │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│   Create a storage array│
│        security key     │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│      Validate the       │
│       security key      │
└─────────────────────────┘
```
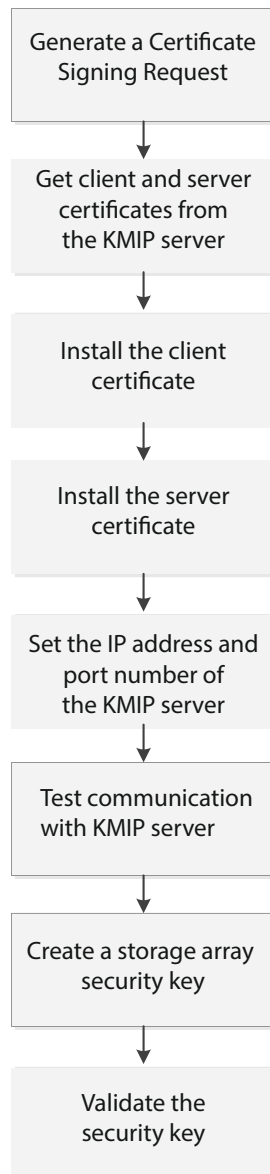
Workflow steps

Both certificate management and external key management are new security features with the ThinkSystem SAN OS. To get started, use the following basic steps:

1. Generate a Certificate signing request using the `save storageArray keyManagementClientCSR` command. See " Generate Key Management Certificate Signing Request (CSR) " on page 429 .

2. From the KMIP server, request a client and a server certificate.

3. Install the client certificate using the `download storageArray keyManagementCertificate` command with the `certificateType` parameter set to `client` . See " Install storage array external key management certificate " on page 430 .

4. Install the server certificate using the `download storageArray keyManagementCertificate` command with the `certificateType` parameter set to `server`. See " Install storage array external key management certificate " on page 430 .

5. Set the IP address and port number of the key management server using the `set storageArray externalKeyManagement` command. See " Set external key management settings " on page 424 .

6. Test communication with the external key management server using the `start storageArray externalKeyManagement test` command. See " Test external key management communication " on page 428 .

7. Create a security key using the `create storageArray securityKey` command. See " Create storage array security key " on page 418 .

8. Validate the security key using the `validate storageArray securityKey` command. See " Validate storage array security key " on page 428 .

Getting started with internal key management

A security key is a string of characters, which is shared between the secure-enabled drives and controllers in a storage array. When using internal key management, you create and maintain security keys on the controller's persistent memory.

See ThinkSystem System Manager online help for conceptual information on using internal security keys. The following graphic shows the basic workflow for using internal security keys:
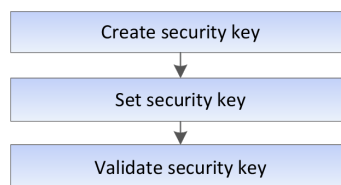
Workflow steps

The following commands get you started with internal security keys:

1. Create a storage array security key, using the `create storageArray securityKey` command. See " Create storage array security key " on page 418 .

2. Set the storage array security key, using the `set storageArray securityKey` command. See " Set internal storage array security key " on page 426 .

3. Validate the security key, using the `validate storageArray securityKey` command. See " Validate storage array security key " on page 428 .

Create storage array security key

The `create storageArray securityKey` command creates or changes a new security key for a storage array that has full disk encryption (FDE) drives.

Supported Arrays

If external key management is enabled, then this command applies only to the DE2000H/ DE4000H / DE4000F / DE6000H / DE6000F arrays. If internal key management is enabled, then the command applies to any individual storage array, as long as all SMcli packages are installed.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

For internal key management, this command enables the Internal Key Management feature and creates the security key. After creating the key, use the `set storageArray securityKey` command to put the key into use. This command can also be used to change the security key.

For external key management, this command creates a different key to replace the key initially created when you enabled the feature. Use the `enable storageArray externalKeyManagement` command to enable the External Key Management feature and create the initial security key. This command can also be used to change the security key.

Syntax

```
create storageArray securityKey
[keyIdentifier="keyIdentifierString"]
passPhrase="passPhraseString"
file="fileName"
[commitSecurityKey=(TRUE | FALSE)]
```

Parameters

Parameter	Description
keyIdentifier - only applicable for internal key management	A character string that you can read that is a wrapper around a security key. Enclose the key identifier in double quotation marks (" ").
	You can enter characters for the key identifier for internal security keys to help you identify the key later. These are the formatting rules:
	• You can enter up to 189 alphanumeric characters for a key identifier. The key identifier cannot have these characters:
	– Spaces
	– Punctuation
	– Symbols
	• If you do not enter the **keyIdentifer** parameter for internal keys, the controller automatically generates the **keyIdentifer** parameter.
	Additional characters are automatically generated and appended to the end of the string that you enter for the key identifier. If you do not enter any string for the **keyIdentifier** parameter, the key identifier consists of only the characters that are automatically generated.
	Important: This parameter is ignored for external key management, because the key identifier is completely automatically generated. If the storage array has a user label, this automatically generated string is composed of the characters `sa.`, followed by the storage array user label, the storage array identifier, and a randomly generated string. Any characters in the user label that are not alpha-numeric are converted to an underscore (_) character. For example, a user label of abc#8 will be converted to `sa.abc_8` before being prepended to the rest of the key identifier. For storage arrays without a user label, the key identifier is composed of the storage array identifier and a randomly generated string.
passPhrase	A character string that encrypts the security key so that you can store the security key in an external file. Enclose the pass phrase in double quotation marks (" ").
	For information about the correct form for creating a valid pass phrase, refer to the Notes in this command description.
	Your pass phrase must meet these criteria:
	• Must be between eight and 32 characters long.
	• Must contain no whitespace.
	• Must contain at least one uppercase letter.
	• Must contain at least one lowercase letter.
	• Must contain at least one number.
	• Must contain at least one non-alphanumeric character, for example, < > @ +.
	Note: If your pass phrase does not meet these criteria, you will receive an error message and will be asked to retry the command.

Parameter	Description
file	The file path and the file name to which you want to save the security key. For example: `file="C:\Program Files\CLI\sup\drivesecurity.slk"` **Important:** The file name must have an extension of .slk . Enclose the file path and name in double quotation marks (" ").
commitSecurityKey - only applicable for internal key management	This parameter commits the security key to the storage array for all FDE drives as well as the controllers. After the security key is committed, a key is required to access data on Security Enabled drives in the storage array. The data can only be read or changed by using a key, and the drive can never be used in a non-secure mode without rendering the data useless or totally erasing the drive. The default value is FALSE. If this parameter is set to FALSE, send a separate **set storageArray securityKey** command to commit the security key to the storage array.

Disable external security key management

The `disable storageArray externalKeyManagement file` command disables external security key management for a storage array that has Full Disk Encryption drives.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Syntax

```
disable storageArray externalKeyManagement
file="fileName"
passPhrase="passPhraseString"
```

Context

Note: This command enables internal key management as the alternate form of Drive Security.

Note: This command applies only to external key management.

Parameters

Parameter	Description
file	The file path and the file name where the internal security key file is stored. For example: `file="C:\Program Files\CLI\sup\drivesecurity.slk"` **Important:** The file name must have an extension of .slk .
passPhrase	A character string that encrypts the security key so that you can store the security key in an external file.

Notes

Your pass phrase must meet these criteria:

• Must be between eight and 32 characters long.

- No whitespace.
- Must contain at least one uppercase letter.
- Must contain at least one lowercase letter.
- Must contain at least one number.
- Must contain at least one non-alphanumeric character, for example, < > @ +.

Note: If your pass phrase does not meet these criteria, you will receive an error message.

Enable external security key management

The `enable storageArray externalKeyManagement file` command enables external security key management for a storage array that has Full Disk Encryption drives, and creates the initial drive security key.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

Note: This command applies only to external key management.

Syntax

```
enable storageArray externalKeyManagement
file="fileName"
passPhrase="passPhraseString"
```

Parameters

Parameter	Description
file	The file path and the file name where the new security key will be stored. Enclose the file path and the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\sup\drivesecurity.slk"` **Important:** The file name must have an extension of .slk .
passPhrase	A character string that encrypts the security key so that you can store the security key in an external file. Enclose the pass phrase character string in double quotation marks (" ").

Notes

Your pass phrase must meet these criteria:

- Must be between eight and 32 characters long.
- Must contain at least one uppercase letter.
- Must contain at least one lowercase letter.
- Must contain at least one number.
- Must contain at least one non-alphanumeric character, for example, < > @ +.

Note: If your pass phrase does not meet these criteria, you will receive an error message.

Export storage array security key

The `export storageArray securityKey` command saves a drive security key to a file.

Supported Arrays

If external key management is enabled, then this command applies only to the DE2000H/ DE4000H / DE4000F and DE6000H / DE6000F arrays. If internal key management is enabled, then the command applies to any individual storage array, as long as all SMcli packages are installed.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

When the key file is exported from one storage array, that key can be imported into another storage array. This enables you to move security-capable drives between storage arrays.

Note: This command applies to both internal and external key management.

Syntax

```
export storageArray securityKey
passPhrase="passPhraseString"
file="fileName"
```

Parameters

Parameter	Description
passPhrase	A character string that encrypts the security key so that you can store the security key in an external file. Enclose the pass phrase in double quotation marks (" ").
file	The file path and the file name to which you want to save the security key. For example: `file="C:\Program Files\CLI\sup\drivesecurity.slk"` **Important:** The file name must have an extension of .slk .

Notes

The storage array to which you will be moving drives must have drives with a capacity that is equal to or greater than the drives that you are importing.

The controller firmware creates a lock that restricts access to the full disk encryption (FDE) drives. FDE drives have a state called Security Capable. When you create a security key, the state is set to Security Enabled, which restricts access to all FDE drives that exist within the storage array.

Your pass phrase must meet these criteria:

• Must be between eight and 32 characters long.

• Must contain no whitespace.

• Must contain at least one uppercase letter.

• Must contain at least one lowercase letter.

• Must contain at least one number.

• Must contain at least one non-alphanumeric character, for example, < > @ +.

Note: If your pass phrase does not meet these criteria, you will receive an error message and will be asked to retry the command.

Import storage array security key

The `import storageArray securityKey file` command unlocks one or more full disk encryption (FDE) drives that you have moved from one storage array to another storage array.

Supported Arrays

If external key management is enabled, then this command applies only to the DE2000H/ DE4000H / DE4000F and DE6000H / DE6000F arrays. If internal key management is enabled, then the command applies to any individual storage array, as long as all SMcli packages are installed.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

Only the drives with the matching security key are unlocked. After they are unlocked, the security key for the new storage array is applied.

Note: This command applies to both internal and external key management.

Syntax

```
import storageArray securityKey file="fileName"
passPhrase="passPhraseString"
```

Parameters

Parameter	Description
file	The file path and the file name that has the original security key of the imported FDE drives. For example: `file="C:\Program Files\CLI\sup\drivesecurity.slk"` **Important:** The file name must have an extension of `.slk` .
passPhrase	The character string that provides authentication for the security key.

Notes

The controller firmware creates a lock that restricts access to the FDE drives. FDE drives have a state called Security Capable. When you create a security key, the state is set to Security Enabled, which restricts access to all FDE drives that exist within the storage array.

Your pass phrase must meet these criteria:

- Must be between eight and 32 characters long.
- Must contain at least one uppercase letter.
- Must contain at least one lowercase letter.
- Must contain at least one number.
- Must contain at least one non-alphanumeric character, for example, < > @ +.

Note: If your pass phrase does not meet these criteria, you will receive an error message and will be asked to retry the command.

Set external key management settings

The `set storageArray externalKeyManagement` command configures the external key management server address and port number.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

Note: This command applies only to external key management.

Syntax

```
set storageArray externalKeyManagement serverAddress=serverAddress
serverPort=portNumber
```

Parameters

Parameter	Description
serverAddress	Allows you to specify the external key management server address. The server address can be a fully qualified domain name, IPv4 address, or IPv6 address.
serverPort	Allows you to specify the port number of the external key management server.

Example

```
SMcli -n Array1 -c "set storageArray externalKeyManagement serverAddress=192.0
.2.1 serverPort=8081;"

   SMcli completed successfully.
```

Set FIPS drive security identifier

The `set drive securityID` command is used to reset a FIPS drive back to the original manufacturer settings.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

Attention: This command resets a FIPS drive back to the original manufacturer settings and erases all existing drive data. This operation is completely irreversible. This may be necessary if the drive is locked due to an invalid or missing security key file or unknown pass phrase. All existing drive data will be erased.

To erase an FDE drive, use the `start secureErase` command.

Syntax

```
set drive [trayID,[drawerID,]slotID] securityID="string"
```

Parameters

Parameter	Description
drive	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).
securityID	The security ID of the drive to erase, in string form. This string can have a maximum of 32 characters. The form of the security ID will vary by manufacturer. **Note:** To find the security ID, remove the drive and read the security ID on the canister label.

Notes

The **drive** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0 , and specify the ID of the slot in which a drive resides.

Example

```
set drive [1,31,4] securityID="V2zdvLTdGWdWyTALGHns";
```

Set internal storage array security key

The `set storageArray securityKey` command sets the security key that is used throughout the storage array to implement the Drive Security feature.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

When any security-capable drive in the storage array is assigned to a secured volume group or disk pool, that drive will be security-enabled using the security key. Before you can set the security key, you must use the `create storageArray securityKey` command to create the security key.

Note: This command applies only to internal key management.

Syntax

```
set storageArray securityKey
```

Parameters

None.

Notes

Security-capable drives have hardware to accelerate cryptographic processing and each has a unique drive key. A security-capable drive behaves like any other drive until it is added to a secured volume group, at which time the security-capable drive becomes security-enabled.

Whenever a security-enabled drive is powered on, it requires the correct security key from the controller before it can read or write data. So, a security-enabled drive uses two keys: the drive key that encrypts and decrypts the data and the security key that authorizes the encryption and decryption processes. The `set storageArray securityKey` command commits the security key to all of the controllers and security-enabled drives in the storage array. The full disk encryption feature ensures that if a security-enabled drive is physically removed from a storage array, its data cannot be read by any other device unless the security key is known.

Start FDE secure drive erase

The `start secureErase drive` command erases all of the data from one or more full disk encryption (FDE) drives so that they can be reused as FDE drives.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

Run this command only when the FDE drives are no longer part of a secure volume group or disk pool, or when the security key is unknown.

Note: To erase a FIPS drive when the drive is locked and the security key to unlock it is unavailable, use the `set drive securityID` command.

Syntax

`start secureErase (drive [`*trayID,[drawerID,]slotID*` ] | drives[` *trayID1,[drawerID1,]slotID1 ... trayIDn,[drawerIDn,]slotIDn* ` ] )`

Parameters

Parameter	Description
drive or **drives**	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 .
	All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0.
	Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).
	Attention: The drives list cannot contain all of the drives in the storage array, or the command will be rejected. To secure erase all drives, run this command twice, specifying the drive list in two separate groups.

Notes

The controller firmware creates a lock that restricts access to the FDE drives. FDE drives have a state called Security Capable. When you create a security key, the state is set to Security Enabled, which restricts access to all FDE drives that exist within the storage array.

Test external key management communication

The `start storageArray externalKeyManagement test` command uses the configured credentials (certificates, address of the KMIP server, and the KMIP port number) to verify that the storage array is able to communicate with the external KMIP server.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

Note: This command applies only to external key management.

Syntax

```
start storageArray externalKeyManagement test
```

Parameters

None.

Validate storage array security key

The `validate storageArray securityKey` command validates the security key for a storage array that has security-capable drives to make sure that the back-up security key file is not corrupt.

Supported Arrays

If external key management is enabled, then this command applies only to the DE2000H/ DE4000H / DE4000F DE6000H / DE6000F arrays. If internal key management is enabled, then the command applies to any individual storage array, as long as all SMcli packages are installed.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

Security key validation uses the pass phrase used to generate the file to decrypt the key and match it with the value maintained in controller memory (for internal keys) or on the external server (for external keys).

Note: This command applies to both internal and external key management.

Syntax

```
validate storageArray securityKey file="fileName" passPhrase="passPhraseString"
```

Parameters

Parameter	Description
file	The file path and the file name that has the security key. Enclose file path and the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\sup\drivesecurity.slk"` **Important:** The file name must have an extension of .slk .
passPhrase	A character string that encrypts the security key so that you can store the security key in an external file. Enclose the pass phrase in double quotation marks (" ").

External key management commands related to certificates

Generate Key Management Certificate Signing Request (CSR)

The `save storageArray keyManagementClientCSR` command requests a generated CSR for the storage array that you can save to a file.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

Note: This command applies only to external key management.

Syntax

```
save storageArray keyManagementClientCSR commonName="common_name"
organization="organization"
locality="locality"
country="country"
file="file"
[organizationalUnit="organizational_unit"]
[stateProvince="state_province"]
```

Parameters

Parameter	Description
commonName	The value entered for this parameter must match one of the user names defined on the KMIP server.
organization	Allows you to specify the organization's full legal name that the storage array belongs to. Do not abbreviate it and include any suffixes such as Inc, Corp, or LLC.
locality	Allows you to specify the city or locality where the storage array is located,
country	Allows you to specify your country's two-digit ISO (International Organization for Standardization) 3166-1 alpha-2 code, such as US.

Parameter	Description
file	Allows you to specify the file and file location where you will save the controller's signed certificate file.
organizationalUnit	Allows you to specify the organization's division that handles the certificate.
stateProvince	Allows you to specify the state or region where the storage array is located. This should not be abbreviated.

Example

```
SMcli -n Array1 -c "save storageArray keyManagementClientCSR commonName="192.0.2.1 "
organization="Widgets Are Us, Inc."
locality="sedgwick"
country="US"
file="latestCertificate"
organizationalUnit="Products Unit"
stateProvince="Kansas";"

SMcli completed successfully.
```

Install storage array external key management certificate

The `download storageArray keyManagementCertificate` command installs the external key management certificates on the storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

Note: This command applies only to external key management.

Syntax

```
download storageArray keyManagementClientCertificate certificateType=(client|server) file="filename"
```

Parameters

Parameter	Description
certificateType	Allows you to specify the certificate file type. Valid choices are `client` or `server` .
file	Allows you to specify the client signed certificate or server root/intermediate CA certificate. The file must be in PEM/DER format.

Examples

```
SMcli -n Array1 -c "download storageArray keyManagementClientCertificate certificateType=client
    file="C:\serverSignedKeyMgmtClientCert.cer";"
```

```
SMcli completed successfully.
```

Remove installed external key management certificate

The `delete storageArray keyManagementCertificate` command removes the installed external key management certificate from the storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

Note: This command applies only to external key management.

Syntax

```
delete storageArray keyManagementCertificate certificateType=certificate_type
```

Parameters

Parameter	Description
certificateType	Allows you to specify the certificate type to delete. Valid choices are: `client` or `server` .

Example

```
SMcli -n Array1 -c "delete storageArray keyManagementCertificate
certificateType="client";"

  SMcli completed successfully.
```

Retrieve installed external key management certificate

The `save storageArray keyManagementCertificate` command retrieves the installed certificate.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Security Admin role.

Context

Note: This command applies only to external key management.

Syntax

```
save storageArray keyManagementCertificate certificateType=" certificateType
file="filename"
```

Parameters

Parameter	Description
certificateType	Allows you to specify the certificate type to install. Valid choices are: `client` or `server`.
file	Allows you to specify the filename for the signed certificate or server CA certificate.

Chapter 16. Volume configuration commands

Disk pool commands

Create disk pool

The `create diskPool` command creates a new disk pool based on the specified parameters.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

You can create the disk pool by entering either a list of drives or a type of drive that you want to use for the disk pool.

Note: If you enter a list of drives, make sure that all of the drives have the same capacity. If the drives do not have the same capacity, each drive in the disk pool reports capacity equal to the smallest drive.

Syntax

```
create diskPool
(drives=(trayID1,[drawerID1,]slotID1 ... trayIDN,[drawerIDN,]slotIDN)| driveType=SAS))
userLabel="diskPoolName"
[driveCount=driveCountValue]
[trayLossProtect=(TRUE | FALSE)]
[drawerLossProtect=(TRUE | FALSE)]
[warningThreshold=(warningThresholdValue | default)]
[criticalThreshold=(criticalThresholdValue | default)]
[criticalPriority=(highest|high|medium|low|lowest)]
[backgroundPriority=(highest|high|medium|low|lowest)]
[degradedPriority=(highest|high|medium|low|lowest)]
[securityType=(none | capable | enabled )]
[secureDrives=(fips | fde )]
[driveMediaType=(ssd | allMedia | unknown)]
[dataAssurance=(none|enabled)]
```

Parameters

Parameter	Description
drives	The drives you want to assign to the disk pool that you want to create. For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0or 1, depending on the tray model. Drive trays compatible with DE2000H/ DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).
userLabel	The name that you want to give the new disk pool. Enclose the disk pool name in double quotation marks (" ").
driveCount	The **driveCount** parameter limits the disk pool candidates to the given number. When using this parameter, the minimum value that you can enter is 11.
warningThreshold	The percentage of storage capacity at which you receive a warning alert that the disk pool is nearing full. Use integer values. For example, a value of 60 means 60 percent. For best operation, the value for this parameter must be less than the value for the **criticalThreshold** parameter. Valid values are from 0 to 100. The default value is 50. Setting this parameter to 0 (zero) disables warning alerts. If you set this to default , the warning alert threshold value is determined by the controller firmware.
criticalThreshold	The percentage of storage capacity at which you receive a critical alert that the disk pool is nearing full. Use integer values. For example, a value of 70 means 70 percent. For best operation, the value for this parameter must be greater than the value for the **warningThreshold** parameter. Valid values are from 0 to 100. The default value is 85 percent. Setting this parameter to 0 (zero) disables both warning alerts and critical alerts. If you set this to default , the critical alert threshold value is determined by the controller firmware.
criticalPriority	The priority for reconstruction operations for critical events on the disk pool. For example, disk pool reconstruction after at least two drive failures. Valid values are highest , high , medium , low , and lowest . The default value is highest .
backgroundPriority	The priority for background operations on the disk pool. Valid values are highest , high , medium , low , and lowest . The default value is low .

Parameter	Description
degradedPriority	The priority for degraded activities on the disk pool. For example, disk pool reconstruction after one drive failures. Valid values are highest , high , medium , low , and lowest . The default value is high .
securityType	The setting to specify the security level when creating the disk pool. All volume candidates for the disk pool will have the specified security type. These settings are valid: • none – The volume candidates are not secure. • capable – The volume candidates are capable of having security set, but security has not been enabled. • enabled – The volume candidates have security enabled. The default value is none .
secureDrives	The type of secure drives to use in the volume group. These settings are valid: • fips – To use FIPS compliant drives only. • fde – To use FDE compliant drives. **Important:** Use this parameter along with the **securityType** parameter. If you specify none for the **securityType** parameter, the value of the **secureDrives** parameter is ignored, because non-secure disk pools do not need to have secure drive types specified. **Note:** This parameter is ignored unless you are also using the **driveCount** parameter. If you are specifying the drives to use for the disk pool instead of providing a count, specify the appropriate type of drives in the selection list based on the security type you desire.
driveMediaType	The type of drive media that you want to use for the disk pool. You must use this parameter when you have more than one type of drive media in your storage array. These drive media are valid: • ssd – Use this option when you have solid-state disks. • unknown – Use this option if you are not sure what types of drive media are in the drive tray. • allMedia – Use this option when you want to use all types of drive media that are in the drive tray. The default value is hdd . **Note:** The controller firmware does not mix hdd and ssd drive media in the same disk pool, regardless of using the setting you select.

Notes

Each disk pool name must be unique. You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the user label. User labels can have a maximum of 30 characters.

If the parameters you specify cannot be satisfied by any of the available candidate drives, the command fails. Normally, all drives that match the quality of service attributes are returned as the top candidates. However,

if you specifying a drive list, some of the available drives returned as candidates might not match the quality of service attributes.

If you do not specify a value for an optional parameter, a default value is assigned.

Drives

When you use the **driveType** parameter, all of the unassigned drives that are of that drive type are used to create the disk pool. If you want to limit the number of drives found by the **driveType** parameter in the disk pool, you can specify the number of drives using the **driveCount** parameter. You can use the **driveCount** parameter only when you use the **driveType** parameter.

The **drives** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0 , and specify the ID of the slot in which a drive resides.

If you enter specifications for a high-capacity drive tray, but a drive tray is not available, the storage management software returns an error message.

Disk pool alert thresholds

Each disk pool has two progressively severe levels of alerts to inform users when the storage capacity of the disk pool is approaching full. The threshold for an alert is a percent of the used capacity to the total usable capacity in the disk pool. The alerts are as follows:

- Warning – This is the first level of alert. This level indicates that the used capacity in a disk pool is approaching full. When the threshold for the warning alert is reached, a Needs Attention condition is generated and an event is posted to the storage management software. The warning threshold is superseded by the critical threshold. The default warning threshold is 50 percent.

- Critical – This is the most severe level of alert. This level indicates that the used capacity in a disk pool is approaching full. When the threshold for the critical alert is reached, a Needs Attention condition is generated and an event is posted to the storage management software. The warning threshold is superseded by the critical threshold. The default threshold for the critical alert is 85 percent.

To be effective, the value for a warning alert always must be less than the value for a critical alert. If the value for the warning alert is the same as the value for a critical alert, only the critical alert is sent.

Disk pool background operations

Disk pools support these background operations:

- Reconstruction
- Instant Availability Format (IAF)
- Format
- Dynamic Capacity Expansion (DCE)
- Dynamic Volume Expansion (DVE) (For disk pools, DVE is actually not a background operation, but DVE is supported as a synchronous operation.)

Disk pools do not queue background commands. You can start several background commands sequentially, but starting more than one background operation at a time delays the completion of commands that you started previously. The supported background operations have the following relative priority levels:

1. Reconstruction

2. Format

3. IAF

4. DCE

Security type

Use the **securityType** parameter to specify the security settings for the storage array.

Before you can set the **securityType** parameter to enabled , you must create a storage array security key. Use the `create storageArray securityKey` command to create a storage array security key. These commands are related to the security key:

- `create storageArray securityKey`

- `export storageArray securityKey`

- `import storageArray securityKey`

- `set storageArray securityKey`

- `enable volumeGroup [volumeGroupName] security`

- `enable diskPool [diskPoolName] security`

Secure drives

Secure-capable drives can be either Full Disk Encryption (FDE) drives or Federal Information Processing Standard (FIPS) drives. Use the **secureDrives** parameter to specify the type of secure drives to use. The values you can use are fips and fde .

Example command

```
create diskPool driveType=SAS userLabel="FIPS_Pool" driveCount=11
 securityType=capable secureDrives=fips;
```

Delete disk pool

The `delete diskPool` command deletes a disk pool.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Attention: Possible damage to the storage array configuration – All of the data in the disk pool is lost as soon as you run this command.

Depending on your version of the storage management software, this command also deletes all of the volumes in the disk pool. If your version of the storage management software does not support automatic deletion of the volumes, you can force the deletion of the disk pool and volumes.

Syntax

```
delete diskPool [diskPoolName]
[force=(TRUE | FALSE)]
```

Parameters

Parameter	Description
diskPoolName	The name of the disk pool that you want to delete. Enclose the disk pool name in square brackets ([ ]). If the disk pool name contains special characters or consists only of numbers, you must enclose the name in double quotation marks (" ") inside square brackets.
force	This parameter forces the deletion of volumes if your storage management software does not support automatic deletion of the volumes in the disk pool. To force the deletion of a disk pool and the volumes that it contains, set this parameter to **TRUE** . The default is **FALSE** .

Notes

Each disk pool name must be unique. You can use any combination of alphanumeric characters, underscore (_), hyphen(-), and pound (#) for the user label. User labels can have a maximum of 30 characters.

Enable disk pool security

The `enable diskPool security` command converts a non-secure disk pool to a secure disk pool.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Note: All of the drives that comprise the disk pool must be secure-capable.

Syntax

```
enable diskPool [diskPoolName] security
```

Parameter

Parameter	Description
diskPool	The name of the disk pool that you want to place in the Security Enabled state. Enclose the disk pool identifier in square brackets ([ ]).

Notes

Each disk pool name must be unique. You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the user label. User labels can have a maximum of 30 characters.

Reduce disk pool capacity

The `set diskPool` command reduces the capacity of the disk pool by logically removing the drives from the pool.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

This command uses the Dynamic Capacity Reduction (DCR) feature, which enables you to remove selected drives from a disk pool and re-use the removed drives as needed.

The maximum number of drives that you can remove from a disk pool in a single DCR operation is 60. You cannot reduce the disk pool to below the minimum disk pool size.

Syntax

```
set diskPool [diskPoolName]
removeDrives=(trayID1,[drawerID1,]slotID1
... trayIDn,[drawerIDn,]slotIDn)
```

Parameter

Parameter	Description
diskPool	The name of the disk pool for which you want to reduce capacity. Enclose the disk pool name in square brackets ([ ]).
removeDrives	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 .
	All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0.
	Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).

Notes

Each disk pool name must be unique. You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the user label. User labels can have a maximum of 30 characters.

You might want to remove selected drives from a disk pool if you need to create a separate group or remove unneeded capacity from the storage array. The removed drives become unassigned drives and the data that existed on them is redistributed across the remaining drives in the disk pool. The capacity of the disk pool is decreased by the capacity of the drives that you remove. Removing drives from a disk pool is always carried out as a background task and the volumes remain fully accessible during this operation. The progress of the removal operation is reported as part of the long running operations status.

This command fails if there is not enough free capacity on the drives that remain in the disk pool to store all of the data that was on the drives you remove from the disk pool. Reserve capacity in the disk pool might be used to store data that was on the drives you remove from the disk pool. However, if the reserve capacity falls below the critical threshold, a critical event is written to the major event log.

Decreasing the disk pool size might result in a smaller necessary reserve capacity. In some cases, in order to decrease the likelihood that this command will fail, reduce your reserve capacity before running this command in order to increase the amount of space available for disk pool data.

The controller firmware determines how many drives that you can remove and you can then select the specific drives to be removed. The controller firmware bases the count on the amount of free space needed to redistribute the data across the remaining drives without consuming any capacity reserved for reconstructions. If the free capacity of the disk pool is already less than the Reserved Reconstruction Drive Amount, the controller does not allow a DCR operation to begin.

A DCR operation might result in the configured capacity exceeding one or both of the Pool Utilization Thresholds. If so, normal threshold alerts are issued.

Set disk pool

The `set diskPool` command sets the attributes associated with a disk pool based on the specified parameters.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set (diskPool [diskPoolName] |
diskPools [diskPoolName1 ... diskPoolNameN] | allDiskPools)
[reservedDriveCount=reservedDriveCountValue]
[warningThreshold=(warningThresholdValue | default)]
[criticalThreshold=(criticalThresholdValue | default)]
[criticalPriority=(highest | high | medium |low |lowest)]
[degradedPriority=(highest |high |medium |low |lowest)]
[backgroundPriority=(highest | high | medium |low |lowest)]
[userLabel=diskPoolName]
```

Parameters

Parameter	Description
diskPool	The name of the disk pool for which you are setting attributes. Enclose the disk pool name in square brackets ([ ]). If the disk pool name has special characters or consists only of numbers, you must enclose the disk pool name in double quotation marks (" ") inside square brackets.
diskPools	The names of several disk pools for which you want to set attributes. Enter the names of the disk pools using these rules: • Enclose all of the names in square brackets ([ ]). • Separate each of the names with a space. If the disk pool names have special characters or numbers, enter the names using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.
allDiskPools	This parameter sets attributes for all of the disk pools in the storage array.
reservedDriveCount	This parameter reserves space on every drive in the disk pool, to be used exclusively for reconstruction of failed drives. Each unit in this count represents the capacity to reconstruct one failed drive to the remainder of the disk pool.

Parameter	Description
warningThreshold	The percentage of disk pool capacity at which you receive a warning alert that the disk pool is nearing full. Use integer values. For example, a value of 70 means 70 percent. For best operation, the value for this parameter must be less than the value for the **criticalThreshold** parameter.
	Valid values are from 0 to 100.
	The default value is 50.
	Setting this parameter to 0 disables warning alerts.
	If you set this to default , the warning alert threshold value is determined by the controller firmware.
criticalThreshold	The percentage of disk pool capacity at which you receive a critical alert that the disk pool is nearing full. Use integer values. For example, a value of 70 means 70 percent. For best operation, the value for this parameter must be greater than the value for the **warningThreshold** parameter.
	Valid values are from 0 to 100.
	The default value is 85 percent.
	Setting this parameter to 0 disables both warning alerts and critical alerts.
	If you set this to default , the critical alert threshold value is determined by the controller firmware.
criticalPriority	The priority for reconstruction operations for critical events on the disk pool. For example, disk pool reconstruction after at least two drive failures.
	Valid values are highest , high , medium , low , and lowest . The default value is highest .
degradedPriority	The priority for reconstruction operations for degraded events on the disk pool. For example, disk pool reconstruction after at one drive failure.
	Valid values are highest , high , medium , low , and lowest . The default value is high .
backgroundPriority	The priority for background operations on the disk pool.
	Valid values are highest , high , medium , low , and lowest . The default value is low .
userLabel	The new name that you want to give the disk pool. Enclose the disk pool name in double quotation marks (" ").

Notes

Each disk pool name must be unique. You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the user label. User labels can have a maximum of 30 characters.

You can specify an arbitrary set of disk pools. If you select multiple disk pools, setting a value for the **userLabel** causes an error.

If you do not specify a value for an optional parameter, a default value is assigned.

Disk pool alert thresholds

Each disk pool has two progressively severe levels of alerts to inform users when the storage capacity of the disk pool is approaching full. The threshold for an alert is a percent of the used capacity to the total usable capacity in the disk pool. The alerts are:

• Warning – This is the first level of alert that the used capacity in a disk pool is approaching full. When the threshold for the warning alert is reached a Needs Attention condition is generated and an event is posted to the storage management software. The warning threshold is superseded by the critical threshold. The default warning threshold is 50 percent.

• Critical – This is the most severe level of alert that the used capacity in a disk pool is approaching full. When the threshold for the critical alert is reached a Needs Attention condition is generated and an event is posted to the storage management software. The warning threshold is superseded by the critical threshold. The default threshold for the critical alert is 85 percent.

To be effective, the value for a warning alert must always be less than the value for a critical alert. If the value for the warning alert is the same as the value for a critical alert, only the critical alert is sent.

Disk pool background operations

Disk pools support these background operations:

• Reconstruction

• Instant Availability Format (IAF)

• Format

• Dynamic Capacity Expansion (DCE)

• Dynamic Capacity Reduction (DCR)

• Dynamic Volume Expansion (DVE) (For disk pools, DVE is actually not a background operation, but DVE is supported as a synchronous operation.)

Disk pools do not queue background commands. You can start several background commands sequentially, but starting more than one background operation at a time delays the completion of commands that you started previously. The relative priority levels for the supported background operations are:

1. Reconstruction

2. Format

3. IAF

4. DCE/DCR

Set disk pool (modify disk pool)

The `set diskPool` command adds capacity to a disk pool (Dynamic Capacity Expansion or DCE) or changes the controller ownership for the entire disk pool.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

These two operations are mutually exclusive.

Syntax

```
set diskPool [diskPoolName]
(addDrives=[trayID1,drawerID1,slotID1 ... trayIDn,drawerIDn,slotIDn] |
addCapacity=(diskPoolCapacity))
[owner=(a| b)]
```

Parameters

Parameter	Description
diskPool	The name of the disk pool that you want to modify. Enclose the disk pool name in square brackets ([ ]). If the disk pool name has special characters or consists only of numbers, you must enclose the name in double quotation marks (" ") inside square brackets.
addDrives	The drives that you want to add to the disk pool. For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value of the drive that you want to add. For low-capacity drive trays, specify the tray ID value and the slot ID value of the drive that you want to add. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . Slot ID values are 1 to 24 . Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]). **Note:** This feature has a 12-drive limit.
addCapacity	The amount of additional storage capacity that you want to add to the disk pool. This parameter automatically selects the drives to meet the capacity that you want to add. The capacity is defined in units of bytes , KB , MB , GB , or TB .
owner	The controller that owns the disk pool. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . If you do not specify an owner, the controller firmware determines the owner.

Notes

Volumes already in the disk pool remain on line and available for I/O operations while you add new drives. The disk pool must be in the Complete state before you add capacity. If the disk pool is not in the Complete state, run the `set diskPool complete` command before you add new drives.

To add capacity, specify individual drives with the **addDrives** parameter, or an amount of drive capacity with the **addCapacity** parameter. If you use **addDrives** , the host must validate the drive set before allowing the operation to run. If you use the **addCapacity** parameter, the capacity you specify is taken as the minimum capacity to be added. The candidate drives with the best match for quality of service and a capacity greater than or equal to what you specified are used. If no candidate is available with a minimum match, or the drive list specified is not available or attribute mismatches are detected, the operation fails.

You also can use this command to change ownership of a disk pool from one controller in the storage array to the other. Using this command to change ownership is mutually exclusive with using the command to add drives or to add capacity.

Show disk pool

The `show diskPool` command returns information about a disk pool.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

This command returns this information about a disk pool:

- The status (such as optimal, online, offline)
- The total capacity
- The preservation capacity, usable capacity and unusable capacity
- The used capacity, free capacity, and percentage full
- The current owner (the controller in slot A or the controller in slot B)
- The drive media (SAS)
- The drive media type (HDD or SSD)
- The drive interface type (Fibre Channel, iSCSI, SAS)
- Tray loss protection (yes or no)
- Secure capable - indicates whether the disk pool is composed of all secure-capable drives. Secure-capable drives can be either FDE drives or FIPS drives.
- Secure - Indicates whether the disk pool has drive security turned on (this is called secure enabled).
- The remaining capacity notification settings (critical and early warning)
- The priority settings
- The associated volumes and free capacity
- The associated drives

Syntax

```
show diskPool [diskPoolName]
```

Parameter

Parameter	Description
diskPool	The name of the disk pool for which you are retrieving information. Enclose the disk pool name in square brackets ([ ]). If the disk pool name has special characters or numbers, you must enclose the disk pool name in double quotation marks (" ") inside square brackets.

Notes

Use this command to show the disk pool content of the storage array profile.

Start disk pool locate

The `start diskPool locate` command identifies the drives that are logically grouped together to form the specified disk pool by blinking the indicator lights on the drives.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

(Use the `stop diskPool locate` command to turn off the indicator lights on the drives.)

Syntax

```
start diskPool [diskPoolName] locate
```

Parameter

Parameter	Description
diskPool	The name of the disk pool for which you want to locate . Enclose the disk pool name in square brackets ([ ]). If the disk pool name has special characters or numbers, you must enclose the disk pool name in double quotation marks (" ") inside square brackets.

Stop disk pool locate

The `stop diskPool locate` command turns off the indicator lights on the drives that were turned on by the `start diskPool locate` command.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
stop diskPool locate
```

Parameters

None.

Host topology commands

Create host

The `create host` command creates a new host.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
create host userLabel="hostName"
[hostGroup=("hostGroupName" | defaultGroup)]
[hostType=(hostTypeIndexLabel | hostTypeIndexNumber)]
```

Parameters

Parameter	Description
userLabel	The name that you want to give the host that you are creating. Enclose the host name in double quotation marks (" ").
hostGroup	The name of the host group in which you want to create a new host. Enclose the host group name in double quotation marks (" "). (If a host group does not exist, you can create a new host group by using the `create hostGroup` command.) The defaultGroup option is the host group that contains the host to which the volume is mapped.
hostType	The index label or the index number that identifies the host type. Use the `show storageArray hostTypeTable` command to generate a list of available host type identifiers. If the host type has special characters, enclose the host type in double quotation marks (" ").

Notes

You can use any combination of alphanumeric characters, hyphens, and underscores for the names. Names can have a maximum of 30 characters.

A host is a computer that is attached to the storage array and accesses the volumes on the storage array through the host ports. You can define specific mappings to an individual host. You also can assign the host to a host group that shares access to one or more volumes.

A host group is an optional topological element that you can define if you want to designate a collection of hosts that share access to the same volumes. The host group is a logical entity. Define a host group only if you have two or more hosts that share access to the same volumes.

If you do not specify a host group in which to place the host that you are creating, the newly defined host belongs to the default host group.

Create host group

The `create hostGroup` command creates a new host group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
create hostGroup userLabel="hostGroupName"
```

Parameter

Parameter	Description
userLabel	The name that you want to give the host group that you are creating. Enclose the host group name in double quotation marks (" ").

Notes

A host group is an optional topological element that you can define if you want to designate a collection of hosts that share access to the same volumes. The host group is a logical entity. Define a host group only if you have two or more hosts that can share access to the same volumes.

You can use any combination of alphanumeric characters, hyphens, and underscores for the names. Names can have a maximum of 30 characters.

Create host port

The `create hostPort` command creates a new host port identification on a host bus adapter (HBA).

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

The host port identification is a software value that represents the physical HBA host port to the controller. Without the correct host port identification, the controller cannot receive instructions or data from the host port.

Syntax

```
create hostPort identifier=("wwID")
userLabel="portLabel"
[host="hostName"]
[interfaceType=(FC | SAS)]
```

Parameters

Parameter	Description
identifier	The 8-byte World Wide Identifier (WWID) or the 16-byte group identifier (GID) of the HBA or HCA host port. Enclose the WWID or the GID in double quotation marks (" ").
userLabel	The name that you want to give to the new HBA host port. Enclose the host port label in double quotation marks (" ").
host	The name of the host for which you are defining an HBA host port. Enclose the host name in double quotation marks (" ").
interfaceType	The identifier of the type of interface for the host port.
	The choices for the types of host port interfaces are:
	• FC – Fibre Channel
	• SAS – Serial-Attached SCSI
	An FC or a SAS selection requires an 8-byte WWID.
	If you do not specify the type of interface, FC is used as the default interface for the host port.

Notes

An HBA host port is a physical connection on a host bus adapter that resides in a host computer. An HBA host port provides host access to the volumes in a storage array. If the HBA has only one physical connection (one host port), the terms host port and host bus adapter are synonymous.

You can use any combination of alphanumeric characters, hyphens, and underscores for the names. Names can have a maximum of 30 characters.

Delete host

The `delete host` command deletes one or more hosts.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

`delete host [hostName]`

Parameters

Parameter	Description
host	The name of the host that you want to delete. Enclose the host name in square brackets ([ ]). If the host name has special characters, you must enclose the host name in double quotation marks (" ") inside square brackets.

Notes

A host is a computer that is attached to the storage array and accesses the volumes on the storage array through the host ports on the host.

Delete host group

The `delete hostGroup` command deletes a host group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Attention: Possible damage to the storage array configuration – This command deletes all of the host definitions in the host group.

Syntax

`delete hostGroup [hostGroupName]`

Parameter

Parameter	Description
hostGroup	The name of the host group that you want to delete. Enclose the host group name in square brackets ([ ]). If the host group name contains special characters or consists only of numbers, you must enclose the host group name in double quotation marks (" ") inside square brackets.

Notes

A host group is an optional topological element that is a collection of hosts that share access to the same volumes. The host group is a logical entity.

Delete host port

The `delete hostPort` command deletes a host port identification.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

The identification is a software value that represents the physical host port to the controller. By deleting the identification, the controller no longer recognizes instructions and data from the host port.

Important: This command does not work in an iSCSI environment, where the host ports are considered initiators.

Syntax

```
delete hostPort [hostPortName]
```

Parameter

Parameter	Description
hostPort	The name of the host port that you want to delete. Enclose the name of the host port in square brackets ([ ]). If the host port name contains special characters or consists only of numbers, you also must enclose the name in double quotation marks (" ") inside square brackets.

Notes

A host port is a physical connection on a host adapter that resides within a host computer. A host port provides a host access to the volumes in a storage array.

Set host

The `set host` command assigns a host to a host group or moves a host to a different host group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

You can also create a new host group and assign the host to the new host group with this command. The actions performed by this command depend on whether the host has individual mappings or does not have individual mappings.

Syntax

```
set host [hostName]
hostGroup=("hostGroupName" | none | defaultGroup)
userLabel="newHostName"
hostType=(hostTypeIndexLabel | hostTypeIndexNumber)
```

Parameters

Parameter	Description
host	The name of the host that you want to assign to a host group. Enclose the host name in square brackets ([ ]). If the host name has special characters or numbers, you must enclose the host name in double quotation marks (" ") inside square brackets.
hostGroup	The name of the host group to which you want to assign the host. (The following table defines how the command runs if the host does or does not have individual mappings.) Enclose the host group name in double quotation marks (" "). The defaultGroup option is the host group that contains the host to which the volume is mapped.
userLabel	The new host name. Enclose the host name in double quotation marks (" ").
hostType	The index label or number of the host type for the host port. Use the `show storageArray hostTypeTable` command to generate a list of available host type identifiers. If the host type has special characters, enclose the host type in double quotation marks (" ").

Host Group Parameter	Host Has Individual Mappings	Host Does Not Have Individual Mappings
hostGroupName	The host is removed from the present host group and is placed under the new host group defined by *hostGroupName* .	The host is removed from the present host group and is placed under the new host group defined by *hostGroupName* .
none	The host is removed from the host group as an independent partition and is placed under the root node.	The host is removed from the present host group and is placed under the default group.
defaultGroup	The command fails.	The host is removed from the present host group and is placed under the default group.

Notes

When you use this command, you can specify one or more of the optional parameters.

For the names, you can use any combination of alphanumeric characters, hyphens, and underscores. Names can have a maximum of 30 characters.

Set host channel

The `set hostChannel` command defines the loop ID for the host channel.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set hostChannel [hostChannelNumber]
preferredID=portID;
```

Parameters

Parameter	Description
hostChannel	The identifier number of the host channel for which you want to set the loop ID. Enclose the host channel identifier number in square brackets ([ ]). Use a host channel value that is appropriate for your particular controller model. A controller tray might support one host channel or as many as eight host channels. Valid host channel values are a1 , a2 , a3 , a4 , a5 , a6 , a7 , a8 , b1 , b2 , b3 , b4 , b5 , b6 , b7 , or b8 .
preferredID	The port identifier for the specified host channel. Port ID values are 0 to 127 .

Set host group

The `set hostGroup` command renames a host group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set hostGroup [hostGroupName]
userLabel="newHostGroupName"
```

Parameters

Parameter	Description
hostGroup	The name of the host group that you want to rename. Enclose the host group name in square brackets ([ ]). If the host group name has special characters or numbers, you must enclose the host group name in double quotation marks (" ") inside square brackets.
userLabel	The new name for the host group. Enclose the new host group name in double quotation marks (" ").

Notes

You can use any combination of alphanumeric characters, hyphens, and underscores for the names. Names can have a maximum of 30 characters.

Set host port

The `set hostPort` command changes the properties for a host port.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Important: This command does not work in an iSCSI environment, where the host ports are considered initiators.

Syntax

```
set hostPort [portLabel] userLabel=newPortLabel
[host=hostName]
```

Parameters

Parameter	Description
hostPort	The name of the host port for which you want to change the host type, or for which you want to create a new name. Enclose the host port name in square brackets ([ ]). If the host port name has special characters or numbers, enclose the host port name in double quotation marks (" ") inside square brackets.
userLabel	The new name that you want to give to the host port. Enclose the new name of the host port in double quotation marks (" ").
host	The name of the host for which you are defining an HBA host port. Enclose the host name in double quotation marks (" ").

Notes

You can use any combination of alphanumeric characters, hyphens, and underscores for the user label. User labels can have a maximum of 30 characters.

Show host ports

The `show allHostPorts` command returns information about configured host ports.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

For all of the host ports that are connected to a storage array, this command returns this information:

• The host port identifier

• The host port name

• The host type

Syntax

```
show allHostPorts
```

Parameters

None.

Notes

This command returns HBA host port information similar to this example.

```
HOST PORT IDENTIFIER     HOST PORT NAME  HOST TYPE

12:34:56:54:33:22:22:22  Jupiter1        Linux

12:34:56:78:98:98:88:88  Pluto1          Windows 2012/Server 2016
```

```
   Clustered
54:32:12:34:34:55:65:66  Undefined      Undefined
```

Show storage array host topology

The `show storageArray hostTopology` command returns the storage partition topology, the host type labels, and the host type index for the host storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Syntax

```
show storageArray hostTopology
```

Parameters

None.

Notes

This command returns the host topology information similar to this example.

```
TOPOLOGY DEFINITIONS
 DEFAULT GROUP
  Default type: Windows 2012/Server 2016 Non-Clustered
  Host Group: scott
   Host: scott1
    Host Port: 28:37:48:55:55:55:55:55
     Alias: scott11
     Type: Windows 2012/Server 2016 Clustered
   Host: scott2
    Host Port: 98:77:66:55:44:33:21:23
     Alias: scott21
     Type: Windows 2012/Server 2016 Clustered
   Host: Bill
    Host Port: 12:34:55:67:89:88:88:88
     Alias: Bill1
     Type: Windows 2012/Server 2016 Non-Clustered
NVSRAM HOST TYPE INDEX DEFINITIONS
HOST TYPE                        ALUA/AVT STATUS      ASSOCIATED INDEXS
Factory Default                  Enabled              0
Linux DM-MP(Kernel 3.10 or later) Enabled             28(Default)
Linux DM-MP(Kernel 3.9 or earlier) Enabled            7
SVC                              Enabled              18
VMWare                           Enabled              10
Windows                          Enabled              1
Windows Clustered                Enabled              8
```

Internet storage name service (iSNS) commands

Set storage array

The `set storageArray` command defines the properties of the storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set storageArray
([autoLoadBalancingEnable=(TRUE | FALSE)]|
[autoSupportMaintenanceWindow AutoSupport Maintenance Window parameters]
[autoSupport schedule AutoSupport Schedule Parameters]|
[autoSupportConfig (enable | disable)]|
[autoSupportOnDemand (enable | disable)]|
[autoSupportRemoteDiag (enable |disable)]|
[cacheBlockSize=cacheBlockSizeValue]|
[cacheFlushStart=cacheFlushStartSize]|
[cacheFlushStop=cacheFlushStopSize]|
[cacheMirrorDataAssuranceCheckEnable=(TRUE | FALSE)]|
[controllerHealthImageAllowOverWrite]|
[defaultHostType=("hostTypeName" |"hostTypeIdentifier")] |
[directoryServer directory server parameters]|
[externalKeyManagement external key management parameters]|
[failoverAlertDelay=delayValue]|
[hostConnectivityReporting (enable | disable)]|
[icmpPingResponse=(TRUE | FALSE)]|
[isnsIPV4ConfigurationMethod isns IPv4 Config Method Parameters]|
[isnsIPv6Address=ipAddress]|
[isnsListeningPort=listeningPortIPAddress]]|
[isnsRegistration=(TRUE | FALSE)]|
[learnCycleDate learn cycle parameters]|
[localUsername=local user name parameters]|
[loginBanner file="path_to_login_banner"]|
[managementInterface restOnly={true | false}]|
[mediaScanRate=(disabled | 1-30)]|
[odxEnabled=(TRUE | FALSE)]|
[password="password"]|
[passwordLength=<INTEGER>]|
[pqValidateOnReconstruct P/Q Validate on Reconstruct parameters]|
[redundancyMode=(simplex | duplex)]|
[revocationCheckSettings revocation check settings parameters]|
[securityKey]|
[symbol SYMbol user name and password parameters]|
[syslog syslog parameters]|
[time]|
[trayPositions=(controller | trayID ... trayIDn)]|
[unnamedDiscoverySession=(TRUE | FALSE)]|
[userLabel="storageArrayName"]|
[userSession sessionTimeout=n]|
[vaaiEnabled=(TRUE | FALSE)])
```

Parameters

Parameter	Description
autoLoadBalancingEnable	This parameter enables auto-load balancing on the controller. To enable the option, set this parameter to TRUE . To disable the option, set this parameter to FALSE . **Note:** When the Automatic Load Balancing feature is enabled, the Host Connectivity Reporting feature will also be enabled.
autoSupport schedule	Sets the daily and weekly times and days of the week that AutoSupport messages are sent.
autoSupportConfig	The setting for automatically collecting support data each time the firmware detects a critical MEL event. This parameter has these values: • enable – Turns on the collection of support data • disable – Turns off the collection of support data Use this parameter under these conditions only: • The AutoSupport (ASUP) feature is not available on the storage array • To support configurations on storage arrays that previously used this parameter **Note:** You cannot use this parameter with the ASUP commands.
autoSupportMaintenanceWindow	Turns on or turns off the AutoSupport maintenance window feature and configures the feature.
cacheBlockSize	The cache block size that is used by the controller for managing the cache. Valid values are 4 (4 KB), 8 (8 KB), 16 (16 KB), or 32 (32 KB).
cacheMirrorDataAssuranceCheckEnable	This parameter enables cache mirror data assurance check on the controller. To enable the option, set this parameter to TRUE . To disable the option, set this parameter to FALSE .
cacheFlushStart	The percentage of unwritten data in the cache that causes a cache flush. Use integer values from 0 to 100 to define the percentage. The default value is 80 .
controllerHealthImageAllowOverWrite	Sets a flag on a controller to allow a new controller health image to overwrite an existing controller health image on storage arrays that support the controller health image feature.
defaultHostType	The default host type of any unconfigured host port to which the controllers are connected. To generate a list of valid host types for the storage array, run the `show storageArray hostTypeTable` command. Host types are identified by a name or a numerical index. Enclose the host type name in double quotation marks (" "). Do not enclose the host type numerical identifier in double quotation marks.
directoryServer	Updates the directory server configuration, including role mappings.
externalKeyManagement	Configures the external key management server address and port number

Parameter	Description
failoverAlertDelay	The failover alert delay time in minutes. The valid values for the delay time are 0 to 60 minutes. The default value is 5 .
hostConnectivityReporting	This parameter enables host connectivity reporting on the controller. To enable the option, set this parameter to enable . To disable the option, set this parameter to disable . **Note:** If you attempt to disable Host Connectivity Reporting when Automatic Load Balancing is enabled, you receive an error. First disable the Automatic Load Balancing feature, then disable the Host Connectivity Reporting feature. **Note:** You can keep Host Connectivity Reporting enabled when Automatic Load Balancing is disabled.
icmpPingResponse	This parameter turns on or turns off Echo Request messages. Set the parameter to TRUE to turn on Echo Request messages. Set the parameter to FALSE to turn off Echo Request messages.
isnsIPv4ConfigurationMethod	The method that you want to use to define the iSNS server configuration. You can enter the IP address for the IPv4 iSNS servers by selecting static . For IPv4, you can choose to have a Dynamic Host Configuration Protocol (DHCP) server select the iSNS server IP address by entering dhcp . To enable DHCP, you must set the **isnsIPv4Address** parameter to 0.0.0.0 .
isnsIPv6Address	The IPv6 address that you want to use for the iSNS server.
isnsListeningPort	The IP address that you want to use for the iSNS server listening port. The range of values for the listening port is 49152 to 65535 . The default value is 53205 . The listening port resides on the server and performs these activities: • Monitors incoming client connection requests • Manages traffic to the server When a client requests a network session with a server, the listener receives the actual request. If the client information matches the listener information, then the listener grants a connection to the database server.
isnsRegistration	This parameter lists the storage array as an iSCSI target on the iSNS server. To register the storage array on the iSNS server, set this parameter to TRUE . To remove the storage array from the iSNS server, set this parameter to FALSE . **Note:** You cannot use the **isnsRegistration** parameter with any other parameter when running the set storageArray command. For more information about iSNS registration, refer to the set storageArray isnsRegistration command.
learnCycleDate	Sets controller battery learn cycles.
localUsername	Allows you to set a local user name password or a SYMbol password for a particular role.

Parameter	Description
loginBanner	Allows you to upload a text file to be used as a login banner. The banner text can include an advisory notice and consent message, which is presented to users before they establish sessions in ThinkSystem System Manager or before they run commands
managementInterface	Changes the management interface of the controller. Change the management interface type to enforce confidentiality between the storage array and its management software or to access external tools.
mediaScanRate	The number of days over which the media scan runs. Valid values are disabled , which turns off the media scan, or 1 day to 30 days, where 1 day is the fastest scan rate, and 30 days is the slowest scan rate. A value other than disabled or 1 to 30 does not allow the media scan to function.
odxEnabled	Turns on or turns off Offloaded Data Transfer (ODX) for a storage array.
passwordLength	Allows you to set the minimum required length for all new or updated passwords. Use a value between 0 and 30.
pqValidateOnReconstruct	Modifies the P/Q validate on reconstruction capability.
redundancyMode	Use simplex mode when you have a single controller. Use duplex mode when you have two controllers.
revocationCheckSettings	Allows you to enable or disable revocation checking, and configure an Online Certificate Status Protocol (OCSP) server.
securityKey	Sets the internal security key that is used throughout the storage array to implement the Drive Security feature. **Note:** Used for an internal security key. When an external key management server is used, use the `create storageArray securityKey` command.
symbol	Allows you to set a SYMbol password for a particular role.
syslog	Allows you to change the syslog server address, protocol, or port number.
time	Sets the clocks on both controllers in a storage array by synchronizing the controller clocks with the clock of the host from which you run this command.
trayPositions	A list of all of the tray IDs. The sequence of the tray IDs in the list defines the positions for the controller tray and the drive trays in a storage array. Valid values are 0 to 99 . Enter the tray ID values separated with a space. Enclose the list of tray ID values in parentheses. For storage arrays where the controller tray has a predefined identifier that is not in the range of valid tray position values, use the controller value.
unnamedDiscoverySession	Enables the storage array to participate in unnamed discovery sessions.
userLabel	The name for the storage array. Enclose the storage array name in double quotation marks (" ").

Parameter	Description
userSession	Allows you to set a timeout in System Manager , so that users' inactive sessions are disconnected after a specified time.
vaaiEnabled	Turns on or turns off VMware vStorage API Array Architecture (VAAI) for a storage array

Notes

Except for the **isnsRegistration** , when you use this command you can specify one or more of the optional parameters.

Auto Support data

Note: You cannot use this parameter with the ASUP commands.

When enabled, the **set storageArray autoSupportConfig** command causes all configuration and state information for the storage array to be returned each time a critical Major Event Log (MEL) event is detected. The configuration and state information is returned in the form of an object graph. The object graph contains all relevant logical and physical objects and their associated state information for the storage array.

The **set storageArray autoSupportConfig** command collects configuration and state information in this way:

- Automatic collection of the configuration and state information occurs every 72 hours. The configuration and state information is saved to the storage array zip archive file. The archive file has a time stamp that is used to manage the archive files.

- Two storage array zip archive files are maintained for each storage array. The zip archive files are kept on a drive. After the 72-hour time period is exceeded, the oldest archive file is always overwritten during the new cycle.

- After you enable automatic collection of the configuration and state information using this command, an initial collection of information starts. Collecting information after the you issue the command makes sure that one archive file is available and starts the time stamp cycle.

You can run the **set storageArray autoSupportConfig** command on more than one storage array.

Cache block size

When you define cache block sizes, use the 4-KB cache block size for storage arrays that require I/O streams that are typically small and random. Use the 8-KB cache block size when the majority of your I/O streams are larger than 4 KB but smaller than 8 KB. Use the 16-KB cache block size or the 32-KB cache block size for storage arrays that require large data transfer, sequential, or high-bandwidth applications.

The **cacheBlockSize** parameter defines the supported cache block size for all of the volumes in the storage array. Not all controller types support all cache block sizes. For redundant configurations, this parameter includes all of the volumes that are owned by both controllers within the storage array.

Cache flush start

When you define values to start a cache flush, a value that is too low increases the chance that data needed for a host read is not in the cache. A low value also increases the number of drive writes that are necessary to maintain the cache level, which increases system overhead and decreases performance.

Default host type

When you define host types, if Storage Partitioning is enabled, the default host type affects only those volumes that are mapped in the default group. If Storage Partitioning is not enabled, all of the hosts that are

attached to the storage array must run the same operating system and be compatible with the default host type.

Media scan rate

Media scan runs on all of the volumes in the storage array that have Optimal status, do not have modification operations in progress, and have the **mediaScanRate** parameter enabled. Use the `set volume` command to enable or disable the **mediaScanRate** parameter.

Password

Passwords are stored on each storage array. For best protection, the password must meet these criteria:

- The password must be between eight and 30 characters long.
- The password must contain at least one uppercase letter.
- The password must contain at least one lowercase letter.
- The password must contain at least one number.
- The password must contain at least one non-alphanumeric character, for example, < > @ +.

Note: If you are using full disk encryption drives in your storage array, you must use these criteria for your storage array password.

Note: You must set a password for your storage array before you can create a security key for encrypted full disk encryption drives.

Set storage array iSNS registration

The `set storageArray isnsRegistration` command enables you to list a storage array on either an IPv4 or an IPv6 Internet Storage Name Service (iSNS) server.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax for IPv4

```
set storageArray isnsRegistration=(TRUE | FALSE)
isnsIPv4ConfigurationMethod=[static | dhcp]
isnsIPv4Address=ipAddress
[isnsListeningPort]
```

Syntax for IPv6

```
set storageArray isnsRegistration=(TRUE | FALSE)
isnsIPv6Address=ipAddress
[isnsListeningPort]
```

Parameters

Parameters	Description
isnsRegistration	The means of registering the iSCSI target on the iSNS server. Set the parameter to TRUE to list an iSCSI target. When you set this parameter to TRUE you must also use these parameters for IPV4 configurations: • **isnsIPV4ConfigurationMethod** • **isnsIPV4Address** When you set this parameter to TRUE you must also use these parameters for IPV6 configurations: • **isnsIPV6Address** Optionally, you can also use the **isnsListeningPort** parameter to define the port monitor and manage traffic to the server. To remove the registration for the storage array from the iSNS server set this parameter to FALSE .
isnsIPv4ConfigurationMethod	The method that you want to use to define the iSNS server configuration. You can enter the IP address for the IPv4 iSNS servers by selecting static . For IPv4, you can choose to have a Dynamic Host Configuration Protocol (DHCP) server select the iSNS server IP address by entering dhcp . To enable DHCP, you must set the **isnsIPv4Address** parameter to 0.0.0.0 .
isnsIPv4Address	The IPv4 address used to connect to the iSNS server. Use this parameter with the static value for IPv4 configurations. If you choose to have a DHCP server set the IP address for an IPv4 Internet iSNS server, you must set the **isnsIPv4Address** parameter to 0.0.0.0 .
isnsIPv6Address	The IPv6 address used to connect to the iSNS server.
isnsListeningPort	The port number that you want to use for the iSNS server listening port. The range of values for the listening port is 49152 to 65535 . The default value is 3205 . The listening port resides on the server and performs these activities: • Monitors incoming client connection requests • Manages traffic to the server When a client requests a network session with a server, the listener receives the actual request. If the client information matches the listener information, then the listener grants a connection to the database server.

Notes

The iSNS protocol facilitates the automated discovery, management, and configuration of iSCSI devices and Fibre Channel devices on a TCP/IP network. iSNS provides intelligent storage discovery and management services comparable to those found in Fibre Channel networks, which allow a commodity IP network to function in a similar capacity as a storage area network. iSNS also facilitates a seamless integration of IP networks and Fibre Channel networks, due to its ability to emulate Fibre Channel fabric services and manage both iSCSI devices and Fibre Channel devices.

The DHCP server passes configuration parameters, such as network addresses, to IP nodes. DHCP enables a client to acquire all of the IP configuration parameters that it needs to operate. DHCP lets you automatically allocate reusable network addresses.

Set storage array iSNS server IPv4 address

The `set storageArray isnsIPv4ConfigurationMethod` command sets the configuration method and address for an IPv4 Internet Storage Name Service (iSNS).

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set storageArray isnsIPv4ConfigurationMethod=(static | dhcp)
isnsIPv4Address=ipAddress
```

Parameters

Parameters	Description
isnsIPv4ConfigurationMethod	The method that you want to use to define the iSNS server configuration. You can enter the IP address for the IPv4 iSNS servers by selecting static . For IPv4, you can choose to have a Dynamic Host Configuration Protocol (DHCP) server select the iSNS server IP address by entering dhcp . To enable DHCP, you must set the **isnsIPv4Address** parameter to 0.0.0.0 .
isnsIPv4Address	The IP address that you want to use for the iSNS server. Use this parameter with the static value for IPv4 configurations. If you choose to have a DHCP server set the IP address for an IPv4 Internet iSNS server, you must set the **isnsIPv4Address** parameter to 0.0.0.0 .

Notes

The iSNS protocol facilitates the automated discovery, management, and configuration of iSCSI devices and Fibre Channel devices on a TCP/IP network. iSNS provides intelligent storage discovery and management services comparable to those found in Fibre Channel networks, which allow a commodity IP network to function in a similar capacity as a storage area network. iSNS also facilitates a seamless integration of IP networks and Fibre Channel networks, due to its ability to emulate Fibre Channel fabric services and manage both iSCSI devices and Fibre Channel devices.

The DHCP server passes configuration parameters, such as network addresses, to IP nodes. DHCP enables a client to acquire all of the IP configuration parameters that it needs to operate. DHCP lets you automatically allocate reusable network addresses.

Set storage array iSNS server IPv6 address

The `set storageArray isnsIPv6Address` command sets the IPv6 address for the iSNS server.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set storageArray isnsIPv6Address=ipAddress
```

Parameter

Parameters	Description
isnsIPv6Address	The IPv6 address that you want to use for the iSNS server.

Notes

The iSNS protocol facilitates the automated discovery, management, and configuration of iSCSI devices and Fibre Channel devices on a TCP/IP network. iSNS provides intelligent storage discovery and management services comparable to those found in Fibre Channel networks, which permits a commodity IP network to function in a similar capacity as a storage area network. iSNS also facilitates a seamless integration of IP networks and Fibre Channel networks, due to its ability to emulate Fibre Channel fabric services, and manage both iSCSI devices and Fibre Channel devices. iSNS provides value in any storage network that has iSCSI devices, Fibre Channel devices, or any combination.

Set storage array iSNS server listening port

The `set storageArray isnsListeningPort` command sets the iSNS server listening port.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
set storageArray isnsListeningPort=listeningPortIPAddress
```

Parameter

Parameter	Description
isnsListeningPort	The IP address that you want to use for the iSNS server listening port. The range of values for the listening port is 49152 to 65535 . The default value is 53205 . The listening port resides on the server and performs these activities: • Monitors incoming client connection requests • Manages traffic to the server When a client requests a network session with a server, the listener receives the actual request. If the client information matches the listener information, then the listener grants a connection to the database server.

Notes

A listening port resides on the database server and is responsible for these activities:

• Listening (monitoring) for incoming client connection requests

- Managing the traffic to the server

When a client requests a network session with a server, a listener receives the actual request. If the client information matches the listener information, then the listener grants a connection to the database server.

Set storage array iSNS server refresh

The `set storageArray isnsServerRefresh` command refreshes the network address information for the iSNS server.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

This command is valid for only IPv4.

Syntax

```
set storageArray isnsServerRefresh
```

Parameters

None.

Notes

If the DHCP server is not operating at full capability, or if the DHCP server is unresponsive, the refresh operation can take between two and three minutes to complete.

The `set storageArray isnsServerRefresh` command returns an error if you did not set the configuration method to DHCP. To set the configuration method to DHCP, use the `set storageArray isnsIPV4ConfigurationMethod` command.

Start storage array iSNS server refresh

The `start storageArray isnsServerRefresh` command initiates a refresh of the network address information for the iSNS server.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

If the DHCP server is marginal or unresponsive, the refresh operation can take from two to three minutes to complete.

Note: This command is for IPv4 only.

Syntax

```
start storageArray isnsServerRefresh
```

Parameter

None.

Notes

If you used the `set storageArray isnsIPv4ConfigurationMethod` command to set the configuration but did not set the configuration to DHCP, running the `start storageArray isnsServerRefresh` returns an error.

ISCSI commands

Create iSCSI initiator

The `create iscsiInitiator` command creates a new iSCSI initiator object.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Important: This command is deprecated and is replaced by the command.

Syntax

```
create iscsiInitiator iscsiName="iscsiID"
userLabel="name"
host="hostName"
[chapSecret="securityKey"]
```

Parameters

Parameters	Description
iscsiName	The default identifier of the iSCSI initiator. Enclose the identifier in double quotation marks (" ").
userLabel	The name that you want to use for the iSCSI initiator. Enclose the name in double quotation marks (" ").
host	The name of the host in which the iSCSI initiator is installed. Enclose the name in double quotation marks (" ").
chapSecret	The security key that you want to use to authenticate a peer connection. Enclose the security key in double quotation marks (" ").

Notes

Challenge Handshake Authentication Protocol (CHAP) is a protocol that authenticates the peer of a connection. CHAP is based upon the peers sharing a *secret* . A secret is a security key that is similar to a password.

Use the **chapSecret** parameter to set up the security keys for initiators that require a mutual authentication.

Delete iSCSI initiator

The `delete iscsiInitiator` command deletes a specific iSCSI initiator object.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Important: This command is deprecated and is replaced by the " Delete initiator " on page 110 command.

Syntax

```
delete iscsiInitiator (<"iscsiID"> | ["name"])
```

Parameters

Parameter	Description
iscsiInitiator	The identifier of the iSCSI initiator that you want to delete. The identifier of the iSCSI initiator can be either an iSCSI ID or a unique name. Enclose an iSCSI ID in double quotation marks (" ") inside angle brackets (< >). Enclose the name in double quotation marks (" ") inside square brackets ([ ]).

Diagnose controller iSCSI host cable

The `diagnose controller iscsiHostPort` command runs diagnostic tests on the copper cables between iSCSI host interface cards and a controller.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

You can run diagnostics on a selected port or all ports. The ports must be able to support the cable diagnostics. If the ports do not support cable diagnostics, an error is returned.

Syntax

```
diagnose controller [(a|b)]
iscsiHostPort ([all] | [portLabel])
testID=cableDiagnostics
```

Parameters

Parameter	Description
controller	The controller on which you want to run the cable diagnostic test. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . Enclose the controller identifier in square brackets ([ ]). If you do not specify a controller, the storage management software returns a syntax error.
iscsiHostPort	The iSCSI host port on which you want to run the diagnostic tests. You can run the diagnostics on all iSCSI host ports, or you can run the diagnostics on a specific iSCSI host port. See the following for more information: " Identifying an iSCSI host port label " on page 466
testID	The identifier for the diagnostic test that you want to run. For this diagnostic test, the only choice is cableDiagnostics .

Identifying an iSCSI host port label

You must specify a label for the host port. Follow these steps to specify the host port label:

1. If you do not know the port label for the iSCSI host port, run the `show controller` command.
2. In the Host interface section of the results, locate the host port you want to select.

   Note: The port label is the complete value returned for the **Port** field.

3. Enclose the entire value of the port label in both quotes and square brackets: [" `portLabel` "]. For example, if the port label is `Ch 2` , specify the iSCSI host port as follows:

   ```
   iscsiHostPort[\"ch 2\"]
   ```

   Note: If you are using a Windows command line and the label contains a pipe (|), the character should be escaped (using ^); otherwise, it will be interpreted as a command. For example, if the port label is `e0b|0b` , specify the iSCSI host port as follows:

   ```
   iscsiHostPort[\"e0b^|0b\"]
   ```

Notes

When you run the cable diagnostic test, the firmware returns the following information:

- Host Port: The port on which the diagnostic test was run.
- HIC: The host interface card associated with this port.
- The date and time the test was run.
- Status:
  - OK: All of the pairs of cables are good and do not have any faults.
  - Open: One or more of the four pairs of cables are open.
  - Short: One or more of the four pairs of cables are shorted.
  - Incomplete: One or more of the four pairs returned incomplete or invalid test results.
- Length – The length of the cables are listed in meters and the following information about the cables is returned:

– When the cable status is OK, the approximate lengths of the cable pairs are returned. The lengths of the cable pairs are shown as a range (L1-L2), which are the shortest and the longest lengths of the cable pairs.

– If the cable status is Open or Short, the approximate distance to the failure in the cable pairs. If there is one failure, the length is reported for that cable pair. If there is more than one failure, the information returned is both the shortest and longest lengths to the failures. The lengths are listed as a range (L1-L2) where L1<L2.

– If the cable status is Incomplete, the information returned are the lengths for the shortest and longest cable pairs that the firmware can successfully test. The lengths are listed for the valid cable pairs as a range (L1-L2) where L1<L2.

• Register values for the cable diagnostic registers. The values are in a hexadecimal format:

– Two bytes show the combined cable status (four bits per port).

– Four two-byte numbers show the length of each channel.

Reset storage array iSCSI baseline

The `reset storageArray iscsiStatsBaseline` command resets the iSCSI baseline to 0 for the storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Important: This command is deprecated and is replaced by the " Reset storage array host port statistics baseline " on page 111 command.

Syntax

```
reset storageArray iscsiStatsBaseline
```

Parameters

None.

Notes

This command resets the baseline to 0 for both controllers in the storage array. The purpose of resetting both of the controller baselines is to help make sure that the controller counts are synchronized between the controllers. If one controller resets but the second controller does not reset, the host is informed that the controllers are out of synchronization. The host is informed by the time stamps that are reported with the statistics.

Save storage array iSCSI statistics

The `save storageArray iscsiStatistics` command saves the iSCSI performance statistics of the storage array to a file.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Important: This command is deprecated and is replaced by the " Save storage array host port statistics " on page 112 command.

Syntax

```
save storageArray iscsiStatistics [(raw | baseline)] file="filename"
```

Parameters

Parameter	Description
raw	The statistics collected are all statistics from the controller start-of-day. Enclose the parameter in square brackets ([ ]).
baseline	The statistics that are collected are all statistics from the time the controllers were reset to zero using the `reset storageArray ibStatsBaseline` command. Enclose the parameter in square brackets ([ ]).
file	The file path and the file name to which you want to save the performance statistics. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\iscsistat.csv"` The default name of the file that contains the iSCSI performance statistics is `iscsi-statistics.csv`. You can use any file name, but you must use the `.csv` extension.

Notes

If you have not reset the iSCSI baseline statistics since the controller start-of-day, the time at the start-of-day is the default baseline time.

Set iSCSI initiator

The `set iscsiInitiator` command sets the attributes for an iSCSI initiator.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Important: This command is deprecated and is replaced by the " Set initiator " on page 111 command.

Syntax

```
set iscsiInitiator (["initiatorUserLabel"] | <"iscsiInitiatorName">)
(userLabel="newName" |
host="newHostName" |
chapSecret="newSecurityKey")
```

Parameters

Parameter	Description
initiatorUserLabel	The iscsi Initiator user label of the iSCSI initiator for which you want to set attributes. Enclose the iSCSI initiator user label in double quotation marks (" ") inside square brackets ([ ]). **Note:** Begin the initiator user label with the host name to which the host port is connected. Because there can be more than one host port identifier on a host, use a unique suffix for the host port ID. If the host name is `ICTM1590S02H1` the initiator label appears as follows: `set iscsiInitiator ["ICTM1590S02H1_AA"]`
iscsiInitiatorName	The name of the initiator for which you want to set attributes. Enclose the **iscsiInitiatorName** in double quotation marks (" ") inside angle brackets (< >). **Note:** The **iscsiInitiatorName** is the iSCSI Qualified Name (iqn). An example: `set iscsiInitiator <"iqn.2016-11.com.vmware.iscsi:ictm1509s02h1">`
userLabel	The new user label that you want to use for the iSCSI initiator. Enclose the new user label in double quotation marks (" "). **Note:** A best practice is to begin the initiator user label with the host name to which the host port is connected. Because there can be more than one host port identifier on a host, use a unique suffix for the host port ID. If the host name is `ICTM1590S02H1` then an example of the initiator user label is shown below: `set iscsiInitiator ["ICTM1590S02H1_AA"]`
host	The name of the new host to which the host port is connected. Enclose the host name in double quotation marks (" "). An example is shown below: `["ICTM1590S02H2"]`
chapSecret	The security key that you want to use to authenticate a peer connection. Enclose the security key in double quotation marks (" ").

Notes

You can use any combination of alphanumeric characters, hyphens, and underscores for the names. Names can have a maximum of 30 characters.

Challenge Handshake Authentication Protocol (CHAP) is a protocol that authenticates the peer of a connection. CHAP is based upon the peers sharing a *secret* . A secret is a security key that is similar to a password.

Use the **chapSecret** parameter to set up the security keys for initiators that require a mutual authentication. The CHAP secret must be between 12 characters and 57 characters. This table lists the valid characters.

Space	!	"	#	$	%	&	'	(	)	*	+
,	-	.	/	0	1	2	3	4	5	6	7
8	9	:	;	<	=	>	?	@	A	B	C
D	E	F	G	H	I	J	K	L	M	N	O

P	Q	R	S	T	U	V	W	X	Y	Z	[
\	]	^	_	'	a	b	c	d	e	f	g
h	i	j	k	l	m	n	o	p	q	r	s
t	u	v	w	x	y	z	{	|	}	~	

Set iSCSI target properties

The `set iscsiTarget` command defines properties for an iSCSI target.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Important: This command is deprecated and is replaced by the command.

Syntax

```
set iscsiTarget ["userLabel"]
authenticationMethod=(none | chap) |
chapSecret=securityKey |
targetAlias="userLabel"
```

Parameters

Parameter	Description
iscsiTarget	The iSCSI target for which you want to set properties. Enclose the *userLabel* in double quotation marks (" "). You must also enclose the *userLabel* in square brackets ([ ]) if the user label is a target alias or angle brackets (< >) if the user label is an iSCSI Qualified Name (IQN).
authenticationMethod	The means of authenticating your iSCSI session.
chapSecret	The security key that you want to use to authenticate a peer connection.
targetAlias	The new name that you want to use for the target. Enclose the name in double quotation marks (" ").

Notes

Challenge Handshake Authentication Protocol (CHAP) is a protocol that authenticates the peer of a connection. CHAP is based upon the peers sharing a *secret* . A secret is a security key that is similar to a password.

Use the **chapSecret** parameter to set up the security keys for initiators that require a mutual authentication. The CHAP secret must be between 12 characters and 57 characters. This table lists the valid characters.

Space	!	"	#	$	%	&	'	(	)	*	+
,	-	.	/	0	1	2	3	4	5	6	7
8	9	:	;	<	=	>	?	@	A	B	C
D	E	F	G	H	I	J	K	L	M	N	O

P	Q	R	S	T	U	V	W	X	Y	Z	[
\	]	^	_	'	a	b	c	d	e	f	g
h	i	j	k	l	m	n	o	p	q	r	s
t	u	v	w	x	y	z	{			}	~	

Show current iSCSI sessions

The `show iscsiSessions` command returns information about an iSCSI session for either an iSCSI initiator or an iSCSI target.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
show iscsiInitiator ["initiatorName" | <"iqn">] iscsiSessions
show iscsiTarget ["targetName" | <"iqn">] iscsiSessions
```

Parameters

Parameter	Description
iscsiInitiator	The name of the iSCSI initiator for which you want to obtain session information. If the iSCSI initiator uses a label or an alias, enclose the iSCSI initiator label or alias in double quotation marks (" ") inside square brackets ([ ]). If the iSCSI initiator uses an iSCSI qualified name (IQN), enclose the IQN in double quotation marks (" ") inside angle brackets (< >).
iscsiTarget	The name of the iSCSI target for which you want to obtain session information. If the iSCSI target uses a label or an alias, enclose the iSCSI target label or alias in double quotation marks (" ") inside square brackets ([ ]). If the iSCSI target uses an iSCSI qualified name (IQN), enclose the IQN in double quotation marks (" ") inside angle brackets (< >).

Notes

If you enter this command without defining any arguments, this command returns information about all of the iSCSI sessions that are currently running. The following command returns information about all of the current iSCSI sessions:

```
show iscsiSessions
```

To limit the information that is returned, enter a specific iSCSI initiator or a specific iSCSI target. This command then returns information about the session for only the iSCSI initiator or the iSCSI target that you named.

An initiator name can be any combination of alpha or numeric characters from 1 to 30 characters in length. An IQN can be up to 255 characters in length and has this format:

```
iqn.yyyy-mm.naming-authority:unique name
```

Show storage array negotiation defaults

The `show storageArray iscsiNegotiationDefaults` command returns information about connection-level settings that are subject to initiator-target negotiation.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Syntax

```
show storageArray iscsiNegotiationDefaults
```

Parameters

None.

Notes

Information returned includes controller tray default settings (that is, those settings that are the starting point for negotiation) and the current active settings.

Show storage array unconfigured iSCSI initiators

The `show storageArray unconfiguredIscsiInitiators` command returns a list of initiators that have been detected by the storage array but are not yet configured into the storage array topology.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

This command is deprecated. The command that replaces it is .

Syntax

```
show storageArray unconfiguredIscsiInitiators
```

Parameters

None.

Start iSCSI DHCP refresh

The `start controller iscsiHostPort dhcpRefresh` command initiates a refresh of the DHCP parameters for the iSCSI interface.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

If the configuration method for the interface is not set to DHCP, the procedure returns an error.

Syntax

```
start controller [(a|b)] iscsiHostPort [portLabel] dhcpRefresh
```

Parameter

Parameter	Description
controller	The identifier letter of the controller that has the iSCSI host ports. Valid controller identifier values are a or b where a is the controller in slot A , and b is the controller in slot B .
iscsiHostPort	The host port label or the number of the iSCSI host port for which you want to refresh the DHCP parameters. See the following for more information: " Identifying an iSCSI host port label " on page 473

Identifying an iSCSI host port label

You must specify a label for the host port. Follow these steps to specify the host port label:

1. If you do not know the port label for the iSCSI host port, run the `show controller` command.
2. In the Host interface section of the results, locate the host port you want to select.

   Note: The port label is the complete value returned for the **Port** field.

3. Enclose the entire value of the port label in both quotes and square brackets: [" portLabel "]. For example, if the port label is `Ch 2` , specify the iSCSI host port as follows:

   ```
   iscsiHostPort[\"ch 2\"]
   ```

   Note: If you are using a Windows command line and the label contains a pipe (|), the character should be escaped (using ^); otherwise, it will be interpreted as a command. For example, if the port label is `e0b|0b` , specify the iSCSI host port as follows:

   ```
   iscsiHostPort[\"e0b^|0b\"]
   ```

Notes

This operation ends the iSCSI connections for the portal and temporarily brings down the portal.

Stop storage array iSCSI session

The `stop storageArray iscsiSession` command forces the termination of a storage array iSCSI session.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

`stop storageArray iscsiSession [`*sessionNumber*`]`

Parameter

Parameter	Description
iscsiSession	The identifier number of the iSCSI session. Enclose the identifier number of the iSCSI session in square brackets ([ ]).

Volume commands

Check volume parity

The `check volume parity` command checks a volume for parity and media errors, and then writes the results of the check to a file.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
check volume [volumeName] parity
[parityErrorFile=filename]
[mediaErrorFile=filename]
[priority=(highest | high | medium | low | lowest)]
[startingLBA=LBAvalue]
[endingLBA=LBAvalue]
[verbose=(TRUE | FALSE)]
```

Parameters

Parameter	Description
volume	The name of the specific volume for which you want to check parity. Enclose the volume name in square brackets ([ ]). If the volume name contains special characters or consists only of numbers, you must enclose the identifier in double quotation marks (" ") inside square brackets.
parityErrorFile	The file path and the file name to which you want to save the parity error information. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\parerr.txt"` This command does not automatically append a file extension to the saved file. You must specify a file extension when entering the file name.

Parameter	Description
mediaErrorFile	The file path and the file name to which you want to save the media error information. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\logs\mederr.txt"` This command does not automatically append a file extension to the saved file. You must specify a file extension when entering the file name.
priority	The priority that the parity check has relative to host I/O activity. Valid values are highest , high , medium , low , or lowest .The lowest priority rate benefits system performance, but the parity check takes longer. The highest priority rate benefits the parity check, but system performance might be compromised.
startingLBA	The starting logical block address.
endingLBA	The ending logical block address.
verbose	The setting to capture progress details, such as percent complete, and to show the information as the volume parity is being scanned. To capture progress details, set this parameter to TRUE . To prevent capturing progress details, set this parameter to FALSE .

Notes

The starting logical block address and the ending logical block address are useful for very large single-volume LUNs or namespaces. Running a volume parity check on a very large single volume LUN or namespace can take a long time. By defining the beginning address and ending address of the data blocks, you can reduce the time that a volume parity check takes to complete.

Clear volume reservations

The `clear volume reservations` command clears persistent volume reservations.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
clear (allVolumes | volume [volumeName] |
volumes ["volumeName1" ... "volumeNameN"]) reservations
```

Parameters

Parameter	Description
allVolumes	The setting to clear persistent volume reservations on all of the volumes in the storage array.
volume	The name of a volume for which you are clearing persistent reservations. Enclose the volume name in square brackets ([ ]). If the volume name contains special characters or consists only of numbers, you must enclose the name in double quotation marks (" ") inside square brackets.
volumes	The names of several volumes for which you are clearing persistent reservations. Enter the names of the member volumes using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.

Notes

You can use any combination of alphanumeric characters, hyphens, and underscores for the names. Names can have a maximum of 30 characters.

Clear volume unreadable sectors

The `clear volume unreadableSectors` command clears unreadable sector information from one or more volumes.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
clear (allVolumes | volume [volumeName] |
volumes ["volumeName1" ... "volumeNameN"]) unreadableSectors
```

Parameters

Parameter	Description
allVolumes	The setting to clear unreadable sector information from all of the volumes in the storage array.
volume	The name of a volume for which you are clearing unreadable sector information. Enclose the volume name in square brackets ([ ]). If the volume name contains special characters or consists only of numbers, you must enclose the name in double quotation marks (" ") inside square brackets.
volumes	The names of several volumes for which you are clearing unreadable sector information. Enter the names of the member volumes using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.

Notes

You can use any combination of alphanumeric characters, hyphens, and underscores for the names. Names can have a maximum of 30 characters.

Create RAID volume (automatic drive select)

The `create volume` command creates a volume group across the drives in the storage array and a new volume in the volume group. The storage array controllers choose the drives to be included in the volume.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Note: If you have drives with different capacities, you cannot automatically create volumes by specifying the **driveCount** parameter. If you want to create volumes with drives of different capacities, see " Create RAID volume (manual drive select) " on page 483 .

Syntax

```
create volume driveCount=numberOfDrives
[volumeGroupUserLabel="volumeGroupName"]
raidLevel=(0 | 1 | 3 | 5 | 6)
userLabel="volumeName"
driveMediaType=(HDD | SSD | unknown | allMedia)
[driveType= SAS]
[capacity=volumeCapacity]
[owner=(a|b)]
[cacheReadPrefetch=(TRUE | FALSE)]
[segmentSize=segmentSizeValue]
[usageHint=(fileSystem | dataBase | multiMedia)]
[trayLossProtect=(TRUE | FALSE)]
[drawerLossProtect=(TRUE | FALSE)]
[dssPreAllocate=(TRUE | FALSE)]
[securityType=(none | capable | enabled)]
[secureDrives=(fips | fde )]
[dataAssurance=(none | enabled)]
```

Parameters

Parameter	Description
driveCount	The number of unassigned drives that you want to use in the volume group.
volumeGroupUserLabel	The name that you want to give the new volume group. Enclose the new volume group name in double quotation marks (" "). **Note:** If you do not specify a user label for the volume group, the controller firmware assigns it a number.
raidLevel	The RAID level of the volume group that contains the volume. Valid values are 0 , 1 , 3 , 5 , or 6 .
userLabel	The name that you want to give to the new volume. Enclose the new volume name in double quotation marks (" "). **Note:** This parameter is required.

Parameter	Description
driveMediaType	The type of drive media that you want to use for the volume group. These drive media are valid: • HDD – Use this option when you have hard drives in the drive tray except for DE4000F and DE6000F. • SSD – Use this option when you have solid state drives in the drive tray. • unknown – Use this option if you are not sure what types of drive media are in the drive tray. • allMedia – Use this option when you want to use all types of drive media that are in the drive tray.
driveType	The type of drive that you want to use in the volume. You cannot mix drive types. You must use this parameter when you have more than one type of drive in your storage array. Valid drive type is: SAS
capacity	The size of the volume that you are adding to the storage array. Size is defined in units of bytes , KB , MB , GB , or TB .
owner	The controller that owns the volume. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . If you do not specify an owner, the controller firmware determines the owner.
cacheReadPrefetch	The setting to turn on or turn off cache read prefetch. To turn off cache read prefetch, set this parameter to FALSE . To turn on cache read prefetch, set this parameter to TRUE .
segmentSize	The amount of data (in KB) that the controller writes on a single drive in a volume before writing data on the next drive. Valid values are 8 , 16 , 32 , 64 , 128 , 256 , or 512 .
usageHint	The setting for both **cacheReadPrefetch** parameter and the **segmentSize** parameter to be default values. The default values are based on the typical I/O usage pattern of the application that is using the volume. Valid values are fileSystem , dataBase , or multiMedia .
trayLossProtect	The setting to enforce tray loss protection when you create the volume group. To enforce tray loss protection, set this parameter to TRUE . The default value is FALSE .
drawerLossProtect	The setting to enforce drawer loss protection when you create the mirror repository volume group. To enforce drawer loss protection, set this parameter to TRUE . The default value is FALSE .
dssPreAllocate	The setting to make sure that reserve capacity is allocated for future segment size increases. The default value is TRUE .
securityType	The setting to specify the security level when creating the volume groups and all associated volumes. These settings are valid: • none – The volume group and volumes are not secure. • capable – The volume group and volumes are capable of having security set, but security has not been enabled. • enabled – The volume group and volumes have security enabled.

Notes

You can use any combination of alphanumeric characters, hyphens, and underscores for the names. Names can have a maximum of 30 characters.

The **driveCount** parameter lets you choose the number of drives that you want to use in the volume group. You do not need to specify the drives by tray ID and slot ID. The controllers choose the specific drives to use for the volume group.

The **owner** parameter defines which controller owns the volume.

If you do not specify a capacity using the **capacity** parameter, all of the drive capacity that is available in the volume group is used. If you do not specify capacity units, bytes is used as the default value.

Segment size

The size of a segment determines how many data blocks that the controller writes on a single drive in a volume before writing data on the next drive. Each data block stores 512 bytes of data. A data block is the smallest unit of storage. The size of a segment determines how many data blocks that it contains. For example, an 8-KB segment holds 16 data blocks. A 64-KB segment holds 128 data blocks.

When you enter a value for the segment size, the value is checked against the supported values that are provided by the controller at run time. If the value that you entered is not valid, the controller returns a list of valid values. Using a single drive for a single request leaves other drives available to simultaneously service other requests. If the volume is in an environment where a single user is transferring large units of data (such as multimedia), performance is maximized when a single data transfer request is serviced with a single data stripe. (A data stripe is the segment size that is multiplied by the number of drives in the volume group that are used for data transfers.) In this case, multiple drives are used for the same request, but each drive is accessed only once.

For optimal performance in a multiuser database or file system storage environment, set your segment size to minimize the number of drives that are required to satisfy a data transfer request.

Usage Hint

Note: You do not need to enter a value for the **cacheReadPrefetch** parameter or the **segmentSize** parameter. If you do not enter a value, the controller firmware uses the **usageHint** parameter with fileSystem as the default value. Entering a value for the **usageHint** parameter and a value for the **cacheReadPrefetch** parameter or a value for the **segmentSize** parameter does not cause an error. The value that you enter for the **cacheReadPrefetch** parameter or the **segmentSize** parameter takes priority over the value for the **usageHint** parameter. The segment size and cache read prefetch settings for various usage hints are shown in the following table:

Usage hint	Segment size setting	Dynamic cache read prefetch setting
File system	128 KB	Enabled
Database	128 KB	Enabled
Multimedia	256 KB	Enabled

Cache read prefetch

Cache read prefetch lets the controller copy additional data blocks into cache while the controller reads and copies data blocks that are requested by the host from the drive into cache. This action increases the chance that a future request for data can be fulfilled from cache. Cache read prefetch is important for multimedia applications that use sequential data transfers. Valid values for the **cacheReadPrefetch** parameter are TRUE or FALSE . The default is TRUE .

Security type

Use the **securityType** parameter to specify the security settings for the storage array.

Before you can set the **securityType** parameter to enabled , you must create a storage array security key. Use the `create storageArray securityKey` command to create a storage array security key. These commands are related to the security key:

- `create storageArray securityKey`
- `export storageArray securityKey`
- `import storageArray securityKey`
- `set storageArray securityKey`
- `enable volumeGroup [volumeGroupName] security`
- `enable diskPool [diskPoolName] security`

Secure drives

Secure-capable drives can be either Full Disk Encryption (FDE) drives or Federal Information Processing Standard (FIPS) drives. Use the **secureDrives** parameter to specify the type of secure drives to use. The values you can use are fips and fde .

Tray loss protection and drawer loss protection

To enable tray/drawer loss protection, refer to the following tables for additional criteria:

Level	Criteria for Shelf Loss Protection	Minimum number of shelves required
Disk Pool	The disk pool contains no more than two drives in a single tray.	6
RAID 6	The volume group contains no more than two drives in a single shelf.	3
RAID 3 or RAID 5	Each drive in the volume group is located in a separate shelf.	3
RAID 1	Each drive in a RAID 1 pair must be located in a separate shelf.	2
RAID 0	Cannot achieve Shelf Loss Protection.	Not applicable

Level	Criteria for drawer loss protection	Minimum number of drawers required
Disk Pool	The pool includes drives from all five drawers and there are an equal number of drives in each drawer. A 60-drive tray can achieve Drawer Loss Protection when the disk pool contains 15, 20, 25, 30, 35, 40, 45, 50, 55, or 60 drives.	5
RAID 6	The volume group contains no more than two drives in a single drawer.	3
RAID 3 or RAID 5	Each drive in the volume group is located in a separate drawer.	3
RAID 1	Each drive in a mirrored pair must be located in a separate drawer.	2
RAID 0	Cannot achieve Drawer Loss Protection.	Not applicable

Example command

```
create volume driveCount=2 volumeGroupUserLabel="FIPS_VG" raidLevel=1 userLabel="FIPS_V"
driveMediaType=HDD securityType=capable secureDrives=fips
```

Create RAID volume (free extent based select)

The `create volume` command creates a volume in the free space of a volume group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
create volume volumeGroup="volumeGroupName"
userLabel="volumeName"
[freeCapacityArea=freeCapacityIndexNumber]
[capacity=volumeCapacity]
[owner=(a|b)]
[cacheReadPrefetch=(TRUE | FALSE)]
[segmentSize=segmentSizeValue]
[usageHint=(fileSystem | dataBase | multiMedia)]
[dssPreAllocate=(TRUE | FALSE)]
[securityType=(none | capable | enabled)]
[dataAssurance=(none | enabled)]
```

Parameters

Parameter	Description
volumeGroup	The name of a specific volume group in your storage array. Enclose the volume group name in double quotation marks (" ").
userLabel	The name that you want to give the new volume. Enclose the new volume name in double quotation marks (" "). **Note:** This parameter is required.
freeCapacityArea	The index number of the free space in an existing volume group that you want to use to create the new volume. Free capacity is defined as the free capacity between existing volumes in a volume group. For example, a volume group might have the following areas: volume 1, free capacity, volume 2, free capacity, volume 3, free capacity. To use the free capacity following volume 2, you would enter this index number: **freeCapacityArea=2** **Note:** Run the `show volumeGroup` command to determine whether the free capacity area exists. **Note:** If this parameter is not specified, the volume is created in the lowest-numbered free capacity area with sufficient capacity for the volume.
capacity	The size of the volume that you are adding to the storage array. Size is defined in units of bytes , KB , MB , GB , or TB .
owner	The controller that owns the volume. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . If you do not specify an owner, the controller firmware determines the owner.

Parameter	Description
cacheReadPrefetch	The setting to turn on or turn off cache read prefetch. To turn on cache read prefetch, set this parameter to TRUE . To turn off cache read prefetch, set this parameter to FALSE .
segmentSize	The amount of data (in KB) that the controller writes on a single drive in a volume before writing data on the next drive. Valid values are 8 , 16 , 32 , 64 , 128 , 256 , or 512 .
usageHint	The settings for both the **cacheReadPrefetch** parameter and the **segmentSize** parameter to be default values. The default values are based on the typical I/O usage pattern of the application that is using the volume. Valid values are fileSystem , dataBase , or multiMedia .
dssPreAllocate	The setting to make sure that reserve capacity is allocated for future segment size increases. The default value is TRUE .
securityType	The setting to specify the security level when creating the volume groups and all associated volumes. These settings are valid: none – The volume group and volumes are not secure. capable – The volume group and volumes are capable of having security set, but security has not been enabled. enabled – The volume group and volumes have security enabled.

Notes

You can use any combination of alphanumeric characters, hyphens, and underscores for the names. Names can have a maximum of 30 characters.

The **owner** parameter defines which controller owns the volume. The preferred controller ownership of a volume is the controller that currently owns the volume group.

If you do not specify a capacity using the **capacity** parameter, all of the available capacity in the free capacity area of the volume group is used. If you do not specify capacity units, bytes is used as the default value.

Segment size

The size of a segment determines how many data blocks that the controller writes on a single drive in a volume before writing data on the next drive. Each data block stores 512 bytes of data. A data block is the smallest unit of storage. The size of a segment determines how many data blocks that it contains. For example, an 8-KB segment holds 16 data blocks. A 64-KB segment holds 128 data blocks.

When you enter a value for the segment size, the value is checked against the supported values that are provided by the controller at run time. If the value that you entered is not valid, the controller returns a list of valid values. Using a single drive for a single request leaves other drives available to simultaneously service other requests. If the volume is in an environment where a single user is transferring large units of data (such as multimedia), performance is maximized when a single data transfer request is serviced with a single data stripe. (A data stripe is the segment size that is multiplied by the number of drives in the volume group that are used for data transfers.) In this case, multiple drives are used for the same request, but each drive is accessed only once.

For optimal performance in a multiuser database or file system storage environment, set your segment size to minimize the number of drives that are required to satisfy a data transfer request.

Usage Hint

Note: You do not need to enter a value for the **cacheReadPrefetch** parameter or the **segmentSize** parameter. If you do not enter a value, the controller firmware uses the **usageHint** parameter with fileSystem as the default value. Entering a value for the **usageHint** parameter and a value for the **cacheReadPrefetch** parameter or a value for the **segmentSize** parameter does not cause an error. The value that you enter for the **cacheReadPrefetch** parameter or the **segmentSize** parameter takes priority over the value for the **usageHint** parameter. The segment size and cache read prefetch settings for various usage hints are shown in the following table:

Usage hint	Segment size setting	Dynamic cache read prefetch setting
File system	128 KB	Enabled
Database	128 KB	Enabled
Multimedia	256 KB	Enabled

Cache read prefetch

Cache read prefetch lets the controller copy additional data blocks into cache while the controller reads and copies data blocks that are requested by the host from the drive into cache. This action increases the chance that a future request for data can be fulfilled from cache. Cache read prefetch is important for multimedia applications that use sequential data transfers. Valid values for the **cacheReadPrefetch** parameter are TRUE or FALSE . The default is TRUE .

Security type

Use the **securityType** parameter to specify the security settings for the storage array.

Before you can set the **securityType** parameter to enabled , you must create a storage array security key. Use the `create storageArray securityKey` command to create a storage array security key. These commands are related to the security key:

- `create storageArray securityKey`
- `export storageArray securityKey`
- `import storageArray securityKey`
- `set storageArray securityKey`
- `enable volumeGroup [volumeGroupName] security`
- `enable diskPool [diskPoolName] security`

Create RAID volume (manual drive select)

The `create volume` command creates a new volume group and volume, and lets you specify the drives for the volume.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
create volume drives=(trayID1,[drawerID1,]slotID1 ... trayIDn,[drawerIDn,]slotIDn)
[volumeGroupUserLabel="volumeGroupName"]
raidLevel=(0 | 1 | 3 | 5 | 6)
```

```
userLabel="volumeName"
[capacity=volumeCapacity]
[owner=(a|b)]
[cacheReadPrefetch=(TRUE | FALSE)]
[segmentSize=segmentSizeValue]
[usageHint=(fileSystem | dataBase | multiMedia)]
[trayLossProtect=(TRUE | FALSE)]
[drawerLossProtect=(TRUE | FALSE)]
[dssPreAllocate=(TRUE | FALSE)]
[securityType=(none | capable | enabled )]
[dataAssurance=(none | enabled)]
```

Parameters

Parameter	Description
drives	The drives that you want to assign to the volume that you want to create. For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).
volumeGroupUserLabel	The name that you want to give the new volume group. Enclose the volume group name in double quotation marks (" "). **Note:** If you do not specify a user label for the volume group, the controller firmware assigns it a number.
raidLevel	The RAID level of the volume group that contains the volume. Valid values are 0 , 1 , 3 , 5 , or 6 .
userLabel	The name that you want to give the new volume. Enclose the new volume name in double quotation marks (" "). **Note:** This parameter is required.
capacity	The size of the volume that you are adding to the storage array. Size is defined in units of bytes , KB , MB , GB , or TB .
owner	The controller that owns the volume. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . If you do not specify an owner, the controller firmware determines the owner.
cacheReadPrefetch	The setting to turn on or turn off cache read prefetch. To turn off cache read prefetch, set this parameter to FALSE . To turn on cache read prefetch, set this parameter to TRUE .
segmentSize	The amount of data (in KB) that the controller writes on a single drive in a volume before writing data on the next drive. Valid values are 4 (SSD only) 8 , 16 , 32 , 64 , 128 , 256 , or 512 .
usageHint	The settings for both the **cacheReadPrefetch** parameter and the **segmentSize** parameter to be default values. The default values are based on the typical I/O usage pattern of the application that is using the volume. Valid values are fileSystem , dataBase , or multiMedia .
trayLossProtect	The setting to enforce tray loss protection when you create the repository. To enforce tray loss protection, set this parameter to TRUE . The default value is FALSE .

Parameter	Description
drawerLossProtect	The setting to enforce drawer loss protection when you create the mirrored repository volume. To enforce drawer loss protection, set this parameter to TRUE . The default value is FALSE .
dssPreAllocate	The setting to make sure that reserve capacity is allocated for future segment size increases. This default value is TRUE .
securityType	The setting to specify the security level when creating the volume groups and all associated volumes. These settings are valid: • none – The volume group and volumes are not secure. • capable – The volume group and volumes are capable of having security set, but security has not been enabled. • enabled – The volume group and volumes have security enabled.

Notes

The **drives** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0 , and specify the ID of the slot in which a drive resides.

If you set the **raidLevel** parameter to RAID level 1:

• There are an even number of drives in the group, by RAID 1 definition

• The first half of the group, in listed order (and in stripe order), are primary drives

• The second half of the group, in listed order (and in stripe order), are the corresponding mirror drives

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the names. Names can have a maximum of 30 characters.

The **owner** parameter defines which controller owns the volume. The preferred controller ownership of a volume is the controller that currently owns the volume group.

If you do not specify a capacity using the **capacity** parameter, all of the drive capacity that is available in the volume group is used. If you do not specify capacity units, bytes is used as the default value.

Tray loss protection and drawer loss protection

For tray loss protection to work, your configuration must adhere to the following guidelines:

Level	Criteria for Shelf Loss Protection	Minimum number of shelves required
Disk Pool	The disk pool contains no more than two drives in a single tray.	6
RAID 6	The volume group contains no more than two drives in a single shelf.	3
RAID 3 or RAID 5	Each drive in the volume group is located in a separate shelf.	3

Level	Criteria for Shelf Loss Protection	Minimum number of shelves required
RAID 1	Each drive in a RAID 1 pair must be located in a separate shelf.	2
RAID 0	Cannot achieve Shelf Loss Protection.	Not applicable

For drawer loss protection to work (in high density enclosure environments), your configuration must adhere to the following guidelines:

Level	Criteria for drawer loss protection	Minimum number of drawers required
Disk Pool	The pool includes drives from all five drawers and there are an equal number of drives in each drawer. A 60-drive tray can achieve Drawer Loss Protection when the disk pool contains 15, 20, 25, 30, 35, 40, 45, 50, 55, or 60 drives.	5
RAID 6	The volume group contains no more than two drives in a single drawer.	3
RAID 3 or RAID 5	Each drive in the volume group is located in a separate drawer.	3
RAID 1	Each drive in a mirrored pair must be located in a separate drawer.	2
RAID 0	Cannot achieve Drawer Loss Protection.	Not applicable

Segment size

The size of a segment determines how many data blocks that the controller writes on a single drive in a volume before writing data on the next drive. Each data block stores 512 bytes of data. A data block is the smallest unit of storage. The size of a segment determines how many data blocks that it contains. For example, an 8-KB segment holds 16 data blocks. A 64-KB segment holds 128 data blocks.

When you enter a value for the segment size, the value is checked against the supported values that are provided by the controller at run time. If the value that you entered is not valid, the controller returns a list of valid values. Using a single drive for a single request leaves other drives available to simultaneously service other requests. If the volume is in an environment where a single user is transferring large units of data (such as multimedia), performance is maximized when a single data transfer request is serviced with a single data stripe. (A data stripe is the segment size that is multiplied by the number of drives in the volume group that are used for data transfers.) In this case, multiple drives are used for the same request, but each drive is accessed only once.

For optimal performance in a multiuser database or file system storage environment, set your segment size to minimize the number of drives that are required to satisfy a data transfer request.

Usage Hint

Note: You do not need to enter a value for the **cacheReadPrefetch** parameter or the **segmentSize** parameter. If you do not enter a value, the controller firmware uses the **usageHint** parameter with fileSystem as the default value. Entering a value for the **usageHint** parameter and a value for the **cacheReadPrefetch** parameter or a value for the **segmentSize** parameter does not cause an error. The value that you enter for the **cacheReadPrefetch** parameter or the **segmentSize** parameter takes priority over the value for the **usageHint** parameter. The segment size and cache read prefetch settings for various usage hints are shown in the following table:

Usage hint	Segment size setting	Dynamic cache read prefetch setting
File system	128 KB	Enabled
Database	128 KB	Enabled
Multimedia	256 KB	Enabled

Cache read prefetch

Cache read prefetch lets the controller copy additional data blocks into cache while the controller reads and copies data blocks that are requested by the host from the drive into cache. This action increases the chance that a future request for data can be fulfilled from cache. Cache read prefetch is important for multimedia applications that use sequential data transfers. Valid values for the **cacheReadPrefetch** parameter are TRUE or FALSE . The default is TRUE .

You do not need to enter a value for the **cacheReadPrefetch** parameter or the **segmentSize** parameter. If you do not enter a value, the controller firmware uses the **usageHint** parameter with fileSystem as the default value. Entering a value for the **usageHint** parameter and a value for the **cacheReadPrefetch** parameter or a value for the **segmentSize** parameter does not cause an error. The value that you enter for the **cacheReadPrefetch** parameter or the **segmentSize** parameter takes priority over the value for the **usageHint** parameter.

Security type

Use the **securityType** parameter to specify the security settings for the storage array.

Before you can set the **securityType** parameter to enabled , you must create a storage array security key. Use the `create storageArray securityKey` command to create a storage array security key. These commands are related to the security key:

- `create storageArray securityKey`
- `export storageArray securityKey`
- `import storageArray securityKey`
- `set storageArray securityKey`
- `enable volumeGroup [volumeGroupName] security`
- `enable diskPool [diskPoolName] security`

Create volume in disk pool

The `create volume diskPool` command creates a new standard RAID volume or a thin volume in an existing disk pool.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Note: Some parameters for creating a standard RAID volume in a volume group are not compatible for creating volumes of any type in a disk pool. When using older scripts to create volumes in disk pools, make sure that all of the parameters are valid for disk pools. Invalid parameters prevent the scripts from running correctly and cause an error to be posted.

Syntax for Creating a Standard Volume

```
create volume diskPool="diskPoolName"
userLabel="volumeName"
capacity=volumeCapacity
[thinProvisioned=(TRUE | FALSE)]
[owner=(a|b)]
[mapping=(none|default)]
[dataAssurance=(none|enabled)]
[cacheReadPrefetch=(TRUE | FALSE)]
```

Syntax for Creating a Thin Provisioned Volume

```
create volume diskPool="diskPoolName"
userLabel="volumeName"
capacity=volumeCapacity
[thinProvisioned=(TRUE | FALSE)]
[owner=(a|b)]
[mapping=(none|default)]
[dataAssurance=(none|enabled)]
[(existingRepositoryLabel=existingRepositoryName |
[newRepositoryCapacity=newRepositoryCapacityValue (KB | MB | GB | TB | Bytes)]
[repositoryMaxCapacity=repositoryMaxCapacityValue(KB|MB|GB|TB|Bytes)]
[warningThresholdPercent=warningThresholdPercentValue]
[repositoryExpansionPolicy=(automatic|manual)]
[cacheReadPrefetch=(TRUE | FALSE)]
```

Parameters

Parameter	Description
diskPool	The name of the disk pool in which to create the new volume. Enclose the disk pool name in double quotation marks (" ").
userLabel	The name that you want to give the new volume. Enclose the volume name in double quotation marks (" ").
capacity	The size of the volume that you are creating. For a standard RAID volume, the capacity that will be allocated for the volume. For a thin volume, the virtual capacity value that will be exposed by the thin volume. Size is defined in units of bytes , KB , MB , GB , or TB . The following are examples of the syntax: • **capacity=500MB** • **capacity=2GB**
thinProvisioned	This parameter enables thin provisioning for the new volume. To use thin provisioning, set this parameter to TRUE . If you do not want thin provisioning, set this parameter to FALSE .
owner	The controller that owns the volume. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . If you do not specify an owner, the controller firmware determines the owner.

Parameter	Description
mapping	This parameter enables you to map the volume to a host. If you want to map later, set this parameter to none . If you want to map now, set this parameter to default . The volume is mapped to all hosts that have access to the storage pool. The default value is none .
existingRepositoryLabel	This parameter identifies an existing repository for a thin volume. A repository volume has the physical capacity for a thin volume. This parameter applies only for thin provisioning. If you use the **existingRepositoryLabel** parameter, you must not use the **newRepositoryCapacity** parameter.
newRepositoryCapacity	This parameter creates a new repository for a thin volume. A repository volume has the physical capacity for a thin volume. Use this parameter only if you set the value of the **thinProvisioned** parameter to TRUE . Size is defined in units of MB , GB , or TB . The following are examples of the syntax: • **capacity=500MB** • **capacity=2GB** The default value is 50 percent of the virtual capacity.
repositoryMaxCapacity	This parameter defines the maximum capacity for a repository for a thin volume. Use this parameter only if you se the value of the **thinProvisioned** parameter to TRUE . Size is defined in units of MB , GB , or TB . The following are examples of the syntax: • **capacity=500MB** • **capacity=2GB**
warningThresholdPercent	The percentage of thin volume capacity at which you receive a warning alert that the thin volume is nearing full. Use integer values. For example, a value of 70 means 70 percent. Valid values are from 1 to 100. Setting this parameter to 100 disables warning alerts.
repositoryExpansionPolicy	This parameter sets the expansion policy to automatic or manual . When you change the policy from automatic to manual , the maximum capacity value (quota) changes to the physical capacity of the repository volume.
cacheReadPrefetch	The setting to turn on or turn off cache read prefetch. To turn off cache read prefetch, set this parameter to FALSE . To turn on cache read prefetch, set this parameter to TRUE .

Notes

Each volume name must be unique. You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the user label. User labels can have a maximum of 30 characters.

For thin volumes, the **capacity** parameter specifies the virtual capacity of the volume, and the **repositoryCapacity** parameter specifies the capacity of the volume created as the repository volume. Use

the **existingRepositoryLabel** parameter to specify an existing unused repository volume instead of creating a new volume.

For best results when creating a thin volume, the repository volume must already exist or must be created in an already existing disk pool. If you do not specify some of the optional parameters when creating thin volumes the storage management software will attempt to create the repository volume. The most desirable candidate volume is a repository volume that already exists and that is within the size requirements. The next most desirable candidate volume is a new repository volume that is created in the disk pool free extent.

Repository volumes for thin volumes cannot be created in volume groups.

Data assurance management

The Data Assurance (DA) feature increases data integrity across the storage system. DA enables the storage array to check for errors that might occur when data is moved between the controllers and drives. When this feature is enabled, the storage array appends error-checking codes (also known as cyclic redundancy checks or CRCs) to each block of data in the volume. After a data block is moved, the storage array uses these CRC codes to determine if any errors occurred during transmission. Potentially corrupted data is not written to disk.

If you want to use the DA feature, start with a pool or volume group that includes only drives that support DA. Then, create DA-capable volumes.

Note: When all drives are DA-capable, you can set the **dataAssurance** parameter to **enabled** and then use DA with certain operations. For example, you can create a volume group that includes DA-capable drives, and then create a volume within that volume group that is DA-enabled. Other operations that use a DA-enabled volume have options to support the DA feature.

If **dataAssurance** parameter is set to **enabled**, only data assurance capable drives will be considered for volume candidates, otherwise both data assurance capable and non-data assurance capable drives will be considered. If only data assurance drives are available, the new volume will be created using the enabled data assurance drives.

Delete volume

The `delete volume` command deletes one or more standard volumes.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Attention: Possible damage to the storage array configuration – All of the data in the volume is lost as soon as you run this command.

Note: When a volume exceeds a given size (currently 128 TB) the delete is being performed in background and the freed space may not be immediately available.

Syntax

```
delete (allVolumes |
volume [volumeName] |
volumes [volumeName1 ... volumeNameN])
[removeVolumeGroup=(TRUE | FALSE)]
```

```
[force=(TRUE | FALSE)]
```

Parameters

Parameter	Description
allVolumes	This parameter deletes all of the volumes in a storage array.
volume	The name of a volume that you want to delete. Enclose the volume name in square brackets ([ ]). If the volume name has special characters or consists only of numbers, you must enclose the volume name in double quotation marks (" ") inside square brackets.
volumes	The names of several volumes that you want to delete. Enter the names of the volumes using these rules: • Enclose all of the names in square brackets ([ ]). • Separate each of the names with a space. If the volume names have special characters or consist only of numbers, enter the names using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.
removeVolumeGroup	Deleting the last volume in a volume group does not delete the volume group. You can have a standalone volume group (minus any volumes). To remove the standalone volume group, set this parameter to TRUE . To keep standalone volume groups intact, set this parameter to FALSE .
force	Use this parameter to force the immediate deletion of a volume even if the controllers are performing other operations. To immediately force the deletion of a volume, set this parameter to TRUE . To wait until the controllers have finished performing other operations, do not use this parameter or set this parameter to FALSE .

Notes

When you use the **allVolumes** parameter, this command deletes volumes until all of the volumes are removed or until an error is encountered. If an error is encountered, this command does not try to delete the remaining volumes. Deleting volumes from different volume groups is possible. All of the volume groups that become empty are deleted if you set the **removeVolumeGroup** parameter to TRUE .

If you want to delete an entire volume group, you can also use the `delete volumeGroup` command.

Delete volume from disk pool

The `delete volume` command deletes either normal or thin volumes from a disk pool.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

You also can use this command to delete any schedules related to the volume. When you delete the schedule the volume is not deleted.

Attention: Possible damage to the storage array configuration – All of the data in the volume is lost as soon as you run this command.

Syntax

```
delete (allVolumes |
volume [volumeName] |
volumes ["volumeName1" ... "volumeNameN"]
[force=(TRUE | FALSE)]
[schedule]
[retainRepositoryMembers=(TRUE | FALSE)]
```

Parameters

Parameter	Description
allVolumes	This parameter deletes all of the volumes on a disk pool.
volume	The name of a specific volume that you want to delete. Enclose the volume name in square brackets ([ ]). If the volume name contains special characters or consists only of numbers, you must enclose the volume name in double quotation marks (" ") inside square brackets.
volumes	The names of several volumes that you want to delete. Enter the names of the volumes using these rules: • Enclose all of the names in square brackets ([ ]). • Separate each of the names with a space.
force	Use this parameter to force the immediate deletion of a volume even if the controllers are performing other operations. To immediately force the deletion of a volume, set this parameter to TRUE . To wait until the controllers have finished performing other operations, do not use this parameter or set this parameter to FALSE .
schedule	This parameter deletes any schedule for related to a specific disk pool volume. Only the schedule is deleted, the disk pool volume remains.
retainRepositoryMembers	When you delete a thin volume, the associated repository volume is deleted by default. However, when the **retainRepositoryMembers** is set to TRUE , the repository volume is retained. For normal volumes, this parameter has no effect.

Notes

When you use the **allVolumes** parameter, this command deletes volumes until all of the volumes are removed or until an error is encountered. If an error is encountered, this command does not try to delete the remaining volumes. Deleting volumes from different volume groups is possible. All of the volume groups that become empty are deleted if you set the **removeVolumeGroup** parameter to TRUE .

Increase capacity of volume in disk pool or volume group

The `start increaseVolumeCapacity volume` command increases the capacity of either a standard volume or a repository volume in a disk pool or volume group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

In this command, a standard volume is also called a thick volume.

Note: You cannot use this command to increase the capacity of a thin volume.

Syntax

```
start increaseVolumeCapacity volume="volumeName"
incrementalCapacity=volumeCapacity
[addDrives=(trayID1,[drawerID1,]slotID1 ... trayIDn,[drawerIDn,]slotIDn)]
```

Parameters

Parameter	Description
volume	The name of the volume in a disk pool or volume group for which you want to increase capacity. Enclose the volume name in double quotation marks (" ").
incrementalCapacity	The setting to increase the storage size (capacity) for the volume. Size is defined in units of bytes , KB , MB , GB , or TB . The default value is bytes .
addDrives	The setting to add new drives to the volume. For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 .
	All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0.
	Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).
	Important: The **addDrives** parameter can only be used to increase the capacity of a volume group. The parameter cannot be used to increase the capacity of a disk pool.

Notes

In some cases a **drive** parameter might appear as valid input for the command syntax. However, you cannot use the **drive** parameter with this command.

Setting the **incrementalCapacity** parameter, starts a long-running operation that you cannot stop. Long-running operations are performed in the background and do not prevent you from running other commands. To show the progress of long-running operations, use the `show volume actionProgress` command.

The **addDrives** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0 , and specify the ID of the slot in which a drive resides.

Initialize thin volume

The `start volume initialize` command initializes or re-initializes a thin volume.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

The action depends on the parameters used:

- Used without any of the optional parameters, this command deletes the data on the thin volume. The repository volume capacity is not affected.

- Used with any of the optional parameters, this command cause reinitialization and repository volume actions.

Note: Initializing a thin volume starts a long-running operation that you cannot stop.

Syntax

```
start volume [volumeName] initialize
[existingRepositoryLabel=existingRepositoryName]
[diskPool=diskPoolName capacity=capacityValue]
[retainRepositoryMembers=(TRUE|FALSE)]
```

Parameter

Parameter	Description
volume	The name of the volume on which you are starting the initialization. Enclose the volume name in square brackets ([ ]). If the volume name contains special characters or numbers, you must enclose the volume name in double quotation marks (" ") inside square brackets.
existingRepositoryLabel	This parameter replaces the repository volume by the candidate volume specified.
	• The value specified is an existing repository volume user label. The volume specified must be an unused repository volume with the name in the proper form.
	• If the newly specified repository volume is on a different disk pool, the thin volume will change ownership to that pool.
	• The old repository volume will be deleted by default.
	If the existing repository volume name contains special characters or consists only of numbers, you must enclose the volume name in double quotation marks (" ").
diskPool	The name of the disk pool in which you want to create a new repository volume with the specified capacity. If the disk pool name contains special characters or consists only of numbers, you must enclose the disk pool name in double quotation marks (" ").
	You must use this parameter with the **capacity** parameter to create a new repository volume with the specified capacity.

Parameter	Description
capacity	The size that you want to set for the repository volume that you are creating. Size is defined in units of bytes , KB , MB , GB , or TB . The minimum physical capacity is 4 GB. The maximum physical capacity is 257 TB. You must use this parameter with the **diskPool** parameter to create a new repository volume with the specified capacity.
retainRepositoryMembers	If this parameter is set to TRUE , the old repository is retained. By default, the old repository is deleted. This parameter is ignored if the existing repository is reused.

Notes

If you do not specify a volume with the **volume** parameter, this command resets the metadata in the repository and, in effect, causes the thin volume to appear empty to the host. If you specify a volume with the **volume** parameter, that volume is either replaced by a newly created volume or by an existing volume if you specify one with the **existingRepositoryLabel** parameter. If you specify an existing volume with the **existingRepositoryLabel** parameter that is in a different disk pool, the thin volume will change ownership to the new disk pool.

The volume parameters of the thin volume, such as virtual capacity, quota and warning threshold, retain their previous values after you reinitialize the thin volume.

Immediate Availability Format (IAF) does not apply to volumes greater than 64 TB.

The following table lists the capacity limits for a thin volume.

Type of Capacity	Size
Minimum virtual capacity	32 MB
Maximum virtual capacity	256 TB
Minimum physical capacity	4 GB
Maximum physical capacity	257 TB

Thin volumes support all of the operations that standard volumes do with the following exceptions:

- You cannot change the segment size of a thin volume.
- You cannot enable the pre-read redundancy check for a thin volume.
- You cannot use a thin volume as the target volume in a volume copy.
- You cannot use a thin volume in a Synchronous Mirroring operation.

If you want to change a thin volume to a standard volume, use the volume copy operation to create a copy of the thin volume. The target of a volume copy is always a standard volume.

Recover RAID volume

The `recover volume` command creates a RAID volume with the given properties without initializing any of the user data areas on the drives.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Parameter values are derived from the Recovery Profile data file (`recovery-profile.csv`) for the storage array. You can create the recover volume in an existing volume group or create a new volume group by using this command.

Note: You can run this command only from a command line. You cannot run this command from the GUI script editor. You cannot use the storage management GUI to recover a volume.

Note: You cannot use this command for Dynamic Disk Pool (DDP) volumes.

Syntax

```
recover volume ( drive=(trayID,[drawerID,]slotID) ) |
( drives=(trayID1,[drawerID1,]slotID1
... trayIDn,[drawerIDn,]slotIDn) ) |
volumeGroup=volumeGroupName))
[newVolumeGroup=volumeGroupName]
userLabel="volumeName" volumeWWN="volumeWWN"
capacity=volumeCapacity
offset=offsetValue
raidLevel=(0 | 1 | 3 | 5 | 6)
segmentSize=segmentSizeValue
dssPreAllocate=(TRUE | FALSE)
SSID=subsystemVolumeID
[owner=(a|b)]
[cacheReadPrefetch=(TRUE | FALSE)]
[dataAssurance=(none | enabled)]
```

Parameters

Parameter	Description
drive or **drives**	The drives that you want to assign to the volume group that will contain the volume that you want to recover. For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).
volumeGroup	The name of an existing volume group in which you want to create the volume. (To determine the names of the volume groups in your storage array, run the `show storageArray profile` command.)
newVolumeGroup	The name that you want to give a new volume group. Enclose the new volume group name in double quotation marks (" ").

Parameter	Description
userLabel	The name of the volume that you want to recover. The user label has two parts: • The volume name. Enclose the volume name in double quotation marks (" "). • The world wide name of the volume, **volumeWWN** , in the form of a 16 byte identifier, for example, 60080E500017B4320000000049887D77. Enclose the identifier in double quotation marks (" "). You must enter both the volume name and the world wide name of the volume. You must enter the volume name first. For example: userLabel="engdata" volumeWWN=60080E500017B4320000000049887D77
capacity	The size of the volume that you are adding to the storage array. Size is defined in units of bytes , KB , MB , GB , or TB .
offset	The number of blocks from the start of the volume group to the start of the referenced volume.
raidLevel	The RAID level of the volume group that contains the drives. Valid values are 0 , 1 , 3 , 5 , or 6 .
segmentSize	The amount of data (in KB) that the controller writes on a single drive in a volume group before writing data on the next drive. Valid values are 8 , 16 , 32 , 64 , 128 , 256 , or 512 .
dssPreAllocate	The setting to turn on or turn off allocating volume storage capacity for future segment size changes. To turn on allocation, set this parameter to TRUE . To turn off allocation, set this parameter to FALSE .
SSID	The storage array subsystem identifier of a volume. Use the show volume command to determine the storage array subsystem identifier.
owner	The controller that owns the volume. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . If you do not specify an owner, the controller firmware determines the owner.
cacheReadPrefetch	The setting to turn on or turn off cache read prefetch. To turn off cache read prefetch, set this parameter to FALSE . To turn on cache read prefetch, set this parameter to TRUE .

Notes

The storage management software collects recovery profiles of the monitored storage arrays and saves the profiles on a storage management station.

The **drive** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0 , and specify the ID of the slot in which a drive resides.

If you attempt to recover a volume using the **drive** parameter or the **drives** parameter and the drives are in an unassigned state, the controller automatically creates a new volume group. Use the **newVolumeGroup** parameter to specify a name for the new volume group.

You can use any combination of alphanumeric characters, underscore (_), hyphen (-), and pound (#) for the names. Names can have a maximum of 30 characters.

The **owner** parameter defines which controller owns the volume. The preferred controller ownership of a volume is the controller that currently owns the volume group.

Preallocating storage capacity

The **dssPreAllocate** parameter enables you to assign capacity in a volume for storing information that is used to rebuild a volume. When you set the **dssPreallocate** parameter to TRUE , the storage space allocation logic in the controller firmware pre-allocates the space in a volume for future segment size changes. The pre-allocated space is the maximum allowable segment size. The **dssPreAllocate** parameter is necessary for properly recovering volume configurations that are not retrievable from the controller database. To turn off the preallocation capability, set **dssPreAllocate** to FALSE .

Segment size

The size of a segment determines how many data blocks that the controller writes on a single drive in a volume before writing data on the next drive. Each data block stores 512 bytes of data. A data block is the smallest unit of storage. The size of a segment determines how many data blocks that it contains. For example, an 8-KB segment holds 16 data blocks. A 64-KB segment holds 128 data blocks.

When you enter a value for the segment size, the value is checked against the supported values that are provided by the controller at run time. If the value that you entered is not valid, the controller returns a list of valid values. Using a single drive for a single request leaves other drives available to simultaneously service other requests.

If the volume is in an environment where a single user is transferring large units of data (such as multimedia), performance is maximized when a single data transfer request is serviced with a single data stripe. (A data stripe is the segment size that is multiplied by the number of drives in the volume group that are used for data transfers.) In this case, multiple drives are used for the same request, but each drive is accessed only once.

For optimal performance in a multiuser database or file system storage environment, set your segment size to minimize the number of drives that are required to satisfy a data transfer request.

Cache read prefetch

Cache read prefetch lets the controller copy additional data blocks into cache while the controller reads and copies data blocks that are requested by the host from disk into cache. This action increases the chance that a future request for data can be fulfilled from cache. Cache read prefetch is important for multimedia applications that use sequential data transfers. The configuration settings for the storage array that you use determine the number of additional data blocks that the controller reads into cache. Valid values for the **cacheReadPrefetch** parameter are TRUE or FALSE .

Remove volume LUN mapping

The `remove lunMapping` command removes the logical unit number (LUN) or namespace ID (NSID) mapping from one or more volumes.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
remove (volume ["volumeName"] | accessVolume) lunMapping
(host="hostName" | hostGroup=("hostGroupName" | defaultGroup)
```

Syntax for removing LUN or NSID mapping from more than one volume LUN or NSID mapping

```
remove (allVolumes | volumes [volumeName1 ... volumeNameN])
lunMapping
```

Parameters

Parameter	Description
volume	The name of a volume from which you are removing the LUN or NSID mapping. Enclose the volume name double quotation marks (" ") inside square brackets ([ ]).
accessVolume	This parameter removes the access volume.
allVolumes	This parameter removes the LUN mapping from all of the volumes.
volumes	The names of several volumes from which you are removing the LUN or NSID mapping. Enter the names of the volumes using these rules: • Enclose all of the names in square brackets ([ ]). • Separate each of the names with a space. If the volume names have special characters or consist only of numbers, enter the names using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.
host	The name of the host to which the volume is mapped. Enclose the host name in double quotation marks (" "). This parameter works only when you are removing LUN or NSID mapping from one volume.
hostGroup	The name of the host group that contains the host to which the volume is mapped. Enclose the host group name in double quotation marks (" "). The **defaultGroup** value is the host group that contains the host to which the volume is mapped. This parameter works only when you are removing LUN or NSID mapping from one volume.

Notes

The access volume is the volume in a SAN environment that is used for communication between the storage management software and the storage array controller. The access volume uses a LUN or NSID address and consumes 20 MB of storage space that is not available for application data storage. An access volume is required only for in-band managed storage arrays.

Attention: Removing an access volume can damage your configuration – The agent uses the access volumes to communicate with a storage array. If you remove an access volume mapping for a storage array from a host that has an agent running on it, the storage management software is no longer able to manage the storage array through the agent.

You must use the **host** parameter and the **hostGroup** parameter when you specify a non-access volume or an access volume. The Script Engine ignores the **host** parameter or the **hostGroup** parameter when you use the **allVolumes** parameter or the **volumes** parameter.

Repair volume parity

The `repair volume parity` command repairs the parity errors on a volume.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

CAUTION:
If volume parity and volume data do not match, volume data might be defective rather than volume parity. Repairing volume parity destroys the ability to repair the defective volume data, if necessary.

Syntax

```
repair volume [volumeName] parity
parityErrorFile="filename"
[verbose=(TRUE | FALSE)]
```

Parameters

Parameter	Description
volume	The name of the volume for which you are repairing parity. Enclose the volume name in square brackets ([ ]). If the volume name has special characters or numbers, you must enclose the volume name in double quotation marks (" ") inside square brackets.
parityErrorFile	The file path and the file name that contains the parity error information that you use to repair the errors. Enclose the file name in double quotation marks (" "). For example: `file="C:\Program Files\CLI\sup\parfile.txt"` **Note:** A **parityErrorFile** is the result of a previous `check volume parity` operation.
verbose	The setting to capture progress details, such as percent complete, and to show the information as the volume parity is being repaired. To capture progress details, set this parameter to TRUE . To prevent capturing progress details, set this parameter to FALSE .

Set thin volume attributes

The `set volume` command defines the properties for a thin volume.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

You can use the parameters to define properties for one or more thin volumes.

Syntax

```
set (volume [volumeName] |
volumes [volumeName1 ... volumeNameN] | volume <"wwID">)
[newCapacity=capacityValue]
[repositoryMaxCapacity=capacityValue]
[repositoryExpansionPolicy=(automatic|manual)]
[warningThresholdPercent=warningThresholdPercentValue]
[addRepositoryCapacity=capacity-spec][hostReportingPolicy=(standard | thin)]
```

Parameters

Parameter	Description
volume	The name of the volume for which you want to define properties. Enclose the volume name in square brackets ([ ]). If the volume name has special characters or numbers, you must enclose the volume name in double quotation marks (" ") inside square brackets.
volume	The World Wide Identifier (WWID) of the volume for which you want to define properties. Enclose the WWID in double quotation marks (" ") inside angle brackets (< >).
volumes	The names of several volumes for which you want to define properties. All of the volumes will have the same properties. Enter the names of the volumes using these rules: • Enclose all of the names in square brackets ([ ]). • Separate each of the names with a space. If the volume names have special characters or consist only of numbers, enter the names using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.
newCapacity	This parameter increases the virtual capacity of the thin volume. The virtual capacity is the value that the volume will report to a host that is mapped to the volume. Values smaller or equal to the existing capacity will cause an error. Size is defined in units of bytes, KB, MB, GB, or TB. The minimum virtual capacity is 32 MB. The maximum virtual capacity is 63 TB.
repositoryMaxCapacity	This parameter sets the maximum capacity of the repository volume. The value must not be smaller that the physical capacity of the repository volume. If the new value results in a reduction in capacity to a level below the warning threshold, the command will produce an error. **Note:** The command `repositoryMaxCapacity` works with `repositoryExpansionPolicy=automatic`.
repositoryExpansionPolicy	This parameter sets the expansion policy to automatic or manual. When you change the policy from automatic to manual, the maximum capacity value (quota) changes to the physical capacity of the repository volume.

Parameter	Description
warningThresholdPercent	The percentage of thin volume capacity at which you receive a warning alert that the thin volume is nearing full. Use integer values. For example, a value of 70 means 70 percent. Valid values are from 1 to 100. Setting this parameter to 100 disables warning alerts.
addRepositoryCapacity	This parameter allocates capacity from the free extent of the disk pool. If insufficient space is available the command fails. **Note:** The command `addRepositoryCapacity` works with `repositoryExpansionPolicy=manual`.
hostReportingPolicy	This parameter changes the way in which the thin volume is reported to the host. Valid values are standard or thin.

Notes

When you use this command, you can specify one or more of the optional parameters.

The following table lists the capacity limits for a thin volume.

Type of Capacity	Size
Minimum virtual capacity	32 MB
Maximum virtual capacity	63 TB
Minimum physical capacity	4 GB
Maximum physical capacity	64 TB

Thin volumes support all of the operations that standard volumes do with the following exceptions:

- You cannot change the segment size of a thin volume.
- You cannot enable the pre-read redundancy check for a thin volume.
- You cannot use a thin volume as the target volume in a volume copy.
- You cannot use a thin volume in a Synchronous Mirroring operation.

If you want to change a thin volume to a standard volume, use the volume copy operation to create a copy of the thin volume. The target of a volume copy is always a standard volume.

Minimum firmware level

7.83

Set volume attributes for a volume in a disk pool

The `set volumes` command defines the properties for a volume in a disk pool.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Note: In configurations where disk pools consist of more than 32 volumes, the operation can result in host I/O errors or internal controller reboots due to the expiration of the timeout period before the operation completes. If you experience host I/O errors or internal controller reboots, bring the host to a quiescent state, and try the operation again.

Syntax

```
set (allVolumes | volume [volumeName] |
volumes [volumeName1 ... volumeNameN] | volume <"wwID">)
addCapacity = capacityValue[KB|MB|GB|TB|Bytes] |
cacheFlushModifier=cacheFlushModifierValue |
cacheReadPrefetch = (TRUE | FALSE) |
cacheWithoutBatteryEnabled=(TRUE | FALSE) |
mediaScanEnabled=(TRUE | FALSE) |
mirrorCacheEnabled=(TRUE | FALSE) |
preReadRedundancyCheck = (TRUE | FALSE) |
readCacheEnabled=(TRUE | FALSE) |
redundancyCheckEnabled = (TRUE | FALSE) |
segmentSize = segmentSizeValue
userLabel = userlabelValue
writeCacheEnabled=(TRUE | FALSE) |
dataAssuranceDisabled=(TRUE | FALSE)
```

Parameters

Parameter	Description
allVolumes	This parameter sets the properties for all of volumes in the storage array.
volume (name)	The name of the volume for which you want to define properties. Enclose the volume name in square brackets ([ ]). If the volume name has special characters or numbers, you must enclose the volume name in double quotation marks (" ") inside square brackets.
volume (WWID)	The World Wide Identifier (WWID) of the volume for which you want to define properties. Enclose the WWID in double quotation marks (" ") inside angle brackets (< >). **Note:** When running this command, do not use colon separators in the WWID.
volumes	The names of several volumes for which you want to define properties. All of the volumes will have the same properties. Enter the names of the volumes using these rules: • Enclose all of the names in square brackets ([ ]). • Separate each of the names with a space. If the volume names have special characters or numbers, enter the names using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.
addCapacity	The setting to increase the storage size (capacity) of the volume for which you are defining properties. Size is defined in units of bytes , KB , MB , GB , or TB . The default value is bytes . This parameter is not valid for thin volumes.

Parameter	Description
cacheFlushModifier	The maximum amount of time that data for the volume stays in cache before the data is flushed to physical storage. Valid values are listed in the Notes section.
cacheReadPrefetch	The setting to turn on or turn off cache read prefetch. To turn off cache read prefetch, set this parameter to FALSE . To turn on cache read prefetch, set this parameter to TRUE .
cacheWithoutBatteryEnabled	The setting to turn on or turn off caching without batteries. To turn on caching without batteries, set this parameter to TRUE . To turn off caching without batteries, set this parameter to FALSE .
mediaScanEnabled	The setting to turn on or turn off media scan for the volume. To turn on media scan, set this parameter to TRUE . To turn off media scan, set this parameter to FALSE . (If media scan is disabled at the storage array level, this parameter has no effect.)
mirrorCacheEnabled	The setting to turn on or turn off the mirror cache. To turn on the mirror cache, set this parameter to TRUE . To turn off the mirror cache, set this parameter to FALSE .
owner	The controller that owns the volume. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . Use this parameter only if you want to change the volume owner.
preReadRedundancyCheck	The setting to turn on or turn off pre-read redundancy checking. Turning on pre-read redundancy checking verifies the consistency of RAID redundancy data for the stripes containing the read data. Pre-read redundancy checking is performed on read operations only. To turn on pre-read redundancy checking, set this parameter to TRUE . To turn off pre-read redundancy checking, set this parameter to FALSE . **Note:** Do not use this parameter on non-redundant volumes, such as RAID 0 volumes.
readCacheEnabled	The setting to turn on or turn off the read cache. To turn on the read cache, set this parameter to TRUE . To turn off the read cache, set this parameter to FALSE .
redundancyCheckEnabled	The setting to turn on or turn off redundancy checking during a media scan. To turn on redundancy checking, set this parameter to TRUE . To turn off redundancy checking, set this parameter to FALSE .
userLabel	The new name that you want to give an existing volume. Enclose the new volume name in double quotation marks (" ").
writeCacheEnabled	The setting to turn on write cache capability.

Notes

When you use this command, you can specify one or more of the optional parameters.

You can apply these parameters to only one volume at a time:

- **addCapacity**
- **segmentSize**
- **userLabel**

Add capacity and segment size

Setting the **addCapacity** parameter or the **segmentSize** parameter starts a long-running operation that you cannot stop. These long-running operations are performed in the background and do not prevent you from running other commands. To show the progress of long-running operations, use the `show volume actionProgress` command.

Cache flush modifier

Valid values for the cache flush modifier are listed in this table.

Value	Description
Immediate	Data is flushed as soon as it is placed into the cache.
.25	Data is flushed after 250 ms.
.5	Data is flushed after 500 ms.
.75	Data is flushed after 750 ms.
1	Data is flushed after 1 s.
1.5	Data is flushed after 1500 ms.
2	Data is flushed after 2 s.
5	Data is flushed after 5 s.
10	Data is flushed after 10 s.
20	Data is flushed after 20 s.
60	Data is flushed after 60 s (1 min.).
120	Data is flushed after 120 s (2 min.).
300	Data is flushed after 300 s (5 min.).
1200	Data is flushed after 1200 s (20 min.).
3600	Data is flushed after 3600 s (1 hr).
Infinite	Data in cache is not subject to any age or time constraints. The data is flushed based on other criteria that are managed by the controller.

Cache without battery enabled

Write caching without batteries enables write caching to continue if the controller batteries are completely discharged, not fully charged, or not present. If you set this parameter to TRUE without an uninterruptible power supply (UPS) or other backup power source, you can lose data if the power to the storage array fails. This parameter has no effect if write caching is disabled.

Modification priority

Modification priority defines the amount of system resources that are used when modifying volume properties. If you select the highest priority level, the volume modification uses the most system resources, which decreases the performance for host data transfers.

Cache read prefetch

The **cacheReadPrefetch** parameter enables the controller to copy additional data blocks into cache while the controller reads and copies data blocks that are requested by the host from the drive into cache. This action increases the chance that a future request for data can be fulfilled from cache. Cache read prefetch is important for multimedia applications that use sequential data transfers. The configuration settings for the storage array that you use determine the number of additional data blocks that the controller reads into cache. Valid values for the **cacheReadPrefetch** parameter are TRUE or FALSE .

Segment size

The size of a segment determines how many data blocks that the controller writes on a single drive in a volume before writing data on the next drive. Each data block stores 512 bytes of data. A data block is the smallest unit of storage. The size of a segment determines how many data blocks that it contains. For example, an 8-KB segment holds 16 data blocks. A 64-KB segment holds 128 data blocks.

When you enter a value for the segment size, the value is checked against the supported values that are provided by the controller at run time. If the value that you entered is not valid, the controller returns a list of valid values. Using a single drive for a single request leaves other drives available to simultaneously service other requests.

If the volume is in an environment where a single user is transferring large units of data (such as multimedia), performance is maximized when a single data transfer request is serviced with a single data stripe. (A data stripe is the segment size that is multiplied by the number of drives in the volume group that are used for data transfers.) In this case, multiple drives are used for the same request, but each drive is accessed only once.

For optimal performance in a multiuser database or file system storage environment, set your segment size to minimize the number of drives that are required to satisfy a data transfer request.

Set volume attributes for a volume in a volume group

The `set volume` command defines the properties for volumes in a volume group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

You can use most parameters to define properties for one or more volumes. You also can use some parameters to define properties for only one volume. The syntax definitions are separated to show which parameters apply to several volumes and which apply to only one volume.

Note: In configurations where volume groups consist of more than 32 volumes, the operation can result in host I/O errors or internal controller reboots due to the expiration of the timeout period before the operation completes. If you experience host I/O errors or internal controller reboots, quiesce the host I/O and try the operation again.

Syntax applicable to one or more volumes

```
set (allVolumes | volume [volumeName] |
volumes [volumeName1 ... volumeNameN | volume <"wwID">)
cacheFlushModifier=cacheFlushModifierValue
cacheWithoutBatteryEnabled=(TRUE | FALSE)
mediaScanEnabled=(TRUE | FALSE)
mirrorCacheEnabled=(TRUE | FALSE)
modificationPriority=(highest | high | medium | low | lowest)
owner=(a|b)
preReadRedundancyCheck=(TRUE | FALSE)
readCacheEnabled=(TRUE | FALSE)
writeCacheEnabled=(TRUE | FALSE)
cacheReadPrefetch=(TRUE | FALSE)
dataAssuranceDisabled=(TRUE | FALSE)
```

Syntax applicable to only one volume

```
set (volume [volumeName] | volume <wwID>)
addCapacity=volumeCapacity
[addDrives=(trayID1,drawerID1,slotID1 ... trayIDn,drawerIDn,slotIDn)]
redundancyCheckEnabled=(TRUE | FALSE)
segmentSize=segmentSizeValue
userLabel=volumeName
preReadRedundancyCheck=(TRUE | FALSE)
```

Parameters

Parameter	Description
allVolumes	This parameter sets the properties for all of the volumes in the storage array.
volume (name)	The name of the volume for which you want to define properties. Enclose the volume name in square brackets ([ ]). If the volume name has special characters or numbers, you must enclose the volume name in double quotation marks (" ") inside square brackets.
volume (WWID)	The World Wide Identifier (WWID) of the volume for which you want to define properties. Enclose the WWID in double quotation marks (" ") inside angle brackets (< >). **Note:** When running this command, do not use colon separators in the WWID.
volumes	The names of several volumes for which you want to define properties. All of the volumes will have the same properties. Enter the names of the volumes using these rules: • Enclose all of the names in square brackets ([ ]). • Separate each of the names with a space. If the volume names have special characters or numbers, enter the names using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.
cacheFlushModifier	The maximum amount of time that data for the volume stays in cache before the data is flushed to physical storage. Valid values are listed in the Notes section.
cacheWithoutBatteryEnabled	The setting to turn on or turn off caching without batteries. To turn on caching without batteries, set this parameter to TRUE . To turn off caching without batteries, set this parameter to FALSE .
mediaScanEnabled	The setting to turn on or turn off media scan for the volume. To turn on media scan, set this parameter to TRUE . To turn off media scan, set this parameter to FALSE . (If media scan is disabled at the storage array level, this parameter has no effect.)
mirrorCacheEnabled	The setting to turn on or turn off the mirror cache. To turn on the mirror cache, set this parameter to TRUE . To turn off the mirror cache, set this parameter to FALSE .
modificationPriority	The priority for volume modifications while the storage array is operational. Valid values are highest , high , medium , low , or lowest .

Parameter	Description
owner	The controller that owns the volume. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . Use this parameter only if you want to change the volume owner.
preReadRedundancyCheck	The setting to turn on or turn off pre-read redundancy checking. Turning on pre-read redundancy checking verifies the consistency of RAID redundancy data for the stripes containing the read data. Pre-read redundancy checking is performed on read operations only. To turn on pre-read redundancy checking, set this parameter to TRUE . To turn off pre-read redundancy checking, set this parameter to FALSE . **Note:** Do not use this parameter on non-redundant volumes, such as RAID 0 volumes.
readCacheEnabled	The setting to turn on or turn off the read cache. To turn on the read cache, set this parameter to TRUE . To turn off the read cache, set this parameter to FALSE .
writeCacheEnabled	The setting to turn on or turn off the write cache. To turn on the write cache, set this parameter to TRUE . To turn off the write cache, set this parameter to FALSE .
cacheReadPrefetch	The setting to turn on or turn off cache read prefetch. To turn off cache read prefetch, set this parameter to FALSE . To turn on cache read prefetch, set this parameter to TRUE .
dataAssuranceDisabled	The setting to turn off data assurance for a specific volume. For this parameter to have meaning, your volume must be capable of data assurance. This parameter changes a volume from one that supports data assurance to a volume that cannot support data assurance. **Note:** This option is only valid for enablement if the drives support DA. To remove data assurance from a volume that supports data assurance, set this parameter to TRUE . **Note:** If you remove data assurance from a volume, you cannot reset data assurance for that volume. To reset data assurance for the data on a volume, from which you removed data assurance, perform these steps: 1. Remove the data from the volume. 2. Delete the volume. 3. Recreate a new volume with the properties of the deleted volume. 4. Set data assurance for the new volume. 5. Move the data to the new volume.
addCapacity	The setting to increase the storage size (capacity) of the volume for which you are defining properties. Size is defined in units of bytes , KB , MB , GB , or TB . The default value is bytes .

Parameter	Description
addDrives	For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 .
	All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0.
	Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).
	Use this parameter with the **addCapacity** parameter if you need to specify additional drives to accommodate the new size.
redundancyCheckEnabled	The setting to turn on or turn off redundancy checking during a media scan. To turn on redundancy checking, set this parameter to TRUE . To turn off redundancy checking, set this parameter to FALSE .
segmentSize	The amount of data (in KB) that the controller writes on a single drive in a volume before writing data on the next drive. Valid values are 8 , 16 , 32 , 64 , 128 , 256 , or 512 .
userLabel	The new name that you want to give an existing volume. Enclose the new volume name in double quotation marks (" ").
preReadRedundancyCheck	The setting to check the consistency of RAID redundancy data on the stripes during read operations. Do not use this operation for non-redundant volumes, for example RAID Level 0. To check redundancy consistency, set this parameter to TRUE . For no stripe checking, set this parameter to FALSE .

Notes

Host I/O errors might result in volume groups with more than 32 volumes. This operation might also result in internal controller reboots due to the expiration of the timeout period before the operation completes. If you experience this issue, quiesce host I/O, and try the operation again.

When you use this command, you can specify one or more of the optional parameters.

You can apply these parameters to only one volume at a time:

- **addCapacity**
- **segmentSize**
- **userLabel**
- **logicalUnitNumber**

Add capacity, add drives, and segment size

Setting the **addCapacity** parameter, the **addDrives** parameter, or the **segmentSize** parameter starts a long-running operation that you cannot stop. These long-running operations are performed in the background and do not prevent you from running other commands. To show the progress of long-running operations, use the `show volume actionProgress` command.

Cache flush modifier

Valid values for the cache flush modifier are listed in this table.

Value	Description
Immediate	Data is flushed as soon as it is placed into the cache.
.25	Data is flushed after 250 ms.
.5	Data is flushed after 500 ms.
.75	Data is flushed after 750 ms.
1	Data is flushed after 1 s.
1.5	Data is flushed after 1500 ms.
2	Data is flushed after 2 s.
5	Data is flushed after 5 s.
10	Data is flushed after 10 s.
20	Data is flushed after 20 s.
60	Data is flushed after 60 s (1 min.).
120	Data is flushed after 120 s (2 min.).
300	Data is flushed after 300 s (5 min.).
1200	Data is flushed after 1200 s (20 min.).
3600	Data is flushed after 3600 s (1 hr).
Infinite	Data in cache is not subject to any age or time constraints. The data is flushed based on other criteria that are managed by the controller.

Important: Do not set the value of the **cacheFlushModifier** parameter above 10 seconds. An exception is for testing purposes. After running any tests in which you have set the values of the **cacheFlushModifier** parameter above 10 seconds, return the value of the **cacheFlushModifier** parameter to 10 or fewer seconds.

Cache without battery enabled

Write caching without batteries enables write caching to continue if the controller batteries are completely discharged, not fully charged, or not present. If you set this parameter to TRUE without an uninterruptible power supply (UPS) or other backup power source, you can lose data if the power to the storage array fails. This parameter has no effect if write caching is disabled.

Modification priority

Modification priority defines the amount of system resources that are used when modifying volume properties. If you select the highest priority level, the volume modification uses the most system resources, which decreases the performance for host data transfers.

Cache read prefetch

The **cacheReadPrefetch** parameter enables the controller to copy additional data blocks into cache while the controller reads and copies data blocks that are requested by the host from the drive into cache. This action increases the chance that a future request for data can be fulfilled from cache. Cache read prefetch is important for multimedia applications that use sequential data transfers. The configuration settings for the storage array that you use determine the number of additional data blocks that the controller reads into cache. Valid values for the **cacheReadPrefetch** parameter are TRUE or FALSE .

Segment size

The size of a segment determines how many data blocks that the controller writes on a single drive in a volume before writing data on the next drive. Each data block stores 512 bytes of data. A data block is the smallest unit of storage. The size of a segment determines how many data blocks that it contains. For example, an 8-KB segment holds 16 data blocks. A 64-KB segment holds 128 data blocks.

When you enter a value for the segment size, the value is checked against the supported values that are provided by the controller at run time. If the value that you entered is not valid, the controller returns a list of valid values. Using a single drive for a single request leaves other drives available to simultaneously service other requests.

If the volume is in an environment where a single user is transferring large units of data (such as multimedia), performance is maximized when a single data transfer request is serviced with a single data stripe. (A data stripe is the segment size that is multiplied by the number of drives in the volume group that are used for data transfers.) In this case, multiple drives are used for the same request, but each drive is accessed only once.

For optimal performance in a multiuser database or file system storage environment, set your segment size to minimize the number of drives that are required to satisfy a data transfer request.

Set volume mapping

The `set volume logicalUnitNumber` command defines the logical unit number (LUN) or namespace ID (NSID) mapping between a volume and a host or host group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

This command is applicable to volumes in either a volume group or disk pool.

Note: You cannot use this command for a snapshot volume that is used in online volume copy.

Syntax

```
set (volume [volumeName] | volume <"wwID"> | accessVolume)
logicalUnitNumber=lun
(host="hostName" |
hostGroup=("hostGroupName" | defaultGroup)
```

Parameter

Parameter	Description
volume (name)	The name of the volume for which you want to define the logical unit number. Enclose the volume name in square brackets ([ ]). If the volume name has special characters or numbers, you must enclose the volume name in double quotation marks (" ") inside square brackets.
volume (WWID)	The World Wide Identifier (WWID) of the volume for which you want to define the logical unit number. Enclose the WWID in double quotation marks (" ") inside angle brackets (< >).
accessVolume	The logical unit number for the access volume. The logical unit number is the only property that you can set for the access volume.

Parameter	Description
logicalUnitNumber	The logical unit number or namespace ID that you want to use to map to a specific host. This parameter also assigns the host to a host group. **Note:** The logical unit number or namespace ID you specify must not already be in use, and must be within the range supported by the host Operating System. There will be no error if you map the volume to a logical unit number or namespace ID not supported by the host, but the host won't be able to access the volume.
host	The name of the host to which the volume is mapped. Enclose the host name in double quotation marks (" ").
hostGroup	The name of the host group to which the volume is mapped. Enclose the host group name in double quotation marks (" "). defaultGroup is the host group that contains the host to which the volume is mapped.

Notes

A host group is an optional topological element that you can define if you want to designate a collection of hosts that share access to the same volumes. The host group is a logical entity. Define a host group only if you have two or more hosts that can share access to the same volumes.

You can use any combination of alphanumeric characters, hyphens, and underscores for the names. Names can have a maximum of 30 characters.

The access volume is the volume in a SAN environment that is used for in-band communication between the storage management software and the storage array controller. This volume uses a LUN or NSID address and consumes 20 MB of storage space that is not available for application data storage. An access volume is required only for in-band managed storage arrays. If you specify the **accessVolume** parameter, the only property you can set is the **logicalUnitNumber** parameter.

Show thin volume

The `show volume` command returns the expansion history or the consumed capacity for the specified thin volume or volumes.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Syntax

```
show (allVolumes | volume [volumeName] |
volumes [volumeName1 ... volumeNameN])
(consumedCapacity |
(expansionHistory [file=fileName]))
```

Parameters

Parameter	Description
allVolumes	This parameter returns information about all of the thin volumes in the storage array.
volume	The name of a thin volume for which you are retrieving information. Enclose the thin volume name in square brackets ([ ]). If the thin volume name has special characters or numbers, you must enclose the thin volume name in double quotation marks (" ") inside square brackets.

Parameter	Description
volumes	The names of several thin volumes for which you want to retrieve information. Enter the names of the volumes using these rules: • Enclose all of the names in square brackets ([ ]). • Separate each of the names with a space. If the volume names have special characters or numbers, enter the names using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.
consumedCapacity	The setting to return a concise list of information about the consumed capacity of the thin volumes.
expansionHistory	The setting to return a concise list of information about the expansion history of the thin volumes.
file	The **file** parameter specifies a file to log the output of the **expansionHistory** parameter. The **file** is valid only when used with the **expansionHistory** parameter. An invalid file name causes the command to fail.

Notes

With the **expansionHistory** parameter, the command returns information similar to the example shown below.

Thin volume name: volume-nameRepository volume Name: REPOS_NNNN			
Logged Time	Expansion Type	Start Capacity	End Capacity
MM/DD/YYYY HH:MM:SS	Manual|Automatic	NNNNNNNN bytes	NNNNNNNN bytes

With the **consumedCapacity** parameter, the command returns information similar to the example shown below.

Volume	Provisioned Capacity	Consumed Capacity	Quota	% Prov.Consumed
volumeName	500.000 GB	230.000 GB	700.000 GB	46%

Show volume

The `show volume summary` command returns information about a volume.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Context

For the volumes in a storage array, this command returns the following information:

- The number of volumes
- The name
- The status
- The capacity
- The RAID level
- The volume group where the volume is located
- Details:
    - The volume ID
    - The subsystem ID
    - The drive type (SAS)
    - Tray loss protection
    - The preferred owner
    - The current owner
    - The segment size
    - The modification priority
    - The read cache status (enabled or disabled)
    - The write cache status (enabled or disabled)
    - The write cache without batteries status (enabled or disabled)
    - The write cache with mirror status (enabled or disabled)
    - The flush write cache after time
    - The cache read prefetch setting (TRUE or FALSE)
    - The enable background media scan status (enabled or disabled)
    - The media scan with redundancy check status (enabled or disabled)
- The mirror repository volumes

Syntax

```
show (allVolumes | volume [volumeName] |
volumes [volumeName1 ... volumeNameN]) summary
```

Parameters

Parameter	Description
allVolumes	This parameter returns performance statistics about all of the volumes in the storage array.
volume	The name of a volume for which you want to retrieve information. Enclose the volume name in square brackets ([ ]). If the volume name has special characters or numbers, you must enclose the name in double quotation marks (" ") inside square brackets.

Parameter	Description
volumes	The names of several volumes for which you want to retrieve information. Enter the names of the volumes using these rules: • Enclose all of the names in square brackets ([ ]). • Separate each of the names with a space. If the volume names have special characters or numbers, enter the names using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.
summary	The setting to return a concise list of information about the volumes.

Show volume action progress

The `show volume actionProgress` command returns information about the volume action and amount of the long-running operation that is completed for a long-running operation on a volume.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Context

Note: With firmware version 7.77, the `show volume actionProgress` command is deprecated. Replace this command with `show storageArray longRunningOperations` .

The amount of the long-running operation that is completed is shown as a percentage (for example, 25 means that 25 percent of the long-running operation is completed).

Syntax

```
show volume [volumeName] actionProgress
```

Parameter

Parameter	Description
volume	The name of a volume for which you want to retrieve information about a long running operation. Enclose the volume name in square brackets ([ ]). If the volume name has special characters or numbers, you must enclose the name in double quotation marks (" ") inside square brackets.

Show volume performance statistics

The `show volume performanceStats` command returns information about volume performance.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Context

For each volume in the storage array, this command returns the following information:

- Storage Arrays
- Total IOs/s
- Read %
- Primary Read Cache Hit %
- Primary Write Cache Hit %
- SSD Cache Hit %
- Current MBs/s
- Maximum MBs/s
- Current IOs/s
- Maximum IOs/s
- Minimum IOs/s
- Average IOs/s
- Minimum MBs/s
- Average MBs/s
- Current IO Latency
- Maximum IO Latency
- Minimum IO Latency
- Average IO Latency

Syntax

```
show (allVolumes | volume ["volumeName"]
volumes ["volumeName1" ... "volumeNameN"]) performanceStats
```

Parameters

Parameter	Description
allVolumes	The parameter to return performance statistics about all of the volumes in the storage array.
volume	The name of a volume for which you want to retrieve information. Enclose the volume name in square brackets ([ ]). If the volume name has special characters or numbers, you must enclose the name in double quotation marks (" ") inside square brackets.
volumes	The names of several volumes for which you want to retrieve information. Enter the names of the volumes using these rules: • Enclose all of the names in square brackets ([ ]). • Separate each of the names with a space. If the volume names have special characters or numbers, enter the names using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.

Notes

Before you run the `show volume performanceStat` command, run the `set session performanceMonitorInterval` command and the `set session performanceMonitorIterations` command to define how often you collect the statistics.

The `show volume performanceStat` command returns volume performance statistics as shown in this example:

```
Performance Monitor Statistics for Storage Array: Tyler -
Date/Time: 11/6/12 10:00: 34 AM - Polling interval in seconds: 5


"Storage Arrays","Total IOs","Read %","Primary Read Cache Hit %",
"Primary Write Cache Hit %","SSD Read Cache Hit %","Current MBs/sec",
"Maximum MBs/sec","Current IOs/sec","Maximum IOs/sec","Minimum IOs/sec",
"Average IOs/sec","Minimum MBs/sec","Average MBs/sec","Current IO Latency",
"Maximum IO Latency","Minimum IO Latency","Average IO Latency"

"Capture Iteration: 1","","","","","","","","","","","","","","","","","",
"Date/Time: 11/6/12 10:00:34 AM","","","","","","","","","","","","","","","",
    "","","""Volume Unnamed","0.0","","0.0","0.0","0.0","0.0","0.0","0.0","0.0","0.0",
    "0.0","0.0","0.0","0.0","0.0","0.0","0.0"
```

Show volume reservations

The `show volume reservations` command returns information about the volumes that have persistent reservations.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Syntax

```
show (allVolumes | volume [volumeName] |
volumes [volumeName1 ... volumeNameN]) reservations
```

Parameters

Parameter	Description
allVolumes	The parameter to return performance statistics about all of the volumes in the storage array.
volume	The name of a volume for which you want to retrieve information. Enclose the volume name in square brackets ([ ]). If the volume name has special characters or numbers, you must enclose the name in double quotation marks (" ") inside square brackets.
volumes	The names of several volumes for which you want to retrieve information. Enter the names of the volumes using these rules: • Enclose all of the names in square brackets ([ ]). • Separate each of the names with a space. If the volume names have special characters or numbers, enter the names using these rules: • Enclose all of the names in square brackets ([ ]). • Enclose each of the names in double quotation marks (" "). • Separate each of the names with a space.

Start volume initialization

The `start volume initialize` command starts the formatting of a volume in a storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Note: Formatting a volume starts a long-running operation that you cannot stop.

Syntax

`start volume [`*volumeName*`] initialize`

Parameter

Parameter	Description
volume	The name of a volume that you want to format. Enclose the volume name in square brackets ([ ]). If the volume name has special characters or numbers, you must enclose the name in double quotation marks (" ") inside square brackets.

Volume group commands

Create volume group

The `create volumeGroup` command creates either a free-capacity volume group or a volume group with one volume when you enter a set of unassigned drives.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
create volumeGroup
drives=(trayID1,[drawerID1,]slotID1 ... trayIDn,[drawerIDn,]slotIDn)
raidLevel=(0 | 1 | 3 | 5 | 6)
userLabel="volumeGroupName"
[driveMediaType=(HDD | SSD | unknown | allMedia)]
[driveType=SAS]
[trayLossProtect=(TRUE | FALSE)]
[drawerLossProtect=(TRUE | FALSE)]
[securityType=(none | capable | enabled )]
[dataAssurance=(none | enabled)]
```

Parameters

Parameter	Description
drives	The drives that you want to assign to the volume group that you want to create. For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 .
	All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0.
	Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).
raidLevel	The RAID level of the volume group that contains the volume. Valid values are 0 , 1 , 3 , 5 , or 6 .
userLabel	The name that you want to give the new volume group. Enclose the volume group name in double quotation marks (" ").
driveMediaType	The type of drive media that you want to use for the volume group You must use this parameter when you have more than one type of drive media in your storage array. These drive media are valid: • HDD – Use this option when you have hard drives in the drive tray. • SSD – Use this option when you have solid state drives in the drive tray. • unknown – Use this option if you are not sure what types of drive media are in the drive tray. • allMedia – Use this option when you want to use all types of drive media that are in the drive tray.

Parameter	Description
driveType	The type of drive that you want to use in the volume group. You cannot mix drive types. You must use this parameter when you have more than one type of drive in your storage array. Valid drive type is: SAS
trayLossProtect	The setting to enforce Tray Loss Protection when you create the volume group. To enforce Tray Loss Protection, set this parameter to TRUE . The default value is FALSE .
drawerLossProtect	The setting to enforce Drawer Loss Protection when you create the volume group. To enforce Drawer Loss Protection, set this parameter to TRUE . The default value is FALSE .
securityType	The setting to specify the security level when creating the volume groups and all associated volumes. These settings are valid: • none – The volume group and volumes are not secure. • capable – The volume group and volumes are capable of having security set, but security has not been enabled. • enabled – The volume group and volumes have security enabled.

Drives and volume groups

A volume group is a set of drives that are logically grouped together by the controllers in the storage array. The number of drives in a volume group is a limitation of the RAID level and the controller firmware. When you create a volume group, follow these guidelines:

• You can create an empty volume group so that you can reserve the capacity for later use.

• You cannot mix HDD and SSD drives within a single volume group for DE2000H, DE4000H, and DE6000H.

• DE4000F and DE6000F suppport SSD only.

• The maximum number of drives in a volume group depends on these conditions:

  – The type of controller

  – The RAID level

• RAID levels include: 0, 1, 3, 5, and 6 .

  – A volume group with RAID level 3, RAID level 5, or RAID level 6 cannot have more than 30 drives.

  – A volume group with RAID level 6 must have a minimum of five drives.

  – If a volume group with RAID level 1 has four or more drives, the storage management software automatically converts the volume group to a RAID level 10, which is RAID level 1 + RAID level 0.

• To enable tray/drawer loss protection, refer to the following tables for additional criteria:

Level	Criteria for Shelf Loss Protection	Minimum number of shelves required
Disk Pool	The disk pool contains no more than two drives in a single tray.	6
RAID 6	The volume group contains no more than two drives in a single shelf.	3
RAID 3 or RAID 5	Each drive in the volume group is located in a separate shelf.	3

Level	Criteria for Shelf Loss Protection	Minimum number of shelves required
RAID 1	Each drive in a RAID 1 pair must be located in a separate shelf.	2
RAID 0	Cannot achieve Shelf Loss Protection.	Not applicable

Level	Criteria for drawer loss protection	Minimum number of drawers required
Disk Pool	The pool includes drives from all five drawers and there are an equal number of drives in each drawer. A 60-drive tray can achieve Drawer Loss Protection when the disk pool contains 15, 20, 25, 30, 35, 40, 45, 50, 55, or 60 drives.	5
RAID 6	The volume group contains no more than two drives in a single drawer.	3
RAID 3 or RAID 5	Each drive in the volume group is located in a separate drawer.	3
RAID 1	Each drive in a mirrored pair must be located in a separate drawer.	2
RAID 0	Cannot achieve Drawer Loss Protection.	Not applicable

Hot spares

With volume groups, a valuable strategy to protect data is to assign available drives in the storage array as hot spare drives. A hot spare is a drive, containing no data, that acts as a standby in the storage array in case a drive fails in a RAID 1, RAID 3, RAID 5, or RAID 6 volume group. The hot spare adds another level of redundancy to the storage array.

Generally, hot spare drives must have capacities that are equal to or greater than the used capacity on the drives that they are protecting. Hot spare drives must be of the same media type, the same interface type, and the same capacity as the drives that they are protecting.

If a drive fails in the storage array, the hot spare is normally substituted automatically for the failed drive without requiring your intervention. If a hot spare is available when a drive fails, the controller uses redundancy data parity to reconstruct the data onto the hot spare. Data evacuation support also allows data to be copied to a hot spare before the software marks the drive "failed."

After the failed drive is physically replaced, you can use either of the following options to restore the data:

When you have replaced the failed drive, the data from the hot spare is copied back to the replacement drive. This action is called copyback.

If you designate the hot spare drive as a permanent member of a volume group, the copyback operation is not needed.

The availability of tray loss protection and drawer loss protection for a volume group depends on the location of the drives that comprise the volume group. Tray loss protection and drawer loss protection might be lost because of a failed drive and the location of the hot spare drive. To make sure that tray loss protection and drawer loss protection are not affected, you must replace a failed drive to initiate the copyback process.

The storage array automatically selects Data Assurance (DA)-capable drives for hot spare coverage of DA-enabled volumes.

Make sure you have DA-capable drives in the storage array for hot spare coverage of DA-enabled volumes. For more information about DA-capable drives, refer to Data Assurance feature.

Secure-capable (FIPS and FDE) drives can be used as a hot spare for both secure-capable and non-secure-capable drives. Non-secure-capable drives can provide coverage for other non-secure-capable drives, and for secure-capable drives if the volume group does not have the security enabled. A FIPS volume group can only use a FIPS drive as a hot spare; however, you can use a FIPS hot spare for non-secure-capable, secure-capable, and secure-enabled volume groups.

If you do not have a hot spare, you can still replace a failed drive while the storage array is operating. If the drive is part of a RAID 1, RAID 3, RAID 5, or RAID 6 volume group, the controller uses redundancy data parity to automatically reconstruct the data onto the replacement drive. This action is called reconstruction.

Segment size

The size of a segment determines how many data blocks that the controller writes on a single drive in a volume before writing data on the next drive. Each data block stores 512 bytes of data. A data block is the smallest unit of storage. The size of a segment determines how many data blocks that it contains. For example, an 8-KB segment holds 16 data blocks. A 64-KB segment holds 128 data blocks.

When you enter a value for the segment size, the value is checked against the supported values that are provided by the controller at run time. If the value that you entered is not valid, the controller returns a list of valid values. Using a single drive for a single request leaves other drives available to simultaneously service other requests. If the volume is in an environment where a single user is transferring large units of data (such as multimedia), performance is maximized when a single data transfer request is serviced with a single data stripe. (A data stripe is the segment size that is multiplied by the number of drives in the volume group that are used for data transfers.) In this case, multiple drives are used for the same request, but each drive is accessed only once.

For optimal performance in a multiuser database or file system storage environment, set your segment size to minimize the number of drives that are required to satisfy a data transfer request.

Usage Hint

Note: You do not need to enter a value for the **cacheReadPrefetch** parameter or the **segmentSize** parameter. If you do not enter a value, the controller firmware uses the **usageHint** parameter with fileSystem as the default value. Entering a value for the **usageHint** parameter and a value for the **cacheReadPrefetch** parameter or a value for the **segmentSize** parameter does not cause an error. The value that you enter for the **cacheReadPrefetch** parameter or the **segmentSize** parameter takes priority over the value for the **usageHint** parameter. The segment size and cache read prefetch settings for various usage hints are shown in the following table:

Usage hint	Segment size setting	Dynamic cache read prefetch setting
File system	128 KB	Enabled
Database	128 KB	Enabled
Multimedia	256 KB	Enabled

Cache read prefetch

Cache read prefetch lets the controller copy additional data blocks into cache while the controller reads and copies data blocks that are requested by the host from the drive into cache. This action increases the chance that a future request for data can be fulfilled from cache. Cache read prefetch is important for multimedia applications that use sequential data transfers. Valid values for the **cacheReadPrefetch** parameter are TRUE or FALSE . The default is TRUE .

Security type

Use the **securityType** parameter to specify the security settings for the storage array.

Before you can set the **securityType** parameter to enabled , you must create a storage array security key. Use the `create storageArray securityKey` command to create a storage array security key. These commands are related to the security key:

- `create storageArray securityKey`
- `export storageArray securityKey`
- `import storageArray securityKey`
- `set storageArray securityKey`
- `enable volumeGroup [volumeGroupName] security`
- `enable diskPool [diskPoolName] security`

Secure drives

Secure-capable drives can be either Full Disk Encryption (FDE) drives or Federal Information Processing Standard (FIPS) drives. Use the **secureDrives** parameter to specify the type of secure drives to use. The values you can use are fips and fde .

Data assurance management

The Data Assurance (DA) feature increases data integrity across the storage system. DA enables the storage array to check for errors that might occur when data is moved between the controllers and drives. When this feature is enabled, the storage array appends error-checking codes (also known as cyclic redundancy checks or CRCs) to each block of data in the volume. After a data block is moved, the storage array uses these CRC codes to determine if any errors occurred during transmission. Potentially corrupted data is not written to disk.

If you want to use the DA feature, start with a pool or volume group that includes only drives that support DA. Then, create DA-capable volumes.

Note: When all the drives are DA-capable, you can set the **dataAssurance** parameter to **enabled** and then use DA with certain operations. For example, you can create a volume group that includes DA-capable drives, and then create a volume within that volume group that is DA-enabled. Other operations that use a DA-enabled volume have options to support the DA feature.

If the **dataAssurance** parameter is set to **enabled** , only data assurance capable drives will be considered for volume candidates; otherwise, both data assurance capable and non-data assurance capable drives will be considered. If only data assurance drives are available the new volume group will be created using the enabled data assurance drives.

Delete volume group

The `delete volumeGroup` command deletes an entire volume group and its associated volumes.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Attention: Possible damage to the storage array configuration – All of the data in the volume group is lost as soon as you run this command.

Syntax

```
delete volumeGroup [volumeGroupName]
```

Parameter

Parameter	Description
volumeGroup	The name of the volume group that you want to delete. Enclose the volume group name in square brackets ([ ]).

Enable volume group security

The `enable volumeGroup security` command converts a non-secure volume group to a secure volume group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

```
enable volumeGroup [volumeGroupName] security
```

Parameter

Parameter	Description
volumeGroup	The name of the volume group that you want to place in the Security Enabled state. Enclose the volume group name in square brackets ([ ]).

Notes

These conditions must be met to successfully run this command.

- All drives in the volume group must be full disk encryption drives.
- The Drive Security feature must be enabled.
- The storage array security key has to be set.
- The volume group is Optimal, and it does not have repository volumes.

The controller firmware creates a lock that restricts access to the FDE drives. FDE drives have a state called Security Capable. When you create a security key, the state is set to Security Enabled, which restricts access to all FDE drives that exist within the storage array.

Revive volume group

The `revive volumeGroup` command forces the specified volume group and its associated failed drives to the Optimal state.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Support Admin role.

Context

Attention: Possible loss of data access – Correct use of this command depends on the data configuration on all of the drives in the volume group. Never try to revive a drive unless you are supervised by technical support.

Syntax

```
revive volumeGroup [volumeGroupName]
```

Parameter

Parameter	Description
volumeGroup	The name of the volume group to be set to the Optimal state. Enclose the volume group name in square brackets ([ ]).

Set volume group

The `set volumeGroup` command defines the properties for a volume group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Note: You must perform only one operation (add drives, change the RAID level, or change volume group ownership) per command. You cannot perform more than one operation with a single command.

Syntax

```
set volumeGroup [volumeGroupName]
[addDrives=(trayID1,[drawerID1,]slotID1 ... trayIDn,[drawerIDn,]slotIDn) ]|
[raidLevel=(0 | 1 | 3 | 5 | 6) ]|
[owner=(a|b)]
```

Parameters

Parameter	Description
volumeGroup	The name of the volume group for which you want to set properties. Enclose the volume group name in square brackets ([ ]).
addDrives	The location of the drive that you want to add to the volume group. For high-capacity drive trays, specify the tray ID value, the drawer ID value, and the slot ID value for the drive. For low-capacity drive trays, specify the tray ID value and the slot ID value for the drive. Tray ID values are 0 to 99 . Drawer ID values are 1 to 5 . All slot ID maximums are 24. Slot ID values either begin at 0 or 1, depending on the tray model. Drive trays compatible with DE2000H / DE4000H / DE4000F / DE6000H / DE6000F controllers have slot ID numbers starting at 0. Enclose the tray ID value, the drawer ID value, and the slot ID value in square brackets ([ ]).
raidLevel	The RAID level for the volume group. Valid values are 0 , 1 , 3 , 5 , or 6 .
owner	The controller that owns the volume group. Valid controller identifiers are a or b , where a is the controller in slot A , and b is the controller in slot B . Use this parameter only if you want to change the volume group owner.

Notes

Host I/O errors might result in volume groups with more than 32 volumes. This operation also might result in internal controller reboots because the timeout period ends before the volume group definition is set. If you experience this issue, quiesce the host I/O operations, and try the command again.

When you use this command, you can specify only one of the parameters.

Note: Specifying the **addDrives** parameter or the **raidLevel** parameter starts a long-running operation that you cannot stop.

The **addDrives** parameter supports both high-capacity drive trays and low-capacity drive trays. A high-capacity drive tray has drawers that hold the drives. The drawers slide out of the drive tray to provide access to the drives. A low-capacity drive tray does not have drawers. For a high-capacity drive tray, you must specify the identifier (ID) of the drive tray, the ID of the drawer, and the ID of the slot in which a drive resides. For a low-capacity drive tray, you need only specify the ID of the drive tray and the ID of the slot in which a drive resides. For a low-capacity drive tray, an alternative method for identifying a location for a drive is to specify the ID of the drive tray, set the ID of the drawer to 0 , and specify the ID of the slot in which a drive resides.

Troubleshooting

Attempting to expand large volume groups by adding drives, also called Dynamic Capacity Expansion (DCE), may fail with the following message:

```
Return code: Error 26 – The modification operation cannot complete because of the number of drives in the volume group and the segment size of the associated volumes. Reduce the segment size of all volumes in the volume group to 128 KB or below using the Change Segment Size option. Then, retry the operation.
```

Systems running 11.50 firmware may fail with the following message instead of the one noted above:

```
Return code: Error 462 – A SYMbol procedure could not be carried out because the firmware could not allocate sufficient cache memory. Operation when error occurred: PROC_startVolum
```

In addition to the above messages, a Major Event Log (MEL) event indicating insufficient cache available to complete the DCE operation may occur.

Any controller running 11.50 firmware may encounter this problem.

DCE requires enough memory to buffer the data read from the original volume and the data to be written to the expanded volume. Some combination of number of drives in the expansion operation, stripe size, and whether mirror operations are enabled may result in not enough memory being available to complete the DCE operation.

If the above situation is encountered, possible workarounds are as follows:

- Create the desired size volume group using other unassigned drives.
- Delete the current volume group and then recreate the volume group with the desired number of drives.
- Reduce the segment size being used and then retry the operation.
- If possible, add additional memory to the controller and then retry the operation.

Set volume group forced state

The `set volumeGroup forcedState` command moves a volume group into a Forced state.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Use this command if the `start volumeGroup import` command does not move the volume group to an Imported state or if the import operation does not work because of hardware errors. In a Forced state, the volume group can be imported, and you can then identify the hardware errors.

Syntax

`set volumeGroup [volumeGroupName] forcedState`

Parameter

Parameter	Description
volumeGroup	The name of the volume group that you want to place in a Forced state. Enclose the volume group name in square brackets ([ ]).

Notes

You can move the drives that comprise a volume group from one storage array to another storage array. The CLI provides three commands that let you move the drives. The commands are `start volumeGroup export`, `start volumeGroup import`, and `set volumeGroup forcedState`.

In the Forced state, you can perform an import operation on the volume group.

Show volume group

The `show volumeGroup` command returns information about a volume group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Context

This command returns this information about a volume group:

- The status (Online or Offline)
- The capacity
- The current owner (the controller in slot A or the controller in slot B)
- The RAID level
- The drive media type (HDD or SSD)
- The drive interface type (Fibre Channel, iSCSI, SAS)
- Tray loss protection (yes or no)
- Secure capable - indicates whether the volume group is composed of all secure-capable drives. Secure-capable drives can be either FDE drives or FIPS drives.
- Secure - Indicates whether the volume group has drive security turned on (this is called secure enabled).
- The associated volumes and free capacity
- The associated drives

Syntax

```
show volumeGroup [volumeGroupName]
```

Parameter

Parameter	Description
volumeGroup	The name of the volume group for which you want to show information. Enclose the volume group name in square brackets ([ ]).

Notes

This command returns volume group information as shown in this example:

```
Name:           SecureGroup

    Status:         Optimal
    Capacity:       120.000 GB
    Current owner: Controller in slot
A


    Quality of Service (QoS) Attributes

       RAID level:           5
       Drive media type:      Hard Disk Drive
       Drive interface type:  Fibre Channel
       Tray loss protection:  No
       Secure Capable:        No
       Secure:                No
```

```
Total Volumes:          1
   Standard volumes:    1
   Repository volumes:  0
   Free Capacity:       110.000 GB

Associated drives - present (in piece order)
Total drives present: 5

   Tray      Slot
   99        1
   99        2
   99        3
   99        4
   99        5
```

Show volume group export dependencies

The `show volumeGroup exportDependencies` command shows a list of dependencies for the drives in a volume group that you want to move from one storage array to a second storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Syntax

`show volumeGroup [`*volumeGroupName*`] exportDependencies`

Parameter

Parameter	Description
volumeGroup	The name of the volume group for which you want to show export dependencies. Enclose the volume group name in square brackets ([ ]).

Notes

This command spins up the drives in a volume group, reads the DACstore, and shows a list of import dependencies for the volume group. The volume group must be in an Exported state or a Forced state.

Show volume group import dependencies

The `show volumeGroup importDependencies` command shows a list of dependencies for the drives in a volume group that you want to move from one storage array to a second storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin or Storage Monitor role.

Syntax

`show volumeGroup [`*volumeGroupName*`] importDependencies`
`[cancelImport=(TRUE | FALSE)]`

Parameters

Parameter	Description
volumeGroup	The name of the volume group for which you want to show import dependencies. Enclose the volume group name in square brackets ([ ]).
cancelImport	The setting to spin the drives back down after the volume group dependencies have been read. To spin down the drives, set this parameter to TRUE . To let the drives stay spinning, set this parameter to FALSE .

Notes

This command returns the dependencies of a specific volume group, which must be in an Exported state or a Forced state. If a decision is made to retain the listed dependencies, then the **cancelImport** parameter can be enforced to spin the drives back down.

You must run the `show volumeGroup importDependencies` command before you run the `start volumeGroup import` command.

Start volume group defragment

The `start volumeGroup defragment` command starts a defragment operation on the specified volume group.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Note: Defragmenting a volume group starts a long-running operation that you cannot stop.

Syntax

```
start volumeGroup [volumeGroupName] defragment
```

Parameter

Parameter	Description
volumeGroup	The name of the volume group that you want to defragment. Enclose the volume group name in square brackets ([ ]).

Notes

Host I/O errors might result in the volume groups with more than 32 volumes. This operation also might result in internal controller reboots because the timeout period ends before the volume group definition is set. If you experience this issue, quiesce the host I/O operations, and try the command again.

Start volume group export

The `start volumeGroup export` command moves a volume group into an Exported state.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Then you can remove the drives that comprise the volume group and reinstall the drives in a different storage array.

CAUTION:
Do not perform these steps without first performing the steps listed in " Learn about volume group migration " on page 531

Note: Within the volume group, you cannot move volumes that are associated with the features from one storage array to another storage array.

Syntax

```
start volumeGroup [volumeGroupName] export
```

Parameter

Parameter	Description
volumeGroup	The name of the volume group that you want to export. Enclose the volume group name in square brackets ([ ]).

Notes

When this command is successful, you can run the `start volumeGroup import` command to finish moving the volume group to a Complete state, which makes the volume group available to the new storage array.

If this command is unsuccessful because hardware problems prevented the completion of the export, use the `set volumeGroup forceState` command. The `set volumeGroup forceState` command lets you use the `start volumeGroup import` command to import a volume group.

After the volume group is in an Exported state or a Forced state, you can remove the drives that comprise the volume group from the storage array. You can reinstall the drives in a different storage array.

Learn about volume group migration
CAUTION:
If you are unsure about whether or not your array(s) contain security-enabled FIPS drives, do not attempt these operations until you have confirmed the FIPS status of the drives. The FIPS status of drives can only be verified by using the datasheet corresponding to each drive model. ThinkSystem SAN OS will not display the FIPS status of the drives. These steps are not necessary if there are no FIPS drives present in the array(s).

Volume group migration lets you export a volume group so that you can import the volume group to a different storage array. You also can export a volume group so that you can store the data offline.

Attention: Possible loss of data access – You must export a volume group before you move the volume group or import the volume group.

Export volume group

The export volume group operation prepares the drives in the volume group for removal. You can remove the drives for offline storage, or you can import the volume group to a different storage array. After you complete the export volume group operation, all of the drives are offline. Any associated volumes or free capacity nodes are no longer shown in the storage management software.

Non-exportable components

You must remove any non-exportable components before you can complete the export volume group procedure. You must remove these components:

- Persistent reservations
- Mappings
- Volume copy pairs
- Remote mirrored pairs
- Mirror repositories

Basic export steps for a volume group

Exporting a volume group includes these steps on the *source* storage array.

1. Save the storage array configuration.
2. Stop all I/O.
3. Back up the data on the volumes in the volume group.
4. Unmount or disconnect the file systems on the volumes in the volume group.
5. Locate the volume group, and label the drives with the source and destination storage array names, volume group name, and total number of drives in the volume group.
6. Place the volume group offline.
7. To maintain proper airflow within the tray, obtain blank drive canisters or new drives so that you can replace the drives after removing the drives associated with the volume group you export.

Exporting a volume group includes these steps on the *target* storage array.

1. Make sure that the target storage array has available drive slots.
2. Make sure that the target storage array supports the drives that you will import.
3. Make sure that the target storage array can support the new volumes.
4. Make sure that the latest version of firmware is installed on the controller.
5. Make sure the target storage array supports RAID Level 6 if you are exporting a RAID Level 6 volume group.
6. Make sure that the latest version of the storage management software is installed on the target storage array.
7. If you are exporting a volume group with Drive Security enabled, make sure Drive Security is enabled on the target storage array.

Import volume group

The import volume group operation adds the imported volume group to the target storage array. After you complete the import volume group operation, all of the drives have Optimal status. Any associated volumes or free capacity nodes now appear in the storage management software that is installed on the target storage array.

Basic import steps for a volume group

Note: You must insert all of the drives in the volume group into the tray before the volume group can be imported.

Importing a volume group includes these steps on the *target* storage array:

1. Insert the exported drives into the available drive slots.
2. Review the Import Report for an overview of the volume group that you are importing.

3. Check for non-importable components.

4. Confirm that you want to proceed with the import procedure.

Non-importable components

Some components cannot be imported during the import volume group procedure. These components are removed during the procedure:

- Persistent reservations
- Mappings
- Volume copy pairs
- Remote mirrored pairs
- Mirror repositories

Start volume group import

The `start volumeGroup import` command moves a volume group into a Complete state to make a newly introduced volume group available to its new storage array.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

The volume group must be in an Exported state or a Forced state before you run this command. Upon successfully running the command, the volume group is operational.

Note: Within the volume group, you cannot move volumes that are associated with the features from one storage array to another storage array.

Syntax

`start volumeGroup [`*volumeGroupName*`] import`

Parameter

Parameter	Description
volumeGroup	The name of the volume group that you want to import. Enclose the volume group name in square brackets ([ ]).

Notes

Higher-level volumes that are specifically related to features (Synchronous Mirroring, Volume Copy, mapping, and persistent reservations) are removed as part of the import operation.

You must run the `show volumeGroup importDependencies` command before you run the `start volumeGroup import` command.

Start volume group locate

The `start volumeGroup locate` command identifies the drives that are logically grouped together to form the specified volume group by blinking the indicator lights on the drives.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Context

Use the `stop volumeGroup locate` command to turn off the indicator lights on the drives.

Syntax

`start volumeGroup [`*volumeGroupName*`] locate`

Parameter

Parameter	Description
volumeGroup	The name of the volume group for which you want to locate the drives that belong to that volume group. Enclose the volume group name in square brackets ([ ]).

Stop volume group locate

The `stop volumeGroup locate` command turns off the indicator lights on the drives that were turned on by the `start volumeGroup locate` command.

Supported Arrays

This command applies to an individual DE2000H, DE4000H, DE4000F, DE6000H, or DE6000F storage array.

Roles

To execute this command on an storage array, you must have the Storage Admin role.

Syntax

`stop volumeGroup locate`

Parameters

None.

Appendix A. Contacting Support

You can contact Support to obtain help for your issue.

You can receive hardware service through a Lenovo Authorized Service Provider. To locate a service provider authorized by Lenovo to provide warranty service, go to https://datacentersupport.lenovo.com/serviceprovider and use filter searching for different countries. For Lenovo support telephone numbers, see https://datacentersupport.lenovo.com/supportphonelist for your region support details.

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