Quantum

QXS 12G (12, 24, and 84-Drive Systems)

CLI Reference Guide

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Contents

About This Guide xi
Intended audience xi
Prerequisites xi
Related Documentation xii
Document conventions and symbols xiii

Using the CLI 1
Accessing the CLI 1
CLI Output Formats 2
Using the CLI Interactively 2
Using a Script to Access the CLI 3
Using XML API Output 4
Using JSON API Output 6
Scripting Guidelines 7
XML API Optimization 9
Command Syntax 10
General Rules for Specifying Commands 10
Specifying Drawers 10
Specifying Disks 11
Specifying Disk Groups 11
Specifying Pools 11
Specifying Volumes 11
Specifying Volume Groups 11
Specifying Ports 11
Specifying Initiators and Hosts 12
Specifying Host Groups 12
Specifying Fan Modules 12
User Password Rules 12
Viewing Help 12
Command Completion, Editing, and History 13
Size Representations 14
Event Log 15

Categorical-List-of-Commands 17
Current Commands by Category 17

Alphabetical List of Commands 21
abort copy 21
abort replication 22
abort scrub 23

abort verify . . . 24
add disk-group . . . 25
add host-group-members . . . 29
add host-members . . . 29
add spares . . . 30
add storage . . . 32
add volume-group-members . . . 33
check firmware-upgrade-health . . . 34
clear cache . . . 36
clear disk-metadata . . . 37
clear events . . . 38
clear expander-status . . . 39
clear fde-keys . . . 40
clear replication-queue . . . 41
copy volume . . . 41
create certificate . . . 43
create chap-record . . . 45
create host . . . 46
create host-group . . . 48
create peer-connection . . . 49
create replication-set . . . 51
create schedule . . . 55
create snapshots . . . 56
create task . . . 57
create temp-license . . . 60
create user . . . 61
create vdisk . . . 64
create volume . . . 66
create volume-group . . . 69
create volume-set . . . 70
delete all-snapshots . . . 73
delete chap-records . . . 74
delete host-groups . . . 75
delete hosts . . . 76
delete initiator-nickname . . . 77
delete peer-connection . . . 78
delete pools . . . 79
delete remote-system . . . 80
delete replication-set . . . 81
delete schedule . . . 82
delete snapshot . . . 83
delete task . . . 83
delete user . . . 84
delete vdisks . . . 85
delete volume-groups . . . 86
delete volumes . . . 87
dequarantine . . . 88
exit . . . 91
expand disk-group . . . 91
expand vdisk . . . 93
expand volume . . . 95
fail . . . 96
help . . . 97
map volume . . . 98
meta . . . 100
ping . . . 101
query peer-connection . . . 101
release volume . . . 103

remove disk-groups . . . 104
remove host-group-members . . . 106
remove host-members . . . 107
remove spares . . . 107
remove volume-group-members . . . 108
replicate . . . 109
rescan . . . 110
reset all-statistics . . . 111
reset controller-statistics . . . 112
reset disk-error-statistics . . . 113
reset disk-group-statistics . . . 114
reset disk-statistics . . . 115
reset host-link . . . 116
reset host-port-statistics . . . 117
reset pool-statistics . . . 118
reset smis-configuration . . . 119
reset snapshot . . . 120
reset vdisk-statistics . . . 121
reset volume-statistics . . . 122
restart mc . . . 123
restart sc . . . 124
restore defaults . . . 125
resume replication-set . . . 126
rollback volume . . . 127
scrub disk-groups . . . 128
scrub vdisk . . . 129
scrub volume . . . 130
set advanced-settings . . . 131
set chap-record . . . 136
set cli-parameters . . . 138
set controller-date . . . 140
set debug-log-parameters . . . 142
set disk . . . 144
set disk-group . . . 145
set disk-parameters . . . 147
set email-parameters . . . 148
set enclosure . . . 150
set expander-fault-isolation . . . 151
set expander-phy . . . 152
set fde-import-key . . . 155
set fde-lock-key . . . 156
set fde-state . . . 157
set host . . . 158
set host-group . . . 159
set host-parameters . . . 160
set host-port-mode . . . 163
set initiator . . . 164
set iscsi-parameters . . . 165
set led . . . 167
set network-parameters . . . 168
set ntp-parameters . . . 169
set password . . . 170
set peer-connection . . . 171
set pool . . . 173
set prompt . . . 175
set protocols . . . 175
set replication-set . . . 178
set schedule . . . 181

set snapshot-space . . . 182
set snmp-parameters . . . 184
set syslog-parameters . . . 185
set system . . . 186
set task . . . 187
set user . . . 189
set vdisk . . . 192
set volume . . . 194
set volume-cache-parameters . . . 196
set volume-group . . . 198
show advanced-settings . . . 199
show cache-parameters . . . 203
show certificate . . . 205
show chap-records . . . 206
show cli-parameters . . . 207
show configuration . . . 209
show controller-date . . . 211
show controllers . . . 212
show controller-statistics . . . 215
show debug-log-parameters . . . 216
show disk-groups . . . 217
show disk-group-statistics . . . 221
show disk-parameters . . . 223
show disks . . . 224
show disk-statistics . . . 231
show email-parameters . . . 235
show enclosures . . . 237
show events . . . 239
show expander-status . . . 241
show fan-modules . . . 244
show fans . . . 245
show fde-state . . . 246
show fenced-data . . . 247
show frus . . . 249
show host-groups . . . 251
show host-phy-statistics . . . 253
show host-port-statistics . . . 254
show initiators . . . 256
show inquiry . . . 257
show iscsi-parameters . . . 258
show license . . . 259
show maps . . . 261
show network-parameters . . . 264
show ntp-status . . . 265
show peer-connections . . . 266
show pools . . . 268
show pool-statistics . . . 270
show ports . . . 275
show power-supplies . . . 278
show protocols . . . 279
show provisioning . . . 281
show redundancy-mode . . . 284
show refresh-counters . . . 285
show remote-systems . . . 286
show replication-sets . . . 287
show replication-snapshot-history . . . 290
show sas-link-health . . . 291
show schedules . . . 293

show sensor-status . . . 294
show sessions . . . 295
show shutdown-status . . . 297
show snapshot-space . . . 298
show snapshots . . . 299
show snmp-parameters . . . 301
show syslog-parameters . . . 302
show system . . . 303
show system-parameters . . . 305
show tasks . . . 307
show tiers . . . 311
show tier-statistics . . . 312
show unwritable-cache . . . 314
show users . . . 315
show vdisks . . . 317
show vdisk-statistics . . . 320
show versions . . . 324
show volume-copies . . . 325
show volume-groups . . . 326
show volume-names . . . 327
show volume-reservations . . . 328
show volumes . . . 330
show volume-statistics . . . 334
shutdown . . . 336
suspend replication-set . . . 337
test . . . 338
trust . . . 339
unfail controller . . . 344
unmap volume . . . 345
verify disk-groups . . . 346
verify links . . . 347
verify vdisk . . . 348

API Basetype Properties . . . 351

adapt-expand-preview . . . 351
advanced-settings-table . . . 353
cache-parameter . . . 359
cache-settings . . . 361
certificate-status . . . 362
chap-records . . . 362
cli-parameters . . . 363
code-load-readiness . . . 366
code-load-readiness-reasons . . . 366
communication-ports . . . 367
compact-flash . . . 367
controller-cache-parameters . . . 368
controllers . . . 369
controller-statistics . . . 375
copy-volumes . . . 377
cs-replicate-tasks . . . 377
cs-replication . . . 378
cs-replication-set . . . 379
current-replication-snapshots . . . 382
debug-log-parameters . . . 383
disk-groups . . . 389
disk-groups-preview . . . 397
disk-group-statistics . . . 399
disk-group-statistics-paged . . . 400

disk-hist-statistics . . . 400
disk-statistics . . . 402
drawers . . . 404
drive-parameters . . . 407
drive-summary . . . 408
drives . . . 408
email-parameters . . . 419
enclosure-fru . . . 421
enclosure-list . . . 423
enclosures . . . 424
events . . . 428
eventsLogs . . . 429
expander-ports . . . 430
expander-versions . . . 432
expanders . . . 432
fan . . . 434
fan-modules . . . 436
fc-port . . . 438
fde-state . . . 439
fenced-data . . . 440
fru-versions . . . 440
host . . . 441
host-group . . . 441
host-group-view . . . 441
host-port-statistics . . . 442
host-view-mappings . . . 443
initiator . . . 444
initiator-view . . . 445
inquiry . . . 446
io-modules . . . 446
iom-versions . . . 449
iscsi-parameters . . . 449
iscsi-port . . . 450
license . . . 452
local-ports . . . 455
local-ports-detail . . . 456
log-header-table . . . 456
midplane-versions . . . 457
network-parameters . . . 457
ntp-status . . . 459
peer-connection-info . . . 459
peer-connections . . . 460
peer-controllers . . . 461
peer-ports . . . 461
pool-hist-statistics . . . 462
pool-statistics . . . 463
pool-summary . . . 464
pools . . . 465
port . . . 469
power-supplies . . . 472
product-info . . . 474
provisioning . . . 474
psu-versions . . . 475
readcache-hist-statistics . . . 476
redundancy . . . 477
refresh-counters . . . 479
remote-ports . . . 479
remote-ports-detail . . . 480

remote-system . . . 480
replication-snapshot-history . . . 482
reset-snapshot-tasks . . . 483
resettable-statistics . . . 484
sas-host-phy-statistics . . . 485
sas-port . . . 485
sas-status-controller-a . . . 486
sas-status-drawer . . . 491
schedules . . . 491
security-communications-protocols . . . 492
sensors . . . 494
sessions . . . 496
show-other-MC-status . . . 498
shutdown-status . . . 498
sideplanes . . . 499
snap-space . . . 501
snapshots . . . 502
snapshot-with-retention-tasks . . . 504
snap-tasks . . . 505
snmp-parameters . . . 505
spares-preview . . . 506
status . . . 508
storage-preview . . . 508
syslog-parameters . . . 509
system . . . 510
system-parameters-table . . . 512
tasks . . . 515
tier-hist-statistics . . . 517
tier-statistics . . . 518
tier-summary . . . 519
tiers . . . 520
time-settings-table . . . 521
unhealthy-component . . . 521
unused-disks-preview . . . 523
unwritable-cache . . . 525
users . . . 526
vdisk-hist-statistics . . . 528
vdisk-statistics . . . 529
versions . . . 530
virtual-disk-summary . . . 531
virtual-disks . . . 531
volume-groups . . . 533
volume-group-view . . . 533
volume-group-view-mappings . . . 534
volume-names . . . 535
volume-reservations . . . 535
volumes . . . 536
volume-statistics . . . 543
volume-view . . . 544
volume-view-mappings . . . 545

Settings Changed by Restore Defaults . . . 547

Glossary . . . 551

About This Guide

This guide provides information for the following QXS 12G systems:

- QXS-312 12G: 12-Drive (2-Port: FC or iSCSI)
- QXS-324 12G: 24-Drive (2-Port: FC or iSCSI)
- QXS-412 12G: 12-Drive (4-Port: FC or iSCSI)
- QXS-424 12G: 24-Drive (4-Port: FC or iSCSI)
- QXS-484 12G: 84-Drive (4-Port: FC or iSCSI)

Intended audience

This guide provides information on how to use the command-line interface (CLI) to configure and manage the QXS 12G systems. It is intended for storage customers and technicians.

Prerequisites

Prerequisites for planning, installing, and using this product include knowledge of:

- Servers and computer networks
- Network administration
- Storage system installation and configuration
- Storage area network (SAN) management and direct attach storage (DAS)
- Converged Network Controllers (CNCs)
- Fibre Channel (FC) protocols
- Serial Attached SCSI (SAS) protocol
- Internet SCSI (iSCSI) protocol
- Ethernet protocol

Related Documentation

Refer to the following table for related QXS 12G documentation.

Table 1 Related Documentation

For Information About	See
Enhancements, known issues, and late-breaking information not included in product documentation	*QXS 12G G265xxxx Release Notes*
Overview of hardware installation	*QXS 12G Quick Start Guide*
Product hardware installation and maintenance	*QXS 12G Hardware Installation and Maintenance Guide*
Obtaining and installing a license to use licensed features	*QXS 12G Licensing Guide*
Using the web interface to configure and manage the product	*QXS 12G Disk Management Utility User Guide V3*
Event codes and recommended actions	*QXS 12G Event Descriptions Reference Guide*
Using the command-line interface (CLI) to configure and manage the product	*QXS 12G CLI Reference Guide*
Cabinet information, QXS 12G specifications, and environment and requirements	*QXS 12G Site Planning Guide*
Regulatory compliance and safety and disposal information	*Product Regulatory Compliance and Safety*
*Printed document included with product.	

Document conventions and symbols

Table 2 Document conventions

Convention	Element
Blue text	Cross-reference links and e-mail addresses
Blue, underlined text	Web site addresses
Bold text	• Key names • Text typed into a GUI element, such as into a box • GUI elements that are clicked or selected, such as menu and list items, buttons, and check boxes
Italic text	Text emphasis
`Monospace text`	• File and directory names • System output • Code • Text typed at the command-line
`Monospace, italic text`	• Code variables • Command-line variables
`Monospace, bold text`	Emphasis of file and directory names, system output, code, and text typed at the command-line

WARNING! Indicates that failure to follow directions could result in bodily injury.

△ **CAUTION:** Indicates that failure to follow directions could result in damage to equipment or data.

IMPORTANT: Provides clarifying information or specific instructions.

NOTE: Provides additional information.

TIP: Provides helpful hints and shortcuts.

Chapter 1

Using the CLI

This chapter provides the following information:

- Accessing the CLI
- CLI Output Formats
- Using the CLI Interactively
- Using a Script to Access the CLI
- Using XML API Output
- Using JSON API Output
- Scripting Guidelines
- Command Syntax
- Viewing Help
- Command Completion, Editing, and History
- Size Representations
- Event Log

Accessing the CLI

The CLI software embedded in the controller modules enables you to manage and monitor storage-system operation. You can access the CLI in two ways:

- By using HTTPS, HTTP, SSH, or Telnet on a management host that is remotely connected through a LAN to a controller module's network port.
- By using a terminal emulator on a management host that is directly connected to a controller module's serial CLI port, or by using a USB connection and a tool like "Tera Term" to emulate the serial connection.

For information about accessing the CLI and obtaining IP values for storage-system management, see your product's Hardware Installation and Maintenance Guide.

Table 3 Default Usernames and Passwords

Username	Password	Roles
`monitor`	`!monitor`	`Monitor (view only)`
(See note below) `manage`	(See note below) `!manage`	(See note below) `Monitor, Manage (view and change)`

NOTE: On new systems running QXS G280 software there is no longer a default "`manage`" user account, nor default "`!manage`" password on the system. To log in to the system, use the username created during initial system installation. For older systems, configured using older QXS software, the default username and password still apply, and are still available after upgrading to QXS G280.

CLI Output Formats

The CLI has two output formats:

- Console format, which is the human-to-computer interface (HCI).
- API format, which is the computer-to-computer interface (CCI).

Console format enables users to interact with the CLI and obtain easily readable information. This format automatically sizes fields according to content and adjusts content to window resizes. These capabilities would present problems for a CCI in the form of scripts or other client software. In console format, some commands display confirmation prompts.

API format enables any external application to interact with the storage system. XML and JSON formats are supported. Both formats are constructed to permit new fields to be added without impacting existing clients if they follow standard parsing conventions for the respective format. In API format, commands do not use confirmation prompts.

Scripting is not supported using console format because labels, field sizes, and order of fields may change in future firmware releases. To properly script CLI commands use API format, which is expected to remain consistent from release to release; field names will be consistent and new functionality will be added as new fields. These types of changes in API output will not impact a conventional XML or JSON parsing engine.

You can change the CLI output format by using the set cli-parameters command.

Using the CLI Interactively

By default the CLI is an interactive application. When you are logged into the CLI, the CLI waits for a command to be entered and then responds to it.

CAUTION: In the interactive mode, confirmation is required for commands that may cause data unavailability or data loss.

The following example shows interactively starting an SSH session, logging into the CLI, executing a command to show the system's current date and time, and exiting the CLI:

```
$: ssh <username>@IP-address
Password:

product
System Name: Test
System Location: Lab
Version: version
# show controller-date
Controller Date: 2015-02-06 10:53:06
Time Zone Offset: -07:00

Success: Command completed successfully. (2015-02-06 10:53:06)

# exit
```

Using a Script to Access the CLI

Because basic command-line semantics provide prompts for user input and response time is indeterminate, scripts would need to use an "expect"-type mechanism to scan output for prompts. It is strongly recommended and more efficient to use the HTTP interface to access the API.

The following example shows how to construct a Perl script to communicate with the XML API via HTTPS.

```
# Include required libraries
use LWP::UserAgent;
use Digest::MD5 qw(md5_hex);
use XML::LibXML;

# Generate the login hash used to authenticate the user. The default
# username and password are hardcoded here to illustrate the
# requirements for the string. The username and password must be
# joined with an underscore.

my $md5_data = "<username> <password>";
my $md5_hash = md5_hex( $md5_data );

# Create a user agent for sending https requests and generate a request
# object.

$user_agent = LWP::UserAgent->new( );
$url = 'https://IP-address/api/login/' . $md5_hash;
$request = HTTP::Request->new( GET => $url );

# Send the request object to the system. The response will be returned.
$response = $user_agent->request($request);

# Once the script has logged in, the response returns back a session
# key. This code shows how to retrieve that session key.

my $parser = XML::LibXML->new();
my $document = $parser->parse_string( $response->content );

my $root = $document->getDocumentElement;
my @objects = $root->getElementsByTagName( 'OBJECT' );
my @properties = $objects[0]->getElementsByTagName( 'PROPERTY' );
```

```
my $sessionKey;

foreach my $property ( @properties ) {
   my $name = $property->getAttribute( 'name' );


    if( $name eq 'response' ) {
       $sessionKey = $property->textContent;
    }
}
```

The following example shows how to construct a Python script to communicate with the JSON API via HTTPS.

```
$url = 'https://IP-address/api/show/configuration';
$request = HTTP::Request->new(GET => $url );
$request->header('sessionKey' => $sessionKey );
$request->header('dataType' => 'ipa' );

$response = $user_agent->request( $request );

print $response->content;
```

Alternatively, the `dataType` in the request header can be set to `json` for JSON output, or to `console` for standard CLI text output. Console output should not be used for parsing, but may be useful for tabular reports obtained directly from the CLI commands.

The next section provides more information about using the XML API.

Using XML API Output

The Management Controller provides access for monitoring and management via the SSH and Telnet protocols for command-line interface semantics, or via the HTTP and HTTPS protocols for XML API request/response semantics.

You can use an XML parser, such as `XML::Parser` in Perl, to process the XML output and store this information as objects.

The output of each CLI command is composed of valid XML data until the CLI prompt (typically #) is encountered. The output contains a valid XML header followed by the XML elements described in the following table.

Table 4 XML API Elements

Element	Description and attributes
RESPONSE	The RESPONSE element is the top-level element, which contains all data output for the CLI command that was issued. The response includes: • A number of OBJECT elements, which varies by command. • A status object that provides a message and return code. A return code of 0 indicates that the command succeeded. Any other return code is an error code. There is only one RESPONSE element per issued command.
OBJECT	In general, an OBJECT element describes a storage-system component such as a disk or a volume. An object has these attributes: • basetype. This attribute allows output in brief mode to be correlated with metadata to reduce the overhead of each command, as described in XML API Optimization. This is also a good field to use to detect the type of the object (e.g., a disk, a volume, etc.). • name. The name of the object. • oid. The unique identifier for the object in the scope of the response. The OBJECT element can contain PROPERTY elements.
PROPERTY	A PROPERTY element provides detail about the attributes of an OBJECT. A property has these attributes: • name. The unique name for the property within the object. • key. Indicates whether this property is a key value to identify this object. • type. The type of data represented by the element data. • size. Typically the maximum size of the output. Usually only important if the console output is displayed in rows. • draw. Whether to show or hide this data in console format. • sort. The type of sorting that can be applied to this property. • display-name. The label for this data to show in user interfaces.
COMP	A COMP (composition) element associates nested objects, such as a task object within a schedule object. A composition element has these attributes: • P. The oid of the part component. • G. The oid of the group component. An alternative to using COMP elements is described in XML API Optimization.
ASC	The association element provides a simple association description between two objects in the response. • A. First object. • B. Second object.

Using JSON API Output

The simplest mechanism to handle JSON output is by using either a JavaScript or a Python parser to interpret the data.

The JSON output is organized according to the basetypes defined for the system. All basetype objects are returned in an array. The JSON object uses the same name for the key as the XML API uses in the `name` attribute. Objects can also be embedded inside of other objects are always presented as an array as well. This is different from the XML API where the default output uses associations. The JSON output always uses a hierarchical presentation of objects to identify relationships between objects.

Each object also has an `object-name` property that may be used in some cases to identify the object uniquely. For example, the show versions command uses the `object-name` property to identify the version for controller A and controller B:

```
{
"versions":[
  {
     "object-name":"controller-a-versions",
     "sc-cpu-type":"SC-CPU-type",
     "bundle-version":"bundle-version",
     "bundle-base-version":"bundle-base-version",
     "build-date":"Mon Jul 17 14:15:44 MDT 2017",
     ...
  },
  {
     "object-name":"controller-b-versions",
     ...
  }
],
"status":[
  {
     "object-name":"status",
     "response-type":"Success",
     "response-type-numeric":0,
     "response":"Command completed successfully. (2017-07-27
     10:21:36)",
     "return-code":0,
     "component-id":"",
     "time-stamp":"2017-07-27 10:21:36",
     "time-stamp-numeric":1501150896
  }
]
}
```

Other basetypes may use the durable ID to uniquely identify the objects.

Scripting Guidelines

When scripting command input, use CLI syntax as defined in this guide. For use with SSH or Telnet, use a space character between command names, parameters, and their values (as shown throughout this guide). For use with the HTTP or HTTPS interface, use a '/' character instead of a space character between command names, parameters, and their values.

When writing scripts to parse XML API output, use an XML library to parse the data. For parsing, a script should not rely on ordering, spacing, or column position. To find a specific property, a script should compare property names as it searches through the data. This allows the script to be compatible with future versions that could potentially add new fields to the output.

CAUTION: Because API format does not use confirmation prompts, use caution when scripting commands that may cause data unavailability or data loss.

The output of show commands is intended for monitoring or obtaining the current configuration. Other commands provide configuration data and display one or more status objects that specify the status of command processing. The last status object specifies the overall status of the command; other status objects indicate intermediate processing status.

The following example shows the API status object, using the ipa output option:

```
<OBJECT basetype="status" name="status" oid="1">
      <PROPERTY name="response-type" type="string">Success</PROPERTY>
      <PROPERTY name="response-type-numeric" type="uint32">0</PROPERTY>
      <PROPERTY name="response" type="string">Command completed successfully.
      (2017-07-20 11:38:26)</PROPERTY>
      <PROPERTY name="return-code" type="sint32">0</PROPERTY>
      <PROPERTY name="component-id" type="string"></PROPERTY>
      <PROPERTY name="time-stamp" type="string">2017-07-20 11:38:26</PROPERTY>
      <PROPERTY name="time-stamp-numeric" type="uint32">1500550706</PROPERTY>
</OBJECT>
```

The following example shows the API status object, using the `json` output option:

```
"status":[
  {
     "object-name":"status",
     "response-type":"Success",
     "response-type-numeric":0,
     "response":"Command completed successfully. (2017-07-20
     11:38:48)",
     "return-code":0,
     "component-id":"",
     "time-stamp":"2017-07-20 11:38:48",
     "time-stamp-numeric":1500550728
  }
]
```

In a script, each command should check the previous command's status before proceeding. If the value of the `status` object's `return-code` property is `0`, the command succeeded; any other value means that the command failed.

TIP: If you script an operation to repeatedly add and remove disk groups, set a delay of at least two minutes between deleting a disk group and creating the next one.

Example Command Input and API Output

The following example shows a command formatted for use with the command-line interface, the same command formatted for use with the HTTPS interface, and command output in the XML and JSON APIs.

- Command-line interface format: `create user JSmith interfaces wbi password Abc#1379`
- HTTPS interface format: `create/user/JSmith/interfaces/wbi/password/Abc#1379`
- XML API output:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>

<RESPONSE VERSION="L100">
   <OBJECT basetype="status" name="status" oid="1">
      <PROPERTY name="response-type" type="string" size="12"
      draw="false" sort="nosort" display-name="Response
      Type">Success</PROPERTY>

      <PROPERTY name="response-type-numeric" type="uint32" size="12"
      draw="false" sort="nosort" display-name="Response
      Type">0</PROPERTY>

      <PROPERTY name="response" type="string" size="180" draw="true"
      sort="nosort" display-name="Response">Command completed
      successfully. (JSmith) - The new user was created. (2014-07-10
      14:16:29)</PROPERTY>

      <PROPERTY name="return-code" type="sint32" size="15" draw="false"
      sort="nosort" display-name="Return Code">0</PROPERTY>

      <PROPERTY name="component-id" type="string" size="80"
      draw="false" sort="nosort" display-name="Component
      ID">JSmith</PROPERTY>

      <PROPERTY name="time-stamp" type="string" size="25" draw="false"
      sort="datetime" display-name="Time">2014-07-10
      14:16:29</PROPERTY>

      <PROPERTY name="time-stamp-numeric" type="uint32" size="25"
      draw="false" sort="datetime"
      display-name="Time">1405001789</PROPERTY>

   </OBJECT>

</RESPONSE>
```

- JSON API output:

```
{

"status":[
   {
      "object-name":"status",
```

```
      "response-type":"Success",
      "response-type-numeric":0,
      "response":"Command completed successfully. (JSmith) - The new
      user was created. (2017-07-27 10:27:46)",
      "return-code":0,
      "component-id":"JSmith",
      "time-stamp":"2017-07-27 10:27:46",
      "time-stamp-numeric":1501151266
    }
  ]
  }
```

XML API Optimization

For the XML API only, the following are two ways to optimize performance:

- Use embedded objects. This allows one object to contain not only properties but also other objects. In general, parsing a structure such as this is easier as the association between objects is simpler. This is an alternative to using `COMP` elements.
- Use brief mode. In brief mode, which is disabled by default, returns a subset of attributes of object properties. The name and type attributes are always returned. Other properties can be obtained by using the meta command with the basetype of the object. This optimization reduces the number of bytes transmitted for each request and allows caching of CLI metadata. Brief mode can be enabled or disabled by using the set cli-parameters command.

The following example shows brief mode output, in which a subset of attributes is returned, and use of embedded objects:

```
# show ports
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<RESPONSE VERSION="L100" REQUEST="show ports">
  <OBJECT basetype="port" name="ports" oid="1" format="rows">
    <PROPERTY name="durable-id" type="string">hostport_A0</PROPERTY>
    <PROPERTY name="controller" key="true" type="string">A</PROPERTY>
    <PROPERTY name="controller-numeric" key="true"
    type="string">1</PROPERTY>
    <PROPERTY name="port" key="true" type="string">A0</PROPERTY>
    <PROPERTY name="port-type" type="string">FC</PROPERTY>
    ...
    <OBJECT basetype="fc-port" name="port-details" oid="2"
    format="rows">
    <PROPERTY name="configured-topology" type="string">PTP</PROPERTY>
    <PROPERTY name="primary-loop-id" type="string">N/A</PROPERTY>
    <PROPERTY name="sfp-status" type="string">Not present</PROPERTY>
    ...
    </OBJECT>
```

```
    </OBJECT>
    ...
    <OBJECT basetype="status" name="status" oid="17">
       <PROPERTY name="response-type" type="string">Success</PROPERTY>
       ...
    </OBJECT>
</RESPONSE>
```

For the JSON API, embedding objects is the only way to show relationships and brief mode is not applicable.

Command Syntax

General Rules for Specifying Commands

Command names and parameter names are not case sensitive.

Parameters enclosed in square brackets ([ ]) are optional. Do not type the bracket characters.

Parameter values separated by '|' characters are options. Enter only one of the values. Unless specified otherwise, enumerated values are not case sensitive.

Parameter values in italics are variables. Substitute text that is appropriate for the task you want to perform. Unless specified otherwise, variable values such as names of users and volumes are case sensitive and have a maximum length in bytes. When encoded in UTF-8, a single character can occupy multiple bytes. Typically:

- 1 byte per character for English, Dutch, French, German, Italian, and Spanish
- 3 bytes per character for Chinese, Japanese, and Korean

Unless otherwise specified, a parameter value can include spaces and printable UTF-8 characters except: " , < > \

A parameter value that includes a space must be enclosed in double quotes. Unless specified otherwise, if you include leading or trailing spaces with a value (such as a name) in double quotes, those spaces are treated as part of the value.

Parameters can be entered in any order. However, for a parameter with no keyword, if you want to specify a value that is partially or entirely the same as the keyword of an optional parameter, you must specify the optional parameter before the value. For example, to create a user named `base` you must specify the optional `base` parameter before the name **`base:`** `create user base 2` **`base`**

Specifying Drawers

In an chassis with drawers:

- Disk drawers are specified by chassis ID and drawer number. Enclosure IDs increment from 0. Drawer IDs increment from 0 in each chassis. Example: `2.1`
- Disks are specified without the drawer number, as described below.

Specifying Disks

Disks are specified by enclosure ID and slot number. Enclosure IDs increment from 0. Disk IDs increment from 0 in each chassis. You can specify:

- A disk. Example: `1.4`
- A hyphenated range of disks. Example: `1.4-7`
- A comma-separated list of individual disks, ranges, or both (with no spaces). Example: `1.4,1.6-9`
- A RAID 10 or 50 disk group with disks in subgroups separated by colons (with no spaces). RAID-10 example: `1.1-2:1.3-4:1.7,1.10`

Specifying Disk Groups

You can specify:

- A disk group by its name or serial number. A unique serial number is automatically assigned when a disk group is created, and does not change for the life of the disk group.
- A list of disk-group names or serial numbers separated by commas (with no spaces). Not all commands support lists. Example: `dg1,"Disk group 1"`

Specifying Pools

For virtual storage, you can specify:

- A pool by its name or serial number.
- A list of pool names or serial numbers separated by commas (with no spaces). Not all commands support lists. Example: `A,B`

Specifying Volumes

You can specify:

- A volume by its name or serial number. A unique serial number is automatically assigned when a volume is created, and does not change for the life of the volume.
- A list of volume names or serial numbers separated by commas (with no spaces). Not all commands support lists. List example: `vd1_v1,"Vol #1"`

Specifying Volume Groups

For virtual storage, you can specify:

A volume group by its name in the format `volume-group.*`, where `*` represents all volumes in the group. Example: `TestVolumes.*`

Specifying Ports

Controller module host ports are specified by port number only (to use the same port in both controllers) or by controller ID and port number (to specify a port in one controller).

In a 2U12 or 2U24 chassis, the top module's ID is A and the bottom module's ID is B. In a 5U84 chassis, the left module's ID is A and the right module's ID is B. Module IDs are not case sensitive.

Port IDs increment from 0 in each controller module.

You can specify:

- A port ID in both controllers. Example: `1`
- A port ID in one controller. Example: `A1`
- A hyphenated range of IDs. Do not mix controller IDs in a range. Example: `b1-b2` or `1-2`
- A comma-separated list of IDs, ranges, or both (with no spaces). Example: `A1,b1-b2` or `A1,2`

Specifying Initiators and Hosts

You can specify:

- An FC initiator by its nickname or 16-hex-digit WWPN.
- A SAS initiator by its nickname or 16-hex-digit WWPN.
- An iSCSI initiator by its nickname or node name (typically the IQN).
- An InfiniBand initiator by its node name (typically the IQN).
- A host by name in the format `host-name.*`, where `*` represents all initiators in the host. Example: `Mail_Server.*`

Specifying Host Groups

For virtual storage, you can specify:

- A host group by name in the format `host-group.*.*`, where the first `*` represents all hosts in the group and the second `*` represents all initiators in those hosts. Example: `TestLab.*.*`

Specifying Fan Modules

In a 5U84 chassis:

- Fan modules are specified by enclosure ID and module number. Enclosure IDs increment from 0. Module IDs increment from 0 in each chassis. Example: `1.1`

User Password Rules

- The value is case sensitive.
- The value can have 8–32 characters.
- The value can include printable UTF-8 characters except a space or: `"', < > \`
- A value that includes only printable ASCII characters must include at least one uppercase character, one lowercase character, one numeric character, and one non-alphanumeric character. This rule does not apply if the password contains UTF-8 characters that are outside the range of printable ASCII characters.

Viewing Help

See help on page 97.

Command Completion, Editing, and History

The CLI supports command completion, command editing, and command history.

When entering commands interactively you can abbreviate their names and keywords. For example, you can enter sho cl to run the show `cli-parameters` command. If you press **Tab** or **Ctrl+i** after typing sufficient characters to uniquely identify the command or keyword, the remainder of the command or keyword is displayed so you can confirm your intent. If you enter too few letters to uniquely identify a keyword, pressing **Tab** or **Ctrl+i** will list commands or keywords that match the entered string and redisplays the string so you can complete it.

When scripting commands, type commands in full to aid readability.

The history contains commands entered in the active CLI session. You can recall a command from the history, edit it, and run it.

Table 5 Keyboard Shortcuts for Command Completion, Editing, and History

To	Press
Complete a partially entered keyword	**Tab** or **Ctrl+i**
Show command history	**F6**
Get previous command from history	**Up Arrow**
Get next command from history	**Down Arrow**
Move cursor left	**Left Arrow**
Move cursor right	**Right Arrow**
Delete previous character	**Backspace**

Size Representations

Operating systems usually show volume size in base 2. Disk drives usually show size in base 10. Memory (RAM and ROM) size is always shown in base 2.

In the CLI, the base for entry and display of storage-space sizes can be set per user or per session; see create user and set cli-parameters. When entering storage-space sizes only, either base-2 or base-10 units can be specified.

Table 6 Size representations in base 2 and base 10

Base 2		Base 10	
Unit	**Size in bytes**	**Unit**	**Size in bytes**
KiB (kibibyte)	1,024	KB (kilobyte)	1,000
MiB (mebibyte)	$1,024^2$	MB (megabyte)	$1,000^2$
GiB (gibibyte)	$1,024^3$	GB (gigabyte)	$1,000^3$
TiB (tebibyte)	$1,024^4$	TB (terabyte)	$1,000^4$
PiB (pebibyte)	$1,024^5$	PB (petabyte)	$1,000^5$
EiB (exbibyte)	$1,024^6$	EB (exabyte)	$1,000^6$

The locale setting determines the character used for the decimal (radix) point, as shown below.

Table 7 Decimal (radix) point character by locale

Language	Character	Examples
English, Chinese, Japanese, Korean	Period (.)	146.81 GB 3.0 Gb/s
Dutch, French, German, Italian, Spanish	Comma (,)	146,81 GB 3,0 Gb/s

Event Log

A controller chassis's event log records all events that have occurred in or been detected by the controller modules and encompasses all field-replaceable units (FRUs) in the storage system.

Each event has one of the following levels, in decreasing severity:

- Critical. A failure occurred that may cause a controller to shut down. Correct the problem immediately.
- Error. A failure occurred that may affect data integrity or system stability. Correct the problem as soon as possible.
- Warning. A problem occurred that may affect system stability but not data integrity. Evaluate the problem and correct it if necessary.
- Informational. A configuration or state change occurred, or a problem occurred that the system corrected. No action is required.
- Resolved. A condition that caused an event to be logged has been resolved.

For information about viewing events, see the show events command.

Chapter 2

Categorical-List-of-Commands

Current Commands by Category

The following table helps you find a command within a category of functionally related commands. A command might appear in more than one category.

Table 8 Commands by Category

Category	Commands
CLI and users	create user on page 61, delete user on page 84, exit on page 91, help on page 97, set cli-parameters on page 138, set password on page 170, set prompt on page 175, set user on page 189, show cli-parameters on page 207, show sessions on page 295, show users on page 315
Disks, disk groups, pools, tiers, and spares	abort scrub on page 23, abort verify on page 24, add disk-group on page 25, add spares on page 30, clear disk-metadata on page 37, clear fde-keys on page 40, create vdisk on page 64, delete pools on page 79, delete vdisks on page 85, dequarantine on page 88, expand vdisk on page 93, remove spares on page 107, rescan on page 110, scrub disk-groups on page 128, scrub vdisk on page 129, set disk on page 144, set disk-group on page 145, set expander-fault-isolation on page 151, set fde-import-key on page 155, set fde-lock-key on page 156, set fde-state on page 157, set led on page 167, set pool on page 173, set vdisk on page 192, show disks on page 224, show disk-groups on page 217, show fde-state on page 246, show pools on page 268, show tiers on page 311, show vdisks on page 317, trust on page 339, verify disk-groups on page 346, verify vdisk on page 348

Table 8 Commands by Category

Category	Commands
Volumes, volume groups, initiators, hosts, host groups, and mapping	add host-group-members on page 29, add host-members on page 29, add volume-group-members on page 33, create host on page 46, create host-group on page 48, create volume on page 66, create volume-group on page 69, create volume-set on page 70, delete host-groups on page 75, delete hosts on page 76, delete initiator-nickname on page 77, delete volume-groups on page 86, delete volumes on page 87, expand disk-group on page 91, expand volume on page 95, map volume on page 98, release volume on page 103, remove disk-groups on page 104, remove host-group-members on page 106, remove host-members on page 107, remove volume-group-members on page 108, scrub volume on page 130, set host on page 158, set host-group on page 159, set host-port-mode on page 163, set initiator on page 164, set volume on page 194, set volume-group on page 198, show cache-parameters on page 203, show host-groups on page 251, show initiators on page 256, show maps on page 261, show ports on page 275, show unwritable-cache on page 314, show volume-groups on page 326, show volume-names on page 327, show volume-reservations on page 328, show volumes on page 330, unmap volume on page 345
Snapshots	create snapshots on page 56, delete all-snapshots on page 73, delete snapshot on page 83, reset snapshot on page 120, rollback volume on page 127, set snapshot-space on page 182, show snapshot-space on page 298, show snapshots on page 299
Virtual volume copy	abort copy on page 21, copy volume on page 41, show volume-copies on page 325
Scheduled tasks	create schedule on page 55, create task on page 57, delete schedule on page 82, delete task on page 83, set schedule on page 181, set task on page 187, show schedules on page 293, show tasks on page 307
Event notification	set email-parameters on page 148, set snmp-parameters on page 184, set syslog-parameters on page 185, show email-parameters on page 235, show events on page 239, show snmp-parameters on page 301, show syslog-parameters on page 302, test on page 338

Table 8 Commands by Category

Category	Commands
System configuration and utilities	check firmware-upgrade-health on page 34, clear cache on page 36, create certificate on page 43, create chap-record on page 45, create temp-license on page 60, delete chap-records on page 74, ping on page 101, reset host-link on page 116, restart mc on page 123, restart sc on page 124, set advanced-settings on page 131, set chap-record on page 136, set controller-date on page 140, set disk-parameters on page 147, set enclosure on page 150, set expander-fault-isolation on page 151, set expander-phy on page 152, set host-parameters on page 160, set host-port-mode on page 163, set iscsi-parameters on page 165, set led on page 167, set network-parameters on page 168, set ntp-parameters on page 169, set protocols on page 175, set system on page 186, set volume-cache-parameters on page 196, show advanced-settings on page 199, show cache-parameters on page 203, show certificate on page 205, show chap-records on page 206, show configuration on page 209, show controller-date on page 211, show controllers on page 212, show disk-parameters on page 223, show enclosures on page 237, show expander-status on page 241, show fan-modules on page 244, show fans on page 245, show fenced-data on page 247, show frus on page 249, show inquiry on page 257, show iscsi-parameters on page 258, show license on page 259, show network-parameters on page 264, show ntp-status on page 265, show ports on page 275, show power-supplies on page 278, show provisioning on page 281, show protocols on page 279, show redundancy-mode on page 284, show sas-link-health on page 291, show sensor-status on page 294, show shutdown-status on page 297, show system on page 303, show system-parameters on page 305, show versions on page 324, shutdown on page 336
Service utilities	clear events on page 38, clear expander-status on page 39, fail on page 96, reset smis-configuration on page 119, restore defaults on page 125, set debug-log-parameters on page 142, set expander-fault-isolation on page 151, set expander-phy on page 152, show debug-log-parameters on page 216, show expander-status on page 241, unfail controller on page 344
API specific	meta on page 100, show refresh-counters on page 285
Remote systems	delete remote-system on page 80, show remote-systems on page 286
Peer connections	create peer-connection on page 49, delete peer-connection on page 78, query peer-connection on page 101, set peer-connection on page 171, show peer-connections on page 266
Virtual volume replication	abort replication on page 22, clear replication-queue on page 41, create replication-set on page 51, delete replication-set on page 81, replicate on page 109, resume replication-set on page 126, set replication-set on page 178, show replication-sets on page 287, show replication-snapshot-history on page 290, suspend replication-set on page 337
Statistics	reset all-statistics on page 111, reset controller-statistics on page 112, reset disk-error-statistics on page 113, reset disk-group-statistics on page 114, reset disk-statistics on page 115, reset host-port-statistics on page 117, reset pool-statistics on page 118, reset vdisk-statistics on page 121, reset volume-statistics on page 122, show controller-statistics on page 215, show disk-group-statistics on page 221, show disk-statistics on page 231, show host-phy-statistics on page 253, show host-port-statistics on page 254, show pool-statistics on page 270, show tier-statistics on page 312, show vdisk-statistics on page 320, show volume-statistics on page 334

Chapter 3

Alphabetical List of Commands

This chapter is organized to help you find a command by name. Each command topic includes one or more of the following sections:

Description	The command's purpose and notes about its usage
Minimum role	The minimum user role required to use the command
Syntax	The command's syntax
Parameters	Descriptions of the command's parameters
Output	Descriptions of fields shown in console format
Examples	One or more examples of the command's usage in console format
Basetypes	References to descriptions of basetype properties shown in API format
See also	References to commands that are used with the command

abort copy

Description

Aborts a copy volume operation.

When the operation is complete, the destination volume is deleted.

Minimum role

`manage`

Syntax

```
abort copy
   volume-ID
```

Parameters

`volume-ID`
The name or serial number of the source volume or the destination volume. A name that includes a space must be enclosed in double quotes.

Examples

Abort copying volume SourceVol to volume DestVol.

```
# abort copy SourceVol
```

See also

copy volume

show volume-copies

show volumes

abort replication

Description

Aborts the current replication operation for the specified replication set.

The current replication may be running or suspended. Aborting a replication for a replication set in a Ready or Unsynchronized state will generate an error. This command must be run on the replication set's primary system.

NOTE: If you abort a replication operation, the snapshot space allocated for that replication in the primary pool and the secondary pool will not be freed. To free that space, either re-run the initial replication or delete the replication set.

Minimum role

`manage`

Syntax

abort replication

`replication-ID`

Parameters

`replication-ID`
The name or serial number of the replication set in which to abort replications.

Examples

Abort active replications in replication set RS1.

```
# abort replication RS1
```

See also

replicate

resume replication-set

show replication-sets

suspend replication-set

abort scrub

Description

Aborts a media scrub operation.

Minimum role

`manage`

Syntax

abort scrub

[disk-group *disk-groups*]

[vdisk *vdisks*]

[volume *volumes*]

Parameters

Specify only one of the following parameters.

`disk-group` *disk-groups*
Optional. A comma-separated list of the names or serial numbers of the disk groups to stop scrubbing. A name that includes a space must be enclosed in double quotes.

`vdisk` *vdisks*
Optional. A comma-separated list of the names or serial numbers of the linear disk groups to stop scrubbing. A name that includes a space must be enclosed in double quotes.

`volume` *volumes*
Optional. A comma-separated list of the names or serial numbers of the volumes to stop scrubbing. A name that includes a space must be enclosed in double quotes.

Examples

Abort scrubbing disk group dg1.

```
# abort scrub disk-group dg1
```

Abort scrubbing linear disk group vd1.

```
# abort scrub vdisk vd1
```

Abort scrubbing volume vol1.

```
# abort scrub volume vol1
```

See also

scrub disk-groups

scrub vdisk

scrub volume

show disk-groups

show vdisks

show volumes

abort verify

Description

Aborts a media verify operation.

Minimum role

`manage`

Syntax

abort verify

[disk-group *disk-groups*]

[vdisk *vdisks*]

Parameters

`disk-group` *disk-groups*
Optional. A comma-separated list of the names or serial numbers of the disk groups to stop verifying. A name that includes a space must be enclosed in double quotes.

`vdisk` *vdisks*
Optional. A comma-separated list of the names or serial numbers of the linear disk groups to stop verifying. A name that includes a space must be enclosed in double quotes.

Examples

Abort verifying disk group dg1.

```
# abort verify disk-group dg1
```

Abort verifying linear disk group vd1.

```
# abort verify vdisk vd1
```

See also

show disk-groups

show vdisks

verify disk-groups

verify vdisk

add disk-group

Description

Creates a disk group using specified disks.

For linear storage, you can create a linear disk group.

For virtual storage, with the Virtualization license you can create a virtual disk group or a read-cache disk group.

All disks in a disk group must be the same type (enterprise SAS, for example).

The rules for using SSDs and spinning disks are:

- If the first disk group is provisioned with SSDs and the system does not have the Performance Tier license installed, then the system will expect to be provisioned as an "all-flash array" and allow only SSDs to be used in all other disk groups. Tiering is not supported for an all-flash array system.
- If the first disk group is provisioned with spinning disks and does not have the Performance Tier license installed, then the system can only use SSDs in a read-cache disk group.
- If the Performance Tier license is installed, then the order and type of disk provisioning is not a concern. The system can use SSDs, spinning disks, or both.

TIP: A disk group can contain a mix of 512-byte native sector size (512n) disks and 512-byte emulated sector size (512e) disks. For consistent and predictable performance, do not mix disks of different sector size types (512n, 512e).

For virtual storage, a disk group of midline SAS disks will be used in the Archive tier. A disk group of enterprise SAS disks will be used in the Standard tier. A disk group of SSDs can be used:

- In the Performance tier (with the Performance tier license).
- As an all-flash array (without the Performance Tier license).
- As read cache. A virtual pool can contain only one read-cache disk group.

A virtual pool cannot contain both a read-cache disk group and a Performance tier. At least one virtual disk group must exist in a pool before a read-cache disk group can be added. A read-cache disk group can contain a maximum of two disks.

When you add a virtual disk group, the system will first prepare the disk group to be added to a virtual pool. During preparation, the disk group's status will be VPREP and the disk group cannot be removed. When preparation is complete, the disk group will start initializing. During initialization, the disk group's status will be INIT and the disk group will be available to store user data—or the disk group can be removed.

TIP: All virtual disk groups in the same tier in a virtual pool should have the same RAID level, capacity, and physical number of disks. This will provide consistent performance across the tier.

TIP: To replace a single-disk read-cache disk group with a multiple-disk read-cache disk group, simply remove the read cache and re-add it.

NOTE: If the only disk group in a virtual pool is quarantined, the pool will be inaccessible and attempting to add a new disk group to that pool will fail with a "duplicate name" error. Before you can add a disk group to that pool, you must resolve the problem with the quarantined disk group.

Minimum role

manage

Syntax

add disk-group

[adapt-spare-capacity *size* [B|KB|MB|GB|TB|KiB|MiB|GiB|TiB]|default

[assigned-to a|b|auto]

[chunk-size 64k|128k|256k|512k]

disks *disks*

[level nraid|raid0|r0|raid1|r1|raid3|r3|raid5|r5|raid6|r6|raid10|r10|raid50|r50|adapt]

[mode online|offline]

[pool a|b]

[spare *disks*]

type linear|virtual|read-cache

[*name*]

Parameters

adapt-spare-capacity size [B|KB|MB|GB|TB|KiB|MiB|GiB|TiB]|default
Optional. For an ADAPT disk group, this specifies the target spare capacity.

- size[B|KB|MB|GB|TB|KiB|MiB|GiB|TiB]: Sets the target spare capacity to a specific size. The unit is optional (B represents bytes). If no unit is specified, GiB will be used, regardless of the current base. Whichever unit is set, internally the value will be rounded down to the nearest GiB. If the value is set to 0, the absolute minimum spare space will be used. If this parameter is omitted, the default setting will be used.
- default: Sets the target spare capacity to the sum of the two largest disks in the disk group, which is sufficient to fully recover fault tolerance after loss of any two disks in the group.

assigned-to a|b|auto
Optional for linear storage. Prohibited for virtual storage. For a system operating in Active-Active ULP mode, this specifies the controller module to own the group. To let the system automatically load-balance groups between controller modules, use auto or omit this parameter. In Single Controller mode, this parameter is ignored; the system automatically load-balances groups in anticipation of the insertion of a second controller in the future.

chunk-size 64k|128k|256k|512k
Optional for linear storage. Prohibited for virtual storage. Prohibited for ADAPT.

For linear storage, this specifies the amount of contiguous data, in KB, that is written to a disk-group member before moving to the next member of the group. For NRAID and RAID 1, chunk-size has no meaning and is therefore not applicable. For RAID 50, this option sets the chunk size of each RAID-5 subgroup. The chunk size of the RAID-50 group is calculated as: *configured-chunk-size* × *(subgroup-members - 1)*. The default is 512k.

For virtual storage, the system will use one of the following chunk sizes, which cannot be changed:

- RAID 1: Not applicable.
- RAID 5 and RAID 6:
  - With 2, 4, or 8 non-parity disks: 512k. For example, a RAID-5 group with 3, 5, or 9 total disks or a RAID-6 group with 4, 6, or 10 total disks.
  - Other configurations: 64k.
- RAID 10: 512k.

For an ADAPT disk group, the system will automatically determine the proper chunk size.

`disks` *`disks`*
Specifies the IDs of the disks to include in the group. For disk syntax, see Command Syntax on page 10.

The minimum and maximum numbers of disks supported for each RAID level are:

NRAID: 1 (linear storage only; not fault tolerant)

RAID 0: 2–16 (linear storage only; not fault tolerant)

RAID 1: 2

RAID 3: 3–16 (linear storage only)

RAID 5: 3–16

RAID 6: 4–16

RAID 10: 4–16

RAID 50: 6–32 (liner storage only)

ADAPT: 12–128

RAID 10 requires a minimum of two RAID-1 subgroups each having two disks. RAID 50 requires a minimum of two RAID-5 subgroups each having three disks. NRAID is automatically used for a read-cache disk group with a single disk. RAID 0 is automatically used for a read-cache disk group with multiple disks.

`level`
`nraid|raid0|r0|raid1|r1|raid3|r3|raid5|r5|raid6|r6|raid10|r10|raid50|r50|adapt`
Required for a linear or virtual group. Prohibited for a read-cache disk group. Specifies the RAID level to apply to the member disks.

`mode online|offline`
Optional for a linear group. Prohibited for a virtual or read-cache disk group. Specifies whether the group is initialized online or offline.

- `online`: After a brief initialization period (seconds), the disk-group state is set to FTOL and I/O operations can be performed on the disk group. Subsequently, an initialization pass across the LBA extent is performed during which the existing data on the member data disks of the disk group is read, parity is generated, and only parity is written to the disk group (the data-area contents are preserved and not zeroed). This pass can take hours to complete on a large disk group. Online mode is the default for a linear disk group. Online mode is always used for a virtual disk group.
- `offline`: The disk group will be in an unavailable, offline (OFFL) state during the initialization process, during which zeros are written to all data and parity sectors of the LBA extent of the disk group. This can take hours to complete on a large disk group but is faster than online mode. When initialization is complete, the disk group state is set to FTOL and I/O operations can be performed on the disk group.

`pool a|b`
Required for a virtual or read-cache disk group. Prohibited for a linear disk group. Specifies the name of the virtual pool to contain the disk group. If the pool does not already exist, it will be created.

`spare disks`
Optional for a linear disk group. Prohibited for a virtual or read-cache disk group. Prohibited for ADAPT. Specifies the IDs of 1–4 dedicated spares to assign to a RAID 1, 3, 5, 6, 10, or 50 disk group. For disk syntax, see Command Syntax on page 10. Only global spares are used for virtual disk groups.

`type linear|virtual|read-cache`
Required. Specifies the type of disk group to create.

- `linear`: A disk group for linear storage.
- `virtual`: A disk group for virtual storage.
- `read-cache`: A disk group for use as read cache for a virtual pool.

`name`
Optional for a virtual or read-cache disk group. Required for a linear disk group. Specifies a name for the new disk group. The name must be unique system-wide. Input rules:

- The value is case sensitive.
- The value can have a maximum of 32 bytes.
- The value can include spaces and printable UTF-8 characters except: " , < \
- A value that includes a space must be enclosed in double quotes.

If this parameter is omitted, the system will generate the name *dgcontroller-ID#* where # starts at `01` for a virtual disk group, or *rccontroller-ID* for a read-cache disk group.

Examples

Add linear RAID-1 disk group `dg1` with one spare.

```
# add disk-group type linear disks 1.20-21 level r1 spare 1.22 dg1
```

Add ADAPT linear disk group `ALDG`.

```
# add disk-group type linear disks 1.1-12 level adapt ALDG
```

Add a virtual RAID-6 disk group to pool A. The resulting group will have an auto-generated name.

```
# add disk-group type virtual disks 1.16-19 level r6 pool a
```

Add an ADAPT virtual disk group to pool B.

```
# add disk-group type virtual disks 2.1-12 level adapt pool b
```

Add a read-cache disk group to pool B. The resulting group will be named rcB.

```
# add disk-group type read-cache disks 1.18-19 pool b
```

See also

expand disk-group

remove disk-groups

set disk-group

show disk-groups

show disks

add host-group-members

Description

Adds hosts to a host group. A host group can contain a maximum of 256 hosts.

To add a host to a host group, the host must be mapped with the same access, port, and LUN settings to the same volumes or volume groups as every other initiator in the host group.

Minimum role

`manage`

Syntax

```
add host-group-members
   hosts hosts
   host-group
```

Parameters

`hosts` *`hosts`*
A comma-separated list of the names of hosts to add to the specified host group. A name that includes a space must be enclosed in double quotes.

`host-group`
The name of an existing host group.

Examples

Add existing hosts Host3 and Host4 to existing host group `HostGroup1`.

```
# add host-group-members hosts Host3,Host4 HostGroup1
```

See also

remove host-group-members

show host-groups

show initiators

add host-members

Description

Adds initiators to a host. A host can contain a maximum of 128 initiators.

To add an initiator to a host, the initiator must be mapped with the same access, port, and LUN settings to the same volumes or volume groups as every other initiator in the host.

Minimum role

`manage`

Syntax

```
add host-members
   initiators initiators
   host-name
```

Parameters

`initiators initiators`
A comma-separated list of the nicknames or IDs of initiators to add to the specified host. A name that includes a space must be enclosed in double quotes.

host-name
The name of an existing host.

Examples

Add existing initiators Init3 and Init4 to existing host Host1.

```
# add host-members initiators Init3,Init4 Host1
```

See also

create host

remove host-group-members

show host-groups (and hosts)

show initiators

add spares

Description

Designates specified available disks to be spares. A spare can replace a failed disk of the same type (enterprise SAS, for example) and the same or lower capacity in a disk group with a fault-tolerant RAID level other than ADAPT.

If the disks in the system are FDE-capable, spares must also be FDE-capable.

For virtual storage, all spares are global spares.

For linear storage, you can add global spares or dedicated spares.

A global spare is available to any non-ADAPT fault-tolerant disk group with the same disk type. In the CLI you can designate a maximum of 64 global spares. However, the system will prevent adding global spares if only ADAPT disk groups exist.

A dedicated spare is assigned to a non-ADAPT fault-tolerant linear disk group with the same disk type. A linear disk group can have 4 dedicated spares.

For information about sparing rules, see the "About spares" topic in the *QXS 12G Disk Management Utility User Guide*.

TIP: A disk group can contain a mix of 512-byte native sector size (512n) disks and 512-byte emulated sector size (512e) disks. For consistent and predictable performance, do not mix disks of different sector size types (512n, 512e).

To add disks to a disk group to expand its capacity, use the expand disk-group command.

Minimum role

manage

Syntax

```
add spares
   [disk-group disk-group]
   [vdisk vdisk]
   disks
```

Parameters

`disk-group` *disk-group*
Optional. The name or serial number of a linear disk group to assign the disks to as dedicated spares. A name that includes a space must be enclosed in double quotes. If this parameter is omitted, the disks will be global spares.

`vdisk` *vdisk*
Optional. The name or serial number of the linear disk group to assign the disks to as dedicated spares. A name that includes a space must be enclosed in double quotes. If this parameter is omitted, the disks will be global spares.

disks
The IDs of the disks to designate as spares. For disk syntax, see Command Syntax on page 10.

Examples

Designate disk 1.2 as a global spare.

```
# add spares 1.2
```

Designate disk 1.3 as a dedicated spare for vdisk VD1.

```
# add spares vdisk VD1 1.3
```

Designate disk 1.3 as a dedicated spare for linear disk group dg1.

```
# add spares disk-group dg1 1.3
```

See also

remove spares

show disk-groups

show disks

show vdisks

add storage

Description

Provisions disks into disk groups, according to rules defined by the storage-system manufacturer. In a new system, this command quickly provisions disks in chassis so that you can proceed with creating and mapping volumes. In an existing system, this command quickly provisions unused disks in new and existing chassis.

If you specify the preview parameter, the command will show some or all of the following reference information, and not provision storage:

- Suggestions to consider before provisioning, if any
- A table of disk groups that can be added, if any
- A table of ADAPT disk groups that can be expanded, if any
- A table of unused disks, if any

Minimum role

`manage`

Syntax

```
add storage
   [enclosure enclosure-IDs]
   [preview]
```

Parameters

`enclosure` *`enclosure-IDs`*
Optional. Limits provisioning to a specified chassis. If this parameter is omitted, the command will use disks from all chassis.

`preview`
Optional. Toggles between adding storage and displaying a possible storage configuration.

Examples

Add storage to the system.

```
# add storage
```

Add storage to a single chassis.

```
# add storage enclosure 3
```

Preview a storage configuration which could be added.

```
# add storage preview
```

See also

add disk-group

add spares

create vdisk

show disks

show disk-groups

show pools

show vdisks

add volume-group-members

Description

Adds virtual volumes to a volume group.

To add a volume to a volume group, the volume must be in the same pool and have the same mappings as all other members of the group. This means that the volume must be mapped with the same access and port settings to the same initiators, hosts, or host groups.

You cannot add a virtual volume to a volume group that is in a replication set.

Minimum role

`manage`

Syntax

```
add volume-group-members
   volumes volumes
   volume-group
```

Parameters

`volumes` *volumes*
A comma-separated list of the names or serial numbers of virtual volumes to add to the specified volume group. A name that includes a space must be enclosed in double quotes.

volume-group
The name of an existing volume group. A name that includes a space must be enclosed in double quotes.

Examples

Add existing volumes `Vol0002` and `Vol0003` to existing volume group `VolumeGroup1`.

```
# add volume-group-members volumes Vol0002,Vol0003 VolumeGroup1
```

See also

create volume-group

remove volume-group-members

show volume-groups

show volumes

check firmware-upgrade-health

Description

Checks that the system is ready for a firmware upgrade.

Under normal conditions, firmware upgrade can be performed safely without risk to data availability or integrity. However, when the system is degraded—for example, because of failed or missing components or lack of multi-pathing to disks—upgrade failure or loss of availability can occur.

This command performs a series of health checks to determine whether any conditions exist that need to be resolved before upgrading firmware. Any conditions that are detected are listed with their potential risks. You can use commands in the "See also" section to determine which components have health problems to be resolved.

For information about using the Disk Management Utility (V3 GUI), SFTP, or FTP to update firmware, see the *QXS 12G Disk Management Utility User Guide V3*.

Minimum role

`manage`

Syntax

```
check firmware-upgrade-health
```

Output

`Upgrade Health`

- `Pass`: There are no risks to performing firmware upgrade.
- `Fail`: At least one condition exists that presents a risk of upgrade failure or loss of availability.

`Condition Detected`

The condition that was detected.

`Risks`

The problems that are likely to result if you do not resolve the conditions before performing a firmware upgrade.

Examples

Check firmware upgrade health for a system that is ready for upgrade.

```
# check firmware-upgrade-health
Upgrade Health
--------------------------------
Pass
--------------------------------
```

Check firmware upgrade health for a system that has problems to be resolved before upgrade.

```
# check firmware-upgrade-health
Upgrade Health
--------------------------------
Fail
 Condition Detected
   Risks

-------------------------------------------------------------------------
----
 One or more disks are currently single ported.
   Data unavailability
 At least one controller is not up.
   Data unavailability
 One or more temperature sensors indicate a critical temperature.
   Code load failure
 At least one controller contains unwritten cache data.
   Data corruption, data loss
 One or more supercapacitors have failed.
   Code load failure
 One or more power supplies are not functioning.
   Code load failure
 One or more fans are not functioning.
   Code load failure
 One or more vdisks are in a quarantined state.
   Code load failure

---------------------
```

Basetypes

code-load-readiness

code-load-readiness-reasons

status

See also

show controllers

show disk-groups

show disks

show enclosures

show fans

show power-supplies

show sensor-status

show system

show vdisks

clear cache

Description

Clears unwritable cache data from both controllers.

NOTE: If you are uncertain whether to use this command, contact technical support for assistance.

This data cannot be written to disk because it is associated with a volume that no longer exists or whose disks are not online. If the data is needed, the volume's disks must be brought online. If the data is not needed it can be cleared, in which case it will be lost and data will differ between the host and disk. Unwritable cache is also called orphan data.

CAUTION: Only use this command when all disk groups are online and accessible from the host. Clearing cache for a volume that is offline or quarantined could result in data loss.

You can clear unwritable cache data for a specified volume or for all volumes.

Minimum role

`manage`

Syntax

```
clear cache
   [volume volume]
```

Parameters

`volume` *`volume`*
Optional. The name or serial number of a specific volume for which to clear unwritable cache data. A name that includes a space must be enclosed in double quotes. If this parameter is omitted, unwritable cache data is cleared for all volumes.

Examples

Clear unwritable cache data for volume V1 from both controllers.

```
# clear cache volume v1
```

See also

show unwritable-cache

show volumes

clear disk-metadata

Description

Clears metadata from leftover disks. For a leftover disk, the show disks command shows the Usage value LEFTOVR.

CAUTION: Only use this command when all disk groups are online and leftover disks exist. Improper use of this command may result in data loss.

NOTE: If you are uncertain whether to use this command, contact technical support for assistance.

Each disk in a disk group has metadata that identifies the owning disk group, the other members of the disk group, and the last time data was written to the disk group. The following situations cause a disk to become a *leftover*:

- Disk group members' timestamps do not match so the system designates members having an older timestamp as leftovers.
- A disk is not detected during a rescan, then is subsequently detected.

When a disk becomes a leftover, the following changes occur:

- The disk's health becomes Degraded and its How Used state becomes LEFTOVR.
- The disk is automatically excluded from the disk group, causing the disk group's health to become Degraded or Fault, depending on the RAID level.
- The disk's fault LED becomes illuminated.

If spares are available, and the health of the disk group is Degraded, the disk group will use spares to start reconstruction. When reconstruction is complete, you can clear the leftover disk's metadata. Clearing the metadata will change the disk's health to OK and its How Used state to AVAIL, making the disk available for use in a new disk group or as a spare.

If spares are not available to begin reconstruction, or reconstruction has not completed, keep the leftover disk so that you'll have an opportunity to recover its data.

This command clears metadata from leftover disks only. If you specify disks that are not leftovers, the disks are not changed.

Minimum role

manage

Syntax

```
clear disk-metadata
   disks
```

Parameters

disks
The IDs of the leftover disks from which to clear metadata. For disk syntax, see Command Syntax on page 10.

Examples

Clear metadata from leftover disk 1.1.

```
# clear disk-metadata 1.1
```

See also

show disks

clear events

Description

Clears the event log in controller A, B, or both.

NOTE: This command is for use by or with direction from technical support.

Minimum role

manage

Syntax

```
clear events
   [a|b|both]
```

Parameters

a|b|both
Optional. The controller event log to clear. If this parameter is omitted, both event logs are cleared.

Examples

Clear the event log for controller A.

```
# clear events a
```

See also

show events

clear expander-status

Description

Clears the counters and status for SAS expander lanes.

NOTE: This command is for use by or with direction from technical support.

Counters and status can be reset to a good state for all chassis, or for a specific chassis whose status is Error as shown by the show expander-status command.

NOTE: If a rescan is in progress, the clear operation will fail with an error message saying that an EMP does exist. Wait for the rescan to complete and then retry the clear operation.

Minimum role

manage

Syntax

```
clear expander-status
   [enclosure ID]
```

Parameters

`enclosure` *ID*
Optional. The chassis number. If this parameter is omitted, the command clears the counters and status of all chassis.

Examples

Clear the expander status for the chassis with ID 1.

```
# clear expander-status enclosure 1
```

See also

show expander-status

clear fde-keys

Description

Clears the lock key ID and import lock ID used with Full Disk Encryption.

Use this command to temporarily deny access to data on the disks during a period when the system will not be under your physical control. If the lock keys are cleared while the system is secured, the system will enter the Secured, Lock Ready state, in preparation for the system being powered down and transported. No further FDE configuration will be allowed until the system has been power cycled. Disks will remain in the Secured, Unlocked state until they are power cycled.

After the system has been transported and powered back up, the system and disks will enter the Secured, Locked state; disk group status will become QTOF; pool health will become Degraded; and volumes will become inaccessible. To restore access to data, re-enter the original passphrase by using the set fde-lock-key command.

Minimum role

`manage`

Syntax

```
clear fde-keys
   [current-passphrase value]
```

Parameters

`current-passphrase value`
Optional. If the system is currently secured, you can provide the current passphrase as part of the command. If this parameter is omitted, the command will prompt you for the current passphrase.

Examples

Clear the lock keys in preparation for shipping a system to a new location.

```
# clear fde-keys current-passphrase myPassphrase
```

See also

set fde-import-key

set fde-lock-key

set fde-state

show fde-state

clear replication-queue

Description

Clears the replication queue for a specified replication set.

If a replication request is initiated for a replication set that is already running a replication, and the replication set's queue policy is `Queue Latest`, the new replication request will be queued. A maximum of one replication can be queued.

If a queued replication is removed, event 587 will be logged with Informational severity.

Minimum role

`manage`

Syntax

```
clear replication-queue
   replication-set-ID
```

Parameters

`replication-set-ID`
The name or serial number of the replication set. A name that includes a space must be enclosed in double quotes.

Examples

Clear the replication queue for replication set RepSet1.

```
# clear replication-queue RepSet1
```

See also

create replication-set

set replication-set

copy volume

Description

Copies all data in a specified source volume to a destination volume.

The source volume can be a virtual base volume or a virtual snapshot. The destination volume will be completely independent of the source volume and will have a different serial number. The destination volume will be created with the default attributes of a standard volume and will not inherit settings, such as snapshot-retention settings, from the source volume.

You can use this command to:

- Copy a base volume to a new base volume.
- Promote a snapshot to a base volume to make the snapshot independent of its parent volume.
- Copy a volume from one pool to another.

Reasons to promote a snapshot include:

- You want to delete the snapshot's base volume without losing the data in the snapshot.
- You want to set a different tier preference for a snapshot than for its parent (or for another snapshot in the same tree).
- You don't want the volume's unique data to be counted against overall pool snapshot space (because it might cause deletion of other snapshots).
- The volume's snapshot tree is full and no more snapshots can be taken, but you don't want to delete any snapshots. Instead, you can promote them.
- The volume's purpose has changed and is no longer considered a subordinate volume.
- You want to balance usage between the two pools, by copying a volume from one pool to the other and then deleting the volume from the source pool.

To ensure the data integrity of the destination volume, unmount and unmap the source volume from host access before starting the copy operation. When the copy operation is complete, mount the destination volume and test to ensure that it is functional. Then you may remount the source volume—or if it's no longer needed, delete it.

To see the progress of a volume copy operation, use the show volume-copies command.

During a copy operation:

- Progress will be periodically logged to allow it to resume if it is interrupted by controller failover or failure.
- The source volume and destination volume cannot be deleted.
- If the source volume or the destination volume fails, the copy operation will fail and be automatically canceled, the destination volume will be automatically deleted, and event 267 will be logged with Error severity.
- If the destination pool runs out of space, or the destination volume was not created due to a shortage of physical storage in a non-thin-provisioned system, the copy operation will fail and be automatically canceled, the destination volume will be automatically deleted, and event 267 will be logged with Error severity.

Minimum role

`manage`

Syntax

```
copy volume
   [destination-pool destination-pool-ID]
   name destination-volume-name
   source-volume-ID
```

Parameters

`destination-pool` *`destination-pool-ID`*
Optional. The name or serial number of the virtual pool in which to create the destination volume. This must be the pool that contains the source volume, and can be either pool in the system. If this parameter is omitted, the destination volume will be created in the same pool as the source volume.

`name` *`destination-volume-name`*
A name for the volume to create in the destination pool. Input rules:

- The value is case sensitive.

- The value can have a maximum of 32 bytes.
- The value can include spaces and printable UTF-8 characters except: " , < \
- A value that includes a space must be enclosed in double quotes.

source-volume-ID
The name or serial number of the source volume to copy. A name that includes a space must be enclosed in double quotes.

Examples

Copy volume SourceVol in pool A to new volume DestVol in pool B.

copy volume SourceVol destination-pool B name DestVol

See also

abort copy

show pools

show volume-copies

show volumes

create certificate

Description

Creates or removes a custom security certificate.

The storage system supports use of unique certificates for secure data communications, to authenticate that the expected storage systems are being managed. Use of authentication certificates applies to the HTTPS protocol, which is used by the web server in each controller module. The Disk Management Utility and SMI-S interfaces use the same certificate.

After using this command you must restart each Management Controller to which the change is applied to have the change take effect.

Minimum role

manage

Syntax

```
create certificate
   [a|b|both]
   [contents content-string]
   [noprompt]
   [restore]
   [unique]
```

Parameters

`a|b|both`
Optional. Specifies whether to apply the change to controller A, B, or both. If this parameter is omitted, the change is applied to the controller being accessed.

`contents` *`content-string`*
Optional. A security certificate is generated based on the supplied content. The content becomes the subject of the certificate creation request and must be formatted as `/type0=value0/type1=value1/type2=...`, where types include `C` for country, `ST` for state or province, `L` for location, `CN` for common name, and `O` for organization. Invalid types will be omitted from the content string. The content string cannot exceed 1024 characters and can include printable UTF-8 characters except space or semicolon. An example is `/C=US/ST=CO/O=MyOrganization/CN=www.mysite.com`. You must specify either this parameter or the `restore` parameter or the `unique` parameter.

`noprompt`
Optional. Suppresses confirmation prompts. Specifying this parameter allows the command to proceed without user interaction.

`restore`
Optional. The system-generated certificate is restored and the custom certificate is discarded. The custom certificate may have been created with this CLI command or uploaded using SFTP or FTP. You must specify either this parameter or the contents parameter or the unique parameter.

`unique`
Optional. A security certificate is generated based on the system's serial number and other standard values. This certificate is installed, and the original certificate is archived. You must specify either this parameter or the `contents` parameter or the `restore` parameter.

Examples

Regenerate the system certificate with a new private key.

```
# create certificate unique
```

Create a custom certificate using a content string.

```
# create certificate contents
/C=US/ST=CO/L=NewYork/O=MyCompany/CN=www.mycompany.com
```

Restore the system-generated certificate and remove the custom certificate.

```
# create certificate restore
```

See also

restart mc

restart sc

show certificate

create chap-record

Description

Creates a CHAP record to authenticate iSCSI login requests.

When CHAP is enabled, the record enables authentication between the originator (initiator) and recipient (target) of a login request. This command is permitted whether or not CHAP is enabled.

IMPORTANT: For information about setting up CHAP for use in a peer connection, see the topic about creating a peer connection in Disk Management Utility documentation.

The CHAP record can specify one name-secret pair to authenticate the originator only (one-way CHAP) or two pairs to authenticate both the originator and the recipient (mutual CHAP).

For a login request from an initiator to a storage system, the initiator is the originator and the storage system is the recipient. Because CHAP works during login, to make CHAP changes take effect you must reset any active iSCSI host links.

In a peer connection, a storage system can act as the originator or recipient of a login request. As the originator, with a valid CHAP record it can authenticate CHAP even if CHAP is disabled. This is possible because the system will supply the CHAP secret requested by its peer and the connection will be allowed.

Minimum role

`manage`

Syntax

```
create chap-record
   name originator-name
   secret originator-secret
   [mutual-name recipient-name mutual-secret recipient-secret]
```

Parameters

`name` *`originator-name`*
The originator name, typically in IQN format. The name is case sensitive and can have a maximum of 223 bytes, including 0–9, lowercase a–z, hyphen, colon, and period.

`secret` *`originator-secret`*
The secret that the recipient uses to authenticate the originator. The secret is case sensitive and can include 12–16 bytes. The value can include spaces and printable UTF-8 characters except: " <

`mutual-name` *`recipient-name`*
Optional: for mutual CHAP only. The recipient name, typically in IQN format. The name is case sensitive and can have a maximum of 223 bytes, including 0–9, lowercase a–z, hyphen, colon, and period. To determine a storage system's IQN, use the show ports command to view the `Target ID` value for an iSCSI port. This parameter and mutual-secret must be set together.

`mutual-secret` *`recipient-secret`*
Optional: for mutual CHAP only. The secret that the originator uses to authenticate the recipient. The secret is case sensitive, can include 12–16 bytes, and must differ from the originator secret. The value can include spaces and printable UTF-8 characters except: " <

A storage system's secret is shared by both controllers. This parameter and `mutual-name` must be set together.

Examples

Create a one-way CHAP record to enable a storage system to authenticate a host initiator.

```
# create chap-record name iqn.1991-05.com.microsoft:myhost.domain secret
123456abcDEF
```

See also

delete chap-records

set chap-record

show chap-records

show iscsi-parameters

show ports

create host

Description

Creates a host with an associated name.

You can use the `create host` command to create a host that groups together specified initiators, and optionally to add the host to a host group. You can create a maximum of 512 hosts, each containing a maximum of 128 initiators.

To create a single initiator, use the set initiator command.

Minimum role

`manage`

Syntax

```
create host
   [host-group host-group]
   [initiators initiators]
   [profile standard|hp-ux|openvms]
   name
```

Parameters

`host-group` *`host-group`*
Optional. The name of an existing host group to which to add the new host.

`initiators` *`initiators`*
A comma-separated list of initiator names, IDs, or both, with no spaces.

For FC, the ID is a WWPN. For SAS, the ID is a WWPN. For iSCSI, the ID is an IQN. A WWPN can include a colon between each byte but the colons will be discarded.

`profile standard|hp-ux|openvms`
Optional.

- `standard`: Default profile.
- `hp-ux`: The host uses Flat Space Addressing.
- `openvms`: The host does not allow LUN 0 to be assigned to a mapping.

`name`
A name for the host. Input rules:

- The value is case sensitive.
- The value can have a maximum of 32 bytes.
- The value can include spaces and printable UTF-8 characters except: " , . < \
- A value that includes a space must be enclosed in double quotes.

Examples

Create host `Host1` that includes two FC initiators.

```
# create host initiators 10000090fa13870e,10000090fa13870f Host1
```

Create host `Host2` that includes two iSCSI initiators.

```
# create host initiators iqn.1992-01.com.example:storage.host2.port1,
iqn.1992-01.com.example:storage.host2.port2 Host2
```

Create host `Host4` by pasting a WWPN that includes colons.

```
# create host initiators 20:70:00:c0:ff:d7:4c:07 Host4
```

See also

set host

set initiator

show host-groups

show initiators

create host-group

Description

Creates a host group that includes specified hosts. You can create a maximum of 32 host groups, each containing a maximum of 256 hosts.

Minimum role

`manage`

Syntax

```
create host-group
   hosts hosts
   host-group
```

Parameters

`hosts` *`hosts`*
A comma-separated list of the names of hosts to include in the host group. A name that includes a space must be enclosed in double quotes.

`host-group`
A name for the host group. Input rules:

- The value is case sensitive.
- The value can have a maximum of 32 bytes.
- The value can include spaces and printable UTF-8 characters except: " , . < \
- A value that includes a space must be enclosed in double quotes.

Examples

Create a host group named `HostGroup1` that includes hosts `Host1` and `Host2`.

```
# create host-group hosts Host1,Host2 HostGroup1
```

See also

add host-group-members

delete host-groups

remove host-group-members

set host-group

show host-groups

create peer-connection

Description

Creates a peer connection between two storage systems.

The peer connection is defined by the ports that connect the two peer systems, as well as the name of the peer connection. The local system uses the remote address to internally run the query peer-connection command. The results of the query are used to configure the peer connection.

The prerequisites to create a peer connection are:

- Both systems must be licensed to use virtual replication.
- Both systems must have iSCSI or FC host ports. Ports at both ends of the connection must use the same protocol.
- All host port addresses in both systems must be unique, even for ports not in use.
- Each system must have a virtual pool.
- If iSCSI CHAP is configured for the peer connection, the authentication must be valid.
- You must specify the username and password of a user to be assigned the “manage” role on the remote system.

You can create a maximum of four peer connections per storage system. However, only one peer connection is allowed to a particular remote system. Attempting to create a second peer connection to the same system will fail.

Host port evaluation is done at the start or resumption of each replication operation.

- At most, two ports will be used.
- Ports with optimized paths will be used first. Ports with unoptimized paths will be used if no optimized path exists. If only one port has an optimized path, then only that port will be used.
- The replication will not use another available port until all currently used ports become unavailable.

If a single host port loses connectivity, event 112 will be logged. Because a peer connection is likely to be associated with multiple host ports, the loss of a single host port may degrade performance but usually will not cause the peer connection to be inaccessible.

Minimum role

`manage`

Syntax

```
create peer-connection
  [remote-password password]
  remote-port-address remote-port-address
  remote-username username
  name
```

Parameters

`remote-password` *`password`*
Optional in console format; required for API format. The password of the user specified by the `remote-username` parameter. If this parameter is omitted, the command prompts you to enter and re-enter a value, which is displayed obscured for security reasons.

`remote-port-address` *`remote-port-address`*
Specifies the FC WWN or iSCSI IP address of the remote system with which to create a peer connection.

`remote-username` *`username`*
The name of a user in the remote system. This must be a user with the manage role to remotely configure or provision that system.

`name`
Specifies a name for the peer connection. Input rules:

- The value is case sensitive.
- The value can have a maximum of 32 bytes.
- The value can include spaces and printable UTF-8 characters except: " , < \
- A value that includes a space must be enclosed in double quotes.

Examples

On a storage system that will replicate via iSCSI to a second system, create peer connection `Peer1` to remote port address 192.168.200.22, using the credentials of remote user `John`.

```
# create peer-connection remote-port-address 192.168.200.22
remote-username John remote-password P@ssw0rd Peer1
```

On a storage system that will replicate via FC to a second system, create peer connection Peer2 to remote port address 247000c0ff1a45b8, using the credentials of remote user `Admin1`.

```
# create peer-connection remote-port-address 247000c0ff1a45b8
remote-username Admin1 Peer2

Enter remote password: *******

Re-enter remote password: *******
```

See also

delete peer-connection

query peer-connection

set peer-connection

show peer-connections

create replication-set

Description

Creates a replication set for a specified volume or volume group. This command is not applicable to a system with SAS controller modules. Linear replication sets and virtual peer connections and replication sets cannot exist on a system at the same time.

For the maximum number of replication sets that can be created, see the "System configuration limits" topic in Disk Management Utility help.

This command designates the specified source volume or volume group as the primary volume or volume group, creates the secondary volume or volume group, and creates the internal snapshots required to support replications.

- A replication set for a volume consumes two internal snapshots each for the primary volume and the secondary volume if the queue policy is set to discard, or three each if the queue policy is set to queue-latest.
- A replication set for a volume group consumes two internal volume groups if the queue policy is set to discard, or three if the queue policy is set to queue-latest. Each internal volume group contains a number of volumes equal to the number of volumes in the base volume group.

Internal snapshots and internal volume groups count against system limits, but do not display and do not count against license limits.

A peer connection must already be defined to create and use a replication set.

The command will fail if the secondary volume names already exist, or if the local system cannot reach the remote system.

Secondary volumes cannot be mapped, moved, expanded, deleted, or participate in a rollback operation. Create a snapshot of the secondary volume and use the snapshot for mapping and accessing data.

A volume or volume group can belong to only one replication set. If the volume group is already in a replication set, individual volumes may not be included in separate replication sets. The maximum number of individual volumes that can be replicated is 32. If a volume group is being replicated, the maximum number of volumes that can exist in the group is 16.

A replication set can be configured to maintain a replication snapshot history. As part of handling a replication, the replication set will automatically take a snapshot of the primary and/or secondary volume(s), thereby creating a history of data that has been replicated over time. This feature can be enabled for a secondary volume or for a primary volume and its secondary volume, but not for a volume group. When this feature is enabled:

- For a primary volume, when a replication starts it will create a snapshot of the data image being replicated.
- For a secondary volume, when a replication successfully completes it will create a snapshot of the data image just transferred to the secondary volume. (This is in contrast to the primary volume snapshot, which is created before the sync.) If replication does not complete, a snapshot will not be created.
- The snapshots are named *basename_nnnn*, where *nnnn* starts at `0000` and increments for each subsequent snapshot. If primary-volume snapshots are enabled, snapshots with the same name will exist on the primary and secondary systems. The snapshot number is incremented each time a replication is requested, whether or not the replication completes — for example, if the replication was queued and subsequently removed from the queue.
- You can set the number of snapshots to retain, referred to as the snapshot count. This setting applies to management of snapshots for both the primary and secondary volume. When the snapshot count is exceeded, the oldest unmapped snapshot will be discarded automatically. If you

reduce the snapshot count setting (by using the set replication-set command) to a value less than the current number of snapshots, the command will be rejected. Thus, you must manually delete the excess snapshots before reducing the snapshot count setting.

- If the replication set is deleted, any existing snapshots automatically created by snapshot history rules will not be deleted. You will be able to manage those snapshots like any other snapshots.
- Manually creating a snapshot will not increase the snapshot count associated with the snapshot history. Manually created snapshots are not managed by the snapshot history feature. If a volume already exists with the name of the snapshot intended to be taken, the snapshot will not occur, and the snapshot number is incremented.
- A snapshot created by this feature is counted against the system-wide maximum licensable snapshots limit, with the following result:
  - If the snapshot count is reached before the system limit then the snapshot history is unchanged.
  - If the system limit is reached before the snapshot count then the snapshot history stops adding or updating snapshots.
- A mapped snapshot-history snapshot will not be deleted until after it is unmapped.
- The `snapshot-basename` and `snapshot-count` settings only take effect when `snapshot-history` is set to `secondary` or `both`, although these settings can be changed at any time.

Minimum role

`manage`

Syntax

```
create replication-set
  peer-connection peer-connection-ID
  primary-volume volume-ID|volume-group-ID
  [queue-policy discard|queue-latest]
  [secondary-pool A|B]
  [secondary-volume-name name]
  [snapshot-basename basename]
  [snapshot-count #]
  [snapshot-history disabled|off|secondary|both]
  [snapshot-retention-priority never-delete|high|medium|low]
  name
```

Parameters

`peer-connection` *`peer-connection-ID`*
Specifies the name or serial number of the peer connection on which to create the replication set.

`primary-volume` *`volume-ID`*|*`volume-group-ID`*
Specifies the name or serial number of a volume or volume group on the local system. Volume groups must be specified with the name and .* notation utilized in mapping.

`queue-policy discard|queue-latest`
Optional. Specifies the action to take when a replication is running and a new replication is requested.

- `discard`: Discard the new replication request.
- `queue-latest`: Take a snapshot of the primary volume and queue the new replication request. If the queue contained an older replication request, discard that older request. A maximum of one replication can be queued. This is the default.

NOTE: If the queue policy is queue-latest and a replication is running and another is queued, you cannot change the queue policy to discard. You must manually remove the queued replication before you can change the policy.

`secondary-pool A|B`
Optional. Specifies an existing virtual pool on the remote peer. If this is not specified, the system will use the corresponding pool on the remote system. For example, if pool A is used on the local system, pool A will be used on the remote system. If this is not specified and the corresponding pool on the remote side does not exist, this command will fail.

`secondary-volume-name` *`name`*
Optional. Specifies a name for the secondary volume. If this is not specified the name from the primary volume will be used. For volume-group targets, all contained volume names must be unique. Input rules:

- The value is case sensitive.
- The value can have a maximum of 32 bytes.
- The value can include spaces and printable UTF-8 characters except: " , < \
- A value that includes a space must be enclosed in double quotes.

`snapshot-basename` *`basename`*
Optional if `snapshot-history` is set to `disabled` or `off`. Required if `snapshot-history` is set to `secondary` or `both`.

Specifies a prefix to help you identify replication snapshots. Input rules:

- The value is case sensitive.
- The value can have 1–26 bytes.
- The value can include spaces and printable UTF-8 characters except: " , < \
- A value that includes a space must be enclosed in double quotes.

There is no default.

`snapshot-count #`
Optional if `snapshot-history` is set to `disabled` or `off`. Required if `snapshot-history` is set to `secondary` or `both`.

Specifies the number of snapshots taken of the replication volume to retain, from 1 to 16. When a new snapshot exceeds this limit, the oldest snapshot in the snapshot history is deleted.

The `snapshot-count` setting can be changed at any time. Its value must be greater than the number of existing snapshots in the replication set, regardless of whether `snapshot-history` is enabled.

`snapshot-history disabled|off|secondary|both`
Optional. Specifies whether to maintain a replication snapshot history for the replication set, as described above.

- `disabled` or `off`: A snapshot history will not be kept. If this parameter is disabled after a replication set has been established, any existing snapshots will be kept, but not updated. This option is the default.
- `secondary`: A snapshot history set will be kept on the secondary system for the secondary volume, using `snapshot-count` and `snapshot-basename` settings.

- `both`: A snapshot history will be kept for the primary volume on the primary system and for the secondary volume on the secondary system. Both snapshot histories will use the same `snapshot-count` and `snapshot-basename` settings.

`snapshot-retention-priority never-delete|high|medium|low`
Optional. For virtual storage, this specifies the retention priority for history snapshots, which is used when automatic deletion of snapshots is enabled by using the "set snapshot-space" command. In a snapshot tree, only leaf snapshots can be deleted automatically. Deletion based on retention priority is unrelated to deleting the oldest snapshots to maintain a snapshot count.

- `never-delete`: Snapshots will never be deleted automatically to make space. The oldest snapshot in the snapshot history will be deleted once the snapshot-count has been exceeded. This is the default.
- `high`: Snapshots can be deleted after all eligible medium-priority snapshots have been deleted.
- `medium`: Snapshots can be deleted after all eligible low-priority snapshots have been deleted.
- `low`: Snapshots can be deleted.

`name`
Specifies a name for the replication set. Input rules:

- The value is case sensitive.
- The value can have a maximum of 32 bytes.
- The value can include spaces and printable UTF-8 characters except: " , < \
- A value that includes a space must be enclosed in double quotes.

Examples

Create replication set `RS1` for primary volume `Vol1` on the peer connection `Peer1`.

```
# create replication-set peer-connection Peer1 primary-volume Vol1 RS1
```

Create replication set `RS1` for volume group `VG1.*` on the peer connection `Peer1`.

```
# create replication-set peer-connection Peer1 primary-volume VG1.* RS1
```

Create replication set `repset2` for volume `vol2` on peer-connection `Lab`; specify that the system cannot automatically delete history snapshots in this set; and enable snapshot history for both the primary volume and the secondary volume, allowing up to 5 replication snapshots with the basename `repsnapvol2` to be retained for each volume.

```
# create replication-set peer-connection Lab primary-volume vol2
secondary-pool A snapshot-retention-priority never-delete
snapshot-history both snapshot-basename repsnapVol2 snapshot-count 5
repset2
```

See also

delete replication-set

resume replication-set

set replication-set

show replication-sets

suspend replication-set

create schedule

Description

Schedules a task to run automatically.

You can schedule a replication task on the replication set's primary system only.

Minimum role

`manage`

Syntax

`create schedule`

`schedule-specification "`*`specification`*`"`

`task-name` *`task-name`*

`schedule-name`

Parameters

`schedule-specification "`*`specification`*`"`
Defines when the task will first run, and optionally when it will recur and expire. You can use a comma to separate optional conditions. Dates cannot be in the past. For times, if neither `AM` nor `PM` is specified, a 24-hour clock is used.

- `start` *`yyyy-mm-dd hh:mm`* [AM|PM]

  Specifies a date and a time in the future to be the first instance when the scheduled task will run, and to be the starting point for any specified recurrence.

- `[every # minutes|hours|days|weeks|months|years]`

  Specifies the interval at which the task will run.

  For better performance when scheduling a `TakeSnapshot` task that will run under heavy I/O conditions or on more than three volumes, the retention count and the schedule interval should be set to similar values. For example if the retention count is 10 then the interval should be set to 10 minutes.

  For a `Replicate` task, the minimum interval is 30 minutes.

- `[between` *`hh:mm`* `[AM|PM]` *`and hh:mm`* `[AM|PM]]`

  Constrains the time range during which the task is permitted to run. Ensure that the start time is within the specified time range.

- `[only any|first|second|third|fourth|fifth|last|#st|#nd|#rd|#th day|weekday|weekendday|Sunday|Monday|Tuesday|Wednesday|Thursday|Friday|Saturday of year|month|January|February|March|April|May|June|July|August|September|October|November|December]`

  Constrains the days or months when the task is permitted to run. Ensure that this constraint includes the start date.

- `[count #]`

  Constrains the number of times the task is permitted to run.

- `[expires` *`yyyy-mm-dd hh:mm`* `[AM|PM]]`

  Specifies when the schedule expires, after which the task will no longer run.

`task-name` *`task-name`*
The name of an existing task to run. The name is case sensitive. A name that includes a space must be enclosed in double quotes.

`schedule-name`

A name for the new schedule. Input rules:

- The value is case sensitive.
- The value can have a maximum of 32 bytes.
- The value can include spaces and printable UTF-8 characters except: " , < \
- A value that includes a space must be enclosed in double quotes.

Examples

Create schedule `Sched1` that runs `Task1` for the first time on March 1, 2014, runs daily between midnight and 1:00 AM, and runs for the last time in the morning of January 1, 2015.

```
# create schedule schedule-specification "start 2014-03-01 00:01, every 1
days, between 12:00 AM and 1:00 AM, expires 2015-01-01 1:00 AM" task-name
Task1 Sched1
```

Create schedule `Sched2` that runs `Task2` for the first time on March 1, 2014, and on the first weekday of each month, with no expiration.

```
# create schedule schedule-specification "start 2012-03-01 00:01 only
first weekday of month" task-name Task2 Sched2
```

See also

delete schedule

set schedule

show schedules

show tasks

create snapshots

Description

Creates a snapshot of each specified source volume.

For virtual storage, the source volume can be a base volume or a snapshot. For linear storage, the source volume can be a standard volume or a master volume. The first time a snapshot is created of a standard volume, the volume is converted to a master volume and a snap pool is created in the volume's disk group. The snap pool's size is either 20% of the volume size or 5.37 GB, whichever is larger. The recommended minimum size for a snap pool is 50 GB. Before creating or scheduling snapshots, verify that the disk group has enough free space to contain the snap pool.

Minimum role

manage

Syntax

```
create snapshots
   volumes volumes
   snap-names
```

Parameters

`volumes` *volumes*
A comma-separated list of the names or serial numbers of 1–16 source volumes of which to create snapshots. A name that includes a space must be enclosed in double quotes.

snap-names
A comma-separated list of names for the resulting snapshots. Snapshot names must be unique system-wide. Input rules:

- The value is case sensitive.
- The value can have a maximum of 32 bytes.
- The value can include spaces and printable UTF-8 characters except: " , < \
- A value that includes a space must be enclosed in double quotes.

Examples

Create snapshots of volumes V4 and V5.

```
# create snapshots volumes V4,V5 V4snap,V5snap
```

See also

show snapshots

show volumes

create task

Description

Creates a task that can be scheduled.

You can create a task to:

- Enable drive spin down for spinning disks. The disks cannot be in a virtual pool. The disks cannot be using ADAPT data protection. You can use this to enable or resume spin down during hours of infrequent activity. When drive spin down is enabled, disks will spin down after 60 minutes of inactivity by default.
- Disable drive spin down. You can use this to disable or suspend spin down during hours of frequent activity.
- Create a snapshot of a source volume. For virtual storage, the source volume can be a base volume or a snapshot. For linear storage, the source volume can be a standard volume or a master volume.

- Reset a snapshot. This deletes the data in the snapshot and resets it to the current data in the volume from which the snapshot was created. The snapshot's name and other volume characteristics are not changed.
- Replicate a virtual replication set's primary volume or volume group to a peer system.

CAUTION: Before scheduling a ResetSnapshot task, consider that if the snapshot is mounted/presented/mapped to a host, the snapshot must be unmounted/unpresented/unmapped before the reset is performed. Leaving it mounted/presented/mapped can cause data corruption. You should create a scheduled job on the host to unmount/unpresent/unmap the snapshot prior to resetting it.

Minimum role

manage

Syntax

To create a task to take a snapshot:

```
create task
   retention-count #
   snapshot-prefix prefix
   source-volume volume
   type TakeSnapshot
   name
```

To create a task to reset a snapshot:

```
create task
   snapshot-volume volume
   type ResetSnapshot
   name
```

To create a task to replicate a virtual volume:

```
create task
   [last-snapshot]
   replication-set replication-set-ID
   type Replicate
   name
```

To create a task to enable spin down:

```
create task
   type EnableDSD
   name
```

To create a task to disable spin down:

```
create task
   type DisableDSD
```

name

Parameters

`last-snapshot`
Optional. For a `Replicate` task this specifies to replicate the most recent snapshot of the primary volume. This snapshot may have been created either manually or by the snapshot history feature.

`replication-set` *`replication-set-ID`*
For a `Replicate` task this specifies the ID of the replication set to replicate.

`retention-count #`
For a `TakeSnapshot` task this specifies the number of snapshots created by this task to retain, from 1 to 8 if the large-pools feature is enabled, or from 1 to 16 if the large-pools feature is disabled. When a new snapshot exceeds this limit, the oldest snapshot with the same prefix is deleted.

`snapshot-prefix` *`prefix`*
For a `TakeSnapshot` task this specifies a label to identify snapshots created by this task. Input rules:

- The value is case sensitive.
- The value can have a maximum of 26 bytes.
- The value can include spaces and printable UTF-8 characters except: " , < \
- A value that includes a space must be enclosed in double quotes.

`snapshot-volume` *`volume`*
For a `ResetSnapshot` task this specifies the name or serial number of the snapshot to reset. A name that includes a space must be enclosed in double quotes.

`source-volume` *`volume`*
For a `TakeSnapshot` task this specifies the name or serial number of the source volume of which to take a snapshot. A name that includes a space must be enclosed in double quotes.

`type Replicate|EnableDSD|DisableDSD`
The task type:

- `Replicate`: Replicate a virtual replication set's primary volume or volume group to a peer system.
- `EnableDSD`: Enables drive spin down.
- `DisableDSD`: Disables drive spin down

`name`
A name for the new task. Input rules:

- The value is case sensitive.
- The value can have a maximum of 32 bytes.
- The value can include spaces and printable UTF-8 characters except: " , < \
- A value that includes a space must be enclosed in double quotes.

Examples

Create task `Snap` that creates a snapshot of volume `VD1_V1` and retains only the latest four snapshots with the prefix `VD1_V1` (for example, `VD1_V1_S0001`).

```
# create task type TakeSnapshot source-volume VD1_V1 snapshot-prefix
VD1_V1 retention-count 4 Snap
```

Create task `Reset` that resets snapshot `VD1_V1_S0001`.

```
# create task type ResetSnapshot snapshot-volume VD1_V1_S0001 Reset
```

Create task `replicateRS1` that replicates virtual replication set `RS1`'s primary volume or volume group.

```
# create task type Replicate replication-set RS1 replicateRS1
```

Create task `replicateRS2` that replicates the newest snapshot of virtual replication set `RS2`'s primary volume or volume group.

```
# create task type Replicate replication-set RS2 replicateRS2
last-snapshot
```

Create task taskDSDresume to enable or resume spin down.

```
# create task type EnableDSD taskDSDresume
```

Create task taskDSDsuspend to disable or suspend spin down.

```
# create task type DisableDSD taskDSDsuspend
```

See also

create schedule

delete task

set task

show tasks

show volumes

create temp-license

Description

Creates and installs a temporary license to try licensed features of the storage system. You can create a temporary license one time. A temporary license will expire 60 days from the time it is created. If you do not install a permanent license before the temporary license expires, you cannot create new items using these features. However, you can continue to use existing snapshots and create new snapshots up to the base maximum limit, and you can continue to access existing replication images.

After a temporary license is created or a permanent license is installed, the command cannot be re-run.

Minimum role

`manage`

Syntax

```
create temp-license
```

Examples

Enable licensed features for 60 days in order to try them.

```
# create temp-license
```

See also

show license

create user

Description

Creates a user account. The system supports 12 user accounts. You can create a general user that can access the Disk Management Utility, CLI, SFTP, or FTP interface, or an SNMPv3 user that can access the MIB or receive trap notifications. SNMPv3 user accounts support SNMPv3 security features such as authentication and encryption.

Minimum role

`manage`

Syntax

```
create user
   [authentication-type MD5|SHA|none]
   [base 2|10]
   [interfaces interfaces]
   [locale
   English|en|Spanish|es|French|fr|German|de|Italian|it|Japanese|ja|
   Korean|ko|Dutch|nl|Chinese-simplified|zh-s|Chinese-traditional|zh-t]
   [password password]
   [precision #]
   [privacy-password encryption-password]
   [privacy-type DES|AES|none]
   [roles roles]
   [storage-size-base 2|10]
   [storage-size-precision #]
   [storage-size-units auto|MB|GB|TB]
   [temperature-scale celsius|c|fahrenheit|f]
   [timeout #]
   [trap-host IP-address]
   [type novice|standard|advanced|diagnostic]
   [units auto|MB|GB|TB]
   name
```

Parameters

`authentication-type MD5|SHA|none`
Optional. For an SNMPv3 user, this specifies whether to use a security authentication protocol. Authentication uses the user password.

- `MD5`: MD5 authentication. This is the default.
- `SHA`: SHA-1 authentication.
- `none`: No authentication.

`base 2|10`
Optional. Sets the base for entry and display of storage-space sizes:

- `2`: Sizes are shown as powers of 2, using 1024 as a divisor for each magnitude. In base 2 when you set a size, whether you specify a base-2 or base-10 size unit, the resulting size will be in base 2.
- `10`: Sizes are shown as powers of 10, using 1000 as a divisor for each magnitude. In base 10 when you set a size, the resulting size will be in the specified unit. This option is the default.

Operating systems usually show volume size in base 2. Disk drives usually show size in base 10. Memory (RAM and ROM) size is always shown in base 2.

`interfaces` *`interfaces`*
Optional. Specifies the interfaces that the user can access. Multiple values must be separated by commas and no spaces. A command that specifies `snmpuser` or `snmptarget` cannot also specify a non-SNMP interface.

- `cli`: Command-line interface. This is enabled by default.
- `wbi`: Web-browser interface. This is enabled by default.
- `ftp`: FTP or SFTP interface.
- `smis`: Storage Management Initiative Specification (SMI-S) interface.
- `snmpuser`: Allows an SNMPv3 user to view the SNMP MIB.
- `snmptarget`: Allows an SNMPv3 user to receive SNMP trap notifications. This option requires the `trap-host` parameter.
- `none`: No interfaces.

To enable or disable protocols that can be used to access interfaces, use the set protocols command.

`locale English|en|Spanish|es|French|fr|German|de|Italian|it|Japanese|ja|Korean|ko|Dutch|nl|Chinese-simplified|zh-s|Chinese-traditional|zh-t`
Optional. The display language. The default is English.

`password` *`password`*
Optional in console format; required for API format. Sets a new password for the user. Input rules:

- The value is case sensitive.
- The value can have 8–32 characters.
- The value can include printable UTF-8 characters except a space or: " ' , < > \
- A value that includes only printable ASCII characters must include at least one uppercase character, one lowercase character, one numeric character, and one non-alphanumeric character.

If this parameter is omitted, the command prompts you to enter and re-enter a value, which is displayed obscured for security reasons. For an SNMPv3 user whose `authentication-type` parameter is set to use authentication, this specifies the authentication password.

`precision #`
Optional. Sets the number of decimal places (1–10) for display of storage-space sizes.

`privacy-password` *`encryption-password`*
Optional. For an SNMPv3 user whose `privacy-type` parameter is set to use encryption, this specifies the encryption password. Input rules:

- The value is case sensitive.
- The value can have 8–32 characters.
- The value can include printable UTF-8 characters except a space or: " ' , < > \
- A value that includes only printable ASCII characters must include at least one uppercase character, one lowercase character, one numeric character, and one non-alphanumeric character.

`privacy-type DES|AES|none`
Optional. For an SNMPv3 user, this specifies whether to use a security encryption protocol. This parameter requires the `privacy-password` parameter and the `authentication-type` parameter.

- `DES`: Data Encryption Standard.
- `AES`: Advanced Encryption Standard.
- `none`: No encryption. This is the default.

`roles` *`roles`*
Optional. Specifies the user's roles as one or more of the following values:

- `monitor`: User can view but not change system settings. This is the default.
- `manage`: User can view and change system settings.
- `diagnostic`: User can view and change system settings.

Multiple values must be separated with a comma (with no spaces). If multiple values are specified, the user's access to commands will be determined by the highest role specified.

`storage-size-base 2|10`
Optional. Alias for `base`.

`storage-size-precision #`
Optional. Alias for `precision`.

`storage-size-units auto|MB|GB|TB`
Optional. Alias for `units`.

`temperature-scale celsius|c|fahrenheit|f`
Optional. Sets the scale for display of temperature values:

- `fahrenheit` or `f`: Temperatures are shown in degrees Fahrenheit.
- `celsius` or `c`: Temperatures are shown in degrees Celsius. This is the default.

`timeout #`
Optional. Sets the timeout value in seconds for the login session. Valid values are 120–43200 seconds (2–720 minutes). The default is 1800 seconds (30 minutes).

`trap-host` *`IP-address`*
Optional. For an SNMPv3 user whose *`interface`* parameter is set to *`snmptarget`*, this specifies the IP address of the host that will receive SNMP traps.

`type novice|standard|advanced|diagnostic`
Optional. Identifies the user's experience level. This parameter is informational only and does not affect access to commands. The default is `standard`.

`units auto|MB|GB|TB`
Optional. Sets the unit for display of storage-space sizes:

- `auto`: Sizes are shown in units determined by the system. This is the default.
- `MB`: Sizes are shown in megabytes.
- `GB`: Sizes are shown in gigabytes.
- `TB`: Sizes are shown in terabytes.

Based on the `precision` setting, if a size is too small to meaningfully display in the selected unit, the system uses a smaller unit for that size. For example, if `units` is set to `TB`, `precision` is set to `1`, and `base` is set to `10`, the size 0.11709 TB is instead shown as 117.1 GB.

`name`
A name for the new user, which cannot already exist in the system. Input rules:

- The value is case sensitive.
- The value can have a maximum of 29 bytes.
- The value can include printable UTF-8 characters except a spare or: " , < \
- A value that includes a space must be enclosed in double quotes.

Examples

Create user `John` who will view system information using base 2 in the Disk Management Utility.

```
# create user base 2 interfaces wbi roles monitor John
Enter new password: ********
Re-enter new password: ********
```

Create user `MIB` that can view the SNMP MIB, using authentication and encryption.

```
# create user interfaces snmpuser password Abcd1234 authentication-type
SHA privacy-type AES privacy-password Abcd%5678 MIB
```

Create user `Traps` that can receive SNMP trap notifications, using authentication without encryption.

```
# create user interfaces snmptarget authentication-type MD5 trap-host
172.22.4.171 Traps
Enter new password: ********
Re-enter new password: ********
```

See also

delete user

set snmp-parameters

set user

show users

create vdisk

Description

Creates a linear disk group using the specified RAID level, disks, and spares. This command applies to linear storage only.

All disks in the disk group must be the same type (enterprise SAS, for example).

TIP: A disk group can contain a mix of 512-byte native sector size (512n) disks and 512-byte emulated sector size (512e) disks. For consistent and predictable performance, do not mix disks of different rotational speed or sector size types (512n, 512e).

For each RAID level, the minimum and maximum numbers of disks supported are:

- NRAID: 1
- RAID 1: 2
- RAID 5: 3–16
- RAID 10: 4–16
- RAID 0: 2–16
- RAID 3: 3–16
- RAID 6: 4–16
- RAID 50: 6–32

For best practices for creating disk groups, see the Disk Management Utility User Guide.

When you create a linear disk group, the system creates a linear pool with the same name. A linear pool can contain a single linear disk group.

Minimum role

`manage`

Syntax

```
create vdisk
   [assigned-to a|b|auto]
   [chunk-size 64k|128k|256k|512k]
   disks disks
   level nraid|raid0|r0|raid1|r1|raid3|r3|raid5|r5|raid6|r6|raid10|r10|
   raid50|r50
   [mode online|offline]
   [spare disks]
   name
```

Parameters

`assigned-to a|b|auto`
Optional. For a system operating in Active-Active ULP mode, this specifies the controller to own the disk group. To let the system automatically load-balance vdisks between controllers, use `auto` or omit this parameter. In Single Controller mode, this parameter is ignored; the system automatically load-balances vdisks in anticipation of the insertion of a second controller in the future.

`chunk-size 64k|128k|256k|512k`
Optional. The amount of contiguous data, in KB, that is written to a disk group member before moving to the next member of the disk group. For RAID 50, this option sets the chunk size of each RAID-5 subgroup. The chunk size of the RAID-50 disk group is calculated as: *configured-chunk-size x (subgroup-members - 1)*. For NRAID and RAID 1, `chunk-size` has no meaning and is therefore not applicable. The default size is `512k`.

`disks` *`disks`*
The IDs of the disks to include in the disk group. RAID 10 requires a minimum of two RAID-1 subgroups each having two disks. RAID 50 requires a minimum of two RAID-5 subgroups each having three disks. For disk syntax, see Command Syntax on page 10.

`level nraid|raid0|r0|raid1|r1|raid3|r3|raid5|r5|raid6|r6|raid10|r10|raid50|r50`
Specifies the RAID level.

`mode online|offline`
Optional. Specifies whether the disk group is initialized online or offline.

- `online`: Enables you to use the disk group immediately after creating it while it is initializing. Because online uses the verify method to create the disk group, it takes longer to complete initializing than offline. Online initialization is fault-tolerant. This option is the default.
- `offline`: You must wait for the disk group initialization process to finish before using the disk group. However, offline takes less time to complete initializing than online.

`spare` *`disks`*
Optional. The IDs of 1–4 dedicated spares to assign to a RAID 1, 3, 5, 6, 10, or 50 disk group. For disk syntax, see Command Syntax on page 10.

name
A name for the new disk group. Input rules:

- The value is case sensitive.
- The value can have a maximum of 32 bytes.
- The value can include spaces and printable UTF-8 characters except: " , < \
- A value that includes a space must be enclosed in double quotes.

Examples

Create a RAID-1 linear disk group named `VD1` using two disks.

```
# create vdisk level raid1 disks 0.1,0.3 VD1
```

Create a RAID-50 linear disk group named `VD2` having three RAID-5 subgroups, each having three disks.

```
# create vdisk level r50 disks 0.1-3:0.4-6:0.7-9 VD2
```

Create a RAID-6 linear disk group named `vdR6` using four disks.

```
# create vdisk level r6 disks 2.3-4,2.8-9 vdR6
```

See also

delete vdisks

set vdisk

show disks

show vdisks

create volume

Description

Creates a volume in a linear disk group or virtual pool.

You must specify a size for the volume. You can create the volume unmapped or set its default mapping. Default mapping settings apply to all hosts, unless overridden by an explicit mapping between a host and the volume. You can later change the mapping by using the map volume and unmap volume commands. By default, this command will not map the created volume.

CAUTION: Using a default mapping for a volume will allow multiple hosts to access the volume. To avoid multiple hosts mounting the volume and causing corruption, the hosts must be cooperatively managed, such as by using cluster software.

Volume sizes are aligned to 4.2-MB (4-MiB) boundaries. When a volume is created or expanded, if the resulting size would be less than 4.2 MB it will be increased to 4.2 MB; if the resulting size would be greater than 4.2 MB it will be decreased to the nearest 4.2-MB boundary.

To create multiple volumes at once, use the create volume-set command.

NOTE: For virtual storage, you cannot add a volume to a volume group that is in a replication set.

For virtual storage, you can set the retention priority for snapshots of the volume. If automatic deletion of snapshots is enabled, the system uses the retention priority of snapshots to determine which, if any, snapshots to delete. Snapshots are considered to be eligible for deletion if they have any retention priority other than never-delete. Eligible snapshots are considered for deletion by priority and age. The oldest, lowest priority snapshots are deleted first. Snapshots that are mapped or are not leaves of a volume's snapshot tree are not eligible for automatic deletion.

Minimum role

manage

Syntax

```
create volume
   [access read-write|rw|read-only|ro|no-access]
   [large-virtual-extents enabled|disabled|on|off]
   [lun LUN]
   [ovms-uid ID]
   [pool pool]
   [ports ports]
   size size[B|KB|MB|GB|TB|KiB|MiB|GiB|TiB]
   [snapshot-retention-priority never-delete|high|medium|low]
   [tier-affinity no-affinity|archive|performance]
   vdisk vdisk
   [volume-group volume-group]
   name
```

Parameters

`access read-write|rw|read-only|ro|no-access`
Optional. The access permission to use for the mapping: `read-write (rw)`, `read-only (ro)`, or `no-access`. If `no-access` is specified, the volume is not mapped. The default is `read-write`.

`large-virtual-extents enabled|disabled|on|off`
Optional. For a virtual volume, this sets whether the system will try to allocate pages in a sequentially optimized way to reduce I/O latency in SSD applications and improve performance.

- `disabled` or `off`: Optimized page allocation is disabled. This is the default.
- `enabled` or `on`: Optimized page allocation is enabled.

`lun` *`LUN`*
Optional if the `access` parameter is set to `no-access`. Specifies the LUN to assign to the mapping on all ports.

`ovms-uid` *`ID`*
Optional. For a volume to be accessed by an OpenVMS host, assign a volume ID in the range 1-32767 to identify that volume to that host.

`pool` *`pool`*
Optional for linear volumes. Required for virtual volumes. The name or serial number of the pool in which to create the volume.

`ports` *`ports`*
Optional. The ports through which the host can access the volume. All specified ports must be the

same type (FC, for example). For port syntax, see Command Syntax on page 10. If this parameter is omitted, all ports are selected.

`size` *`size`*`[B|KB|MB|GB|TB|KiB|MiB|GiB|TiB]`
Sets the volume size. The unit is optional (B represents bytes). If base 2 is in use, whether you specify a base-2 or base-10 unit, the resulting size will be in base 2. If no unit is specified, the default is 512-byte blocks.

A value less than 4.2 MB (4 MiB) will be increased to that size. A value greater than 4 MB will be decreased to the nearest 4-MB boundary. The maximum volume size is 140 TB (128 TiB).

If overcommit is enabled, the size can exceed the physical capacity of the storage pool. To see whether overcommit is enabled, use the show pools command.

`snapshot-retention-priority never-delete|high|medium|low`
Optional. For virtual storage, this specifies the retention priority for snapshots of the volume.

- `never-delete`: Snapshots will never be deleted.
- `high`: Snapshots may be deleted after all eligible medium-priority snapshots have been deleted.
- `medium`: Snapshots may be deleted after all eligible low-priority snapshots have been deleted. This is the default.
- `low`: Snapshots may be deleted.

`tier-affinity no-affinity|archive|performance`
Optional. For virtual storage, this specifies how to tune the tier-migration algorithm for the volume:

- `no-affinity`: This setting uses the highest available performing tiers first and only uses the Archive tier when space is exhausted in the other tiers. Volume data will swap into higher performing tiers based on frequency of access and tier space availability. This is the default.
- `archive`: This setting prioritizes the volume data to the least performing tier available. Volume data can move to higher performing tiers based on frequency of access and available space in the tiers.
- `performance`: This setting prioritizes volume data to the higher performing tiers. If no space is available, lower performing tier space is used. Performance affinity volume data will swap into higher tiers based upon frequency of access or when space is made available.

`vdisk` *`vdisk`*
Optional; required for linear volumes. The name or serial number of the linear disk group in which to create the volume. A name that includes a space must be enclosed in double quotes.

`volume-group` *`volume-group`*
Optional. The name of a volume group to which to add the volume. A name that includes a space must be enclosed in double quotes. If the group does not exist, it will be created.

`name`
A name for the new volume. The name must be unique system-wide. Input rules:

- The value is case sensitive.
- The value can have a maximum of 32 bytes.
- The value can include spaces and printable UTF-8 characters except: " , < \
- A value that includes a space must be enclosed in double quotes.

Examples

Create the 20-GB volume `V1` in disk group VD1, and map it to ports A1 and B1 using LUN 5.

```
# create volume vdisk VD1 size 20GB ports a1,b1 lun 5 V1
```

Create a 100-GB standard volume named `MyVolume` in pool A, map it to use LUN 5 with read-write access through port 1 in each controller, add it to volume group `MyGroup`, and tune tier-migration for performance.

```
# create volume MyVolume pool A size 100GB access rw lun 5 ports 1
volume-group MyGroup tier-affinity performance
```

Create a 20-GB standard volume named `Secrets` in storage pool A, and map it to use LUN 333 with read-only access through all ports.

```
# create volume Secrets pool A size 20GB lun 333 access read-only
```

Create volume `Vol1` with snapshot retention priority high.

```
# create volume snapshot-retention-priority high Vol1
```

See also

create volume-set

delete volumes

set volume

show pools

show ports

show vdisks

show volume-groups

show volumes

create volume-group

Description

Creates a volume group that includes specified volumes. You can create a maximum of 256 volume groups. A volume group can contain a maximum of 1024 volumes. All volumes in a volume group must be in the same pool.

Minimum role

`manage`

Syntax

```
create volume-group
   volumes volumes
   volume-group
```

Parameters

`volumes` *`volumes`*
A comma-separated list of the names of volumes to include in the volume group. A name that includes a space must be enclosed in double quotes.

`volume-group`
A name for the volume group. Input rules:

- The value is case sensitive.
- The value can have a maximum of 32 bytes.
- The value can include spaces and printable UTF-8 characters except: " , < \
- A value that includes a space must be enclosed in double quotes.

Examples

Create a volume group named `VGroup1` that includes hosts `Vol0001` and `Vol0002`.

```
# create volume-group volumes Vol0001,Vol0002 VGroup1
```

See also

add volume-group-members

delete volume-groups

remove volume-group-members

set volume-group

show volume-groups

show volumes

create volume-set

Description

Creates a specified number of volumes in a linear disk group or virtual pool.

You must specify a base name and a size for the volumes. You can create the volumes unmapped or set their default mapping. Default mapping settings apply to all hosts, unless overridden by an explicit mapping between a host and the volume. You can later change mappings by using the map volume and unmap volume commands. By default, this command will not map the created volumes.

CAUTION: Using a default mapping for a volume will allow multiple hosts to access the volume. To avoid multiple hosts mounting the volume and causing corruption, the hosts must be cooperatively managed, such as by using cluster software.

Volume sizes are aligned to 4.2-MB (4-MiB) boundaries. When a volume is created or expanded, if the resulting size would be less than 4.2 MB it will be increased to 4.2 MB; if the resulting size would be greater than 4.2 MB it will be decreased to the nearest 4.2-MB boundary.

For virtual storage, you can set the retention priority for snapshots of the volume. If automatic deletion of snapshots is enabled, the system uses the retention priority of snapshots to determine which, if any, snapshots to delete. Snapshots are considered to be eligible for deletion if they have any retention priority other than `never-delete`. Eligible snapshots are considered for deletion by priority and age. The oldest, lowest priority snapshots are deleted first. Snapshots that are mapped or are not leaves of a volume's snapshot tree are not eligible for automatic deletion.

Minimum role

`manage`

Syntax

```
create volume-set
   [access read-write|rw|read-only|ro|no-access]
   [baselun base-LUN]
   basename base-name
   count #
   [large-virtual-extents enabled|disabled|on|off]
   [pool pool]
   [ports ports]
   size size[B|KB|MB|GB|TB|KiB|MiB|GiB|TiB]
   [snapshot-retention-priority never-delete|high|medium|low]
   [tier-affinity no-affinity|archive|performance]
   [vdisk vdisk]
   [volume-group volume-group]
```

Parameters

`access read-write|rw|read-only|ro|no-access`
Optional. The access permission to use for the mapping: `read-write (rw)`, `read-only (ro)`, or `no-access`. If `no-access` is specified, the volume is not mapped. The default is `read-write`.

`baselun` *`base-LUN`*
Optional. The first in a sequence of LUNs to assign to map the volumes through ports specified by the `ports` parameter. If the `baselun` and `ports` parameters are omitted, the volumes are not mapped. If a LUN to be assigned to a volume is already in use, an error message is displayed and that volume and any subsequent volumes are not mapped.

`basename` *`base-name`*
A name to which a number will be appended to generate a different name for each volume. Volume names must be unique system-wide. Input rules:

- The value is case sensitive.
- The value can have a maximum of 16 bytes.
- The value can include spaces and printable UTF-8 characters except: " , < \
- A value that includes a space must be enclosed in double quotes.

Resulting volumes are numbered sequentially starting with 0000. If volumes with the specified basename already exist, names of new volumes start with the first available name in the sequence. For example: for basename `vd1_v`, if `vd1_v0000` and `vd1_v0002` exist, the next volumes created will be `vd1_v0001` and `vd1_v0003`.

`count #`
The number of volumes to create, from 1 to 128. Volumes will be created up to the maximum number supported per disk group.

`large-virtual-extents enabled|disabled|on|off`
Optional. For a virtual volume, this sets whether the system will try to allocate pages in a sequentially optimized way to reduce I/O latency in SSD applications and improve performance.

- `disabled` or `off`: Optimized page allocation is disabled. This is the default.
- `enabled` or `on`: Optimized page allocation is enabled.

`pool` *pool*
Optional; required for virtual volumes. The name or serial number of the pool in which to create the volumes.

`ports` *ports*
Optional. The controller ports to use for the mapping. All ports must be the same type (FC, for example). For port syntax, see Command Syntax on page 10. If not all ports are specified, the unspecified ports are not mapped. If the `ports` and `baselun` parameters are omitted, the volumes are not mapped.

`size` *size*`[B|KB|MB|GB|TB|KiB|MiB|GiB|TiB]`
Sets the volume size. The unit is optional (B represents bytes). If base 2 is in use, whether you specify a base-2 or base-10 unit, the resulting size will be in base 2. If no unit is specified, the default is 512-byte blocks.

A value less than 4.2 MB (4 MiB) will be increased to 4.2 MB. A value greater than 4.2 MB will be decreased to the nearest 4.2-MB boundary. The maximum volume size is 140 TB (128 TiB).

If overcommit is enabled, the volume size can exceed the physical capacity of the storage pool. To see whether overcommit is enabled, use the show pools command. If overcommit is disabled and the combined size of the volumes will exceed the capacity of the storage pool, an error message is displayed and no volumes are created.

`snapshot-retention-priority never-delete|high|medium|low`
Optional. For virtual storage, this specifies the retention priority for snapshots of the volume set.

- `never-delete`: Snapshots will never be deleted.
- `high`: Snapshots may be deleted after all eligible medium-priority snapshots have been deleted.
- `medium`: Snapshots may be deleted after all eligible low-priority snapshots have been deleted. This is the default.
- `low`: Snapshots may be deleted.

`tier-affinity no-affinity|archive|performance`
Optional. For virtual storage, this specifies how to tune the tier-migration algorithm for the volume:

- `no-affinity`: This setting uses the highest available performing tiers first and only uses the Archive tier when space is exhausted in the other tiers. Volume data will swap into higher performing tiers based on frequency of access and tier space availability. This is the default.
- `archive`: This setting prioritizes the volume data to the least performing tier available. Volume data can move to higher performing tiers based on frequency of access and available space in the tiers.
- `performance`: This setting prioritizes volume data to the higher performing tiers. If no space is available, lower performing tier space is used. Performance affinity volume data will swap into higher tiers based upon frequency of access or when space is made available.

`vdisk` *vdisk*
Optional; required for linear volumes. The name or serial number of the linear disk group in which to create the volumes. A name that includes a space must be enclosed in double quotes.

`volume-group` *volume-group*
Optional. The name of a volume group to which to add the volume. A name that includes a space must be enclosed in double quotes. If the group does not exist, it will be created.

Examples

Create two unmapped, 100-GB volumes with base name `MyVol-` in pool `B` and add them to volume group `MyVG`.

```
# create volume-set count 2 size 100GB pool b basename MyVol-
volume-group MyVG
```

Create two unmapped, 100-GB volumes with base name `data-` in disk group `data`.

```
# create volume-set count 2 size 100GB vdisk data basename data-
```

Create ten 20-GB volumes with the base name `vd1_v` in disk group `vd1`, mapped starting with LUN 5 with read-only access through port A1.

```
# create volume-set count 10 size 20GB vdisk vd1 basename vd1_v baselun 5
access ro ports a1
```

Create four 5-MB volumes with the base name `BV1_` with snapshot retention priority `high`.

```
# create volume-set count 4 size 5MB basename BV1_
snapshot-retention-priority high Vol1
```

See also

create volume

delete volumes

map volume

set volume

show maps

show pools

show vdisks

show volume-groups

show volumes

unmap volume

delete all-snapshots

Description

Deletes all snapshots associated with a specified source volume. All data associated with the snapshots is deleted and their space in the pool is freed for use.

For virtual storage, the source volume can be a base volume or a snapshot. For linear storage, the source volume can be a master volume or a snap pool.

The snapshots' schedules and tasks are also deleted.

CAUTION: When the snapshots are deleted, all data in those snapshots will be lost.

This command has a confirmation prompt in interactive console mode.

Minimum role

`manage`

Syntax

```
delete all-snapshots
   volume volume
```

Parameters

`volume` *`volume`*
The name or serial number of the source volume. A name that includes a space must be enclosed in double quotes.

Examples

Delete all snapshots associated with volume `MV1`.

```
# delete all-snapshots volume MV1
```

See also

show snapshots

show volumes

delete chap-records

Description

Deletes a specified CHAP record or all CHAP records. This command is permitted whether or not CHAP is enabled.

For a login request from an initiator to a storage system, the initiator is the originator and the storage system is the recipient. Because CHAP works during login, to make CHAP changes take effect you must reset any active iSCSI host links.

In a peer connection, a storage system can act as the originator or recipient of a login request. As the originator, with a valid CHAP record it can authenticate CHAP even if CHAP is disabled. This is possible because the system will supply the CHAP secret requested by its peer and the connection will be allowed.

CAUTION: Deleting CHAP records may make volumes inaccessible and the data in those volumes unavailable.

This command has a confirmation prompt in interactive console mode.

Minimum role

`manage`

Syntax

To delete the CHAP record for a specific originator:

```
delete chap-records
   name originator-name
```

To delete all CHAP records:

```
delete chap-records
   all
```

Parameters

`name` *originator-name*
The originator name, typically in IQN format.

`all`
Delete all CHAP records in the database.

Examples

Delete the CHAP record for a specific originator.

```
# delete chap-records name iqn.1991-05.com.microsoft:myhost.domain
```

Delete all CHAP records.

```
# delete chap-records all
```

See also

create chap-record

set chap-record

show chap-records

show iscsi-parameters

delete host-groups

Description

Deletes specified host groups and optionally all hosts in those groups.

Before using the option to delete all the hosts in the groups, ensure that the hosts are unmapped.

This command has a confirmation prompt in interactive console mode.

Minimum role

`manage`

Syntax

```
delete host-groups
   [delete-hosts]
   host-groups|all
```

Parameters

`delete-hosts`
Optional. Specifies to delete all hosts in the groups. If this parameter is omitted, the host groups will be deleted but their hosts will not be deleted.

host-groups`|all`
Specifies either:

- A comma-separated list of the names of host groups to delete. A name that includes a space must be enclosed in double quotes.

- `all`: Deletes all host groups.

Examples

Delete host group `HGroup1` but not the hosts in those groups.

```
# delete host-groups HGroup1
```

Delete all host groups and the hosts in those groups.

```
# delete host-groups delete-hosts all
```

See also

show host-groups

delete hosts

Description

Deletes specified hosts that are not in a host group. Mapped and unmapped hosts can be deleted. Deleting a host does not delete its initiators. Volume maps continue to apply to the initiators in the host that is deleted.

Minimum role

`manage`

Syntax

```
delete hosts
   hosts|all
```

Parameters

`hosts``|all`
Specifies either:

- A comma-separated list of the names of hosts to delete. A name that includes a space must be enclosed in double quotes.
- `all`: Deletes all hosts.

Examples

Delete hosts `Host1` and `Host2`.

```
# delete hosts Host1,Host2
```

Delete all hosts.

```
# delete hosts all
```

See also

create host

set host

set initiator

show host-groups

show initiators

delete initiator-nickname

Description

Deletes manually created initiators or the nicknames of discovered initiators.

Volume maps continue to apply to the initiators in the host that is deleted. If you delete the nickname of a discovered initiator, commands will show the initiator by its ID.

Minimum role

`manage`

Syntax

```
delete initiator-nickname
   initiator|all
```

Parameters

initiator|all
Specifies either:

- The nickname or ID of the initiator to delete. A value that includes a space must be enclosed in double quotes.
- `all`: Deletes all manually created initiators and nicknames of discovered initiators.

Examples

Delete the manually created initiator named `Init1`.

```
# delete initiator-nickname Init1
```

Delete the nickname of discovered initiator `Init2`.

```
# delete initiator-nickname Init2
```

Delete all manually created initiators and nicknames of discovered initiators.

```
# delete initiator-nickname all
```

See also

create host

set initiator

show initiators

delete peer-connection

Description

Deletes a peer connection between two storage systems.

You can run this command on either the local or remote system.

You cannot delete a peer connection if any replication sets are using it.

Minimum role

`manage`

Syntax

```
delete peer-connection
   [local-only]
   peer-connection-ID
```

Parameters

`local-only`
Optional. Only use this parameter if you need to remove a peer connection when no network connection is available between the systems and you do not expect to be able to reconnect them. Do not use this parameter in normal operating conditions.

Run the command with this parameter on both systems. After the peer connection has been deleted, if you want to re-create it with new addresses, use the create peer-connection command.

`peer-connection-ID`
Specifies the name or serial number of the peer connection to delete.

Examples

Delete the peer connection `Peer1`.

```
# delete peer-connection Peer1
```

See also

create peer-connection

query peer-connection

set peer-connection

show peer-connections

delete pools

Description

Deletes specified pools.

CAUTION: Deleting a pool will delete all the data it contains.

For linear storage, a pool and a disk group are logically equivalent. For a linear pool, if the pool contains volumes, the command will prompt for confirmation to delete the volumes. If the reply is yes, the command will unmap and delete all volumes in the pool, delete the pool and corresponding disk group, and make all the disks available. If the reply is no, the command will be canceled.

For virtual storage, a pool can contain multiple disk groups. For a virtual pool, if the pool contains volumes, the command will prompt for confirmation to delete the volumes. If the reply is yes, the command will unmap and delete all volumes in the pool, and then delete each disk group in the pool and make all the disks available. If the reply is no, the command will be canceled.

NOTE: You cannot remove the only pool from a system that is used in a peer connection, or a pool that contains a volume that is used in a replication set.

NOTE: If you delete a quarantined disk group and its missing disks are later found, the group will reappear as quarantined or offline and you must delete it again (to clear those disks).

Minimum role

`manage`

Syntax

```
delete pools
   [prompt yes|no]
   pools
```

Parameters

`prompt yes|no`
Optional. For scripting, this specifies an automatic reply to confirmation prompts:

- `yes`: Allow the command to proceed.
- `no`: Cancel the command.

If this parameter is omitted, you must manually reply to prompts.

`pools`
A comma-separated list of the names or serial numbers of the pools to delete. For a linear pool, a name that includes a space must be enclosed in double quotes.

Examples

Delete virtual pool `A`.

```
# delete pools A
```

Delete linear pool `dg1`.

```
# delete pools dg1
```

See also

delete vdisks

remove disk-groups

show pools

show vdisks

delete remote-system

Description

Deletes the persistent association with a remote system. This command applies to linear storage only.

NOTE: Remote-system connections for linear replication are not supported for virtual replication. Instead you must create peer connections.

Minimum role

`manage`

Syntax

```
delete remote-system
   system
```

Parameters

`system`
The name or network-port IP address of the remote system. A name that includes a space must be enclosed in double quotes.

Examples

Delete remote system `System2`.

```
# delete remote-system System2
```

See also

show remote-systems

delete replication-set

Description

Deletes a replication set.

For virtual storage, you can run this command on the replication set's primary or secondary system.

When you delete a virtual replication set, the internal snapshots created by the system are also deleted. However, no user data is deleted. The primary and secondary volumes can be used like any other base volumes.

You cannot delete a virtual replication set if it has a replication in progress. If you want to delete a replication set that has a replication in progress, you must first suspend and then abort replication for that replication set. To view replication activity, use the show replication-sets command. To suspend replication, use the suspend replication-set command. To abort replication, use the abort replication command.

This command has a confirmation prompt in interactive console mode.

Minimum role

`manage`

Syntax

```
delete replication-set
   [local-only]
   replication-set-ID
```

Parameters

`local-only`

Optional. Only use this parameter if you need to remove a replication set from a primary or secondary system when no network connection is available to the peer system and you do not expect to be able to reconnect them. Do not use this parameter in normal operating conditions.

Run the command with this parameter on both the primary system and the secondary system to completely remove the replication relationship between the primary and secondary volumes.

`replication-set-ID`
The name or serial number of the replication set. A name that includes a space must be enclosed in double quotes.

Examples

Delete replication set `RS1`.

```
# delete replication-set RS1
```

See also

abort replication

create replication-set

resume replication-set

set replication-set

show replication-sets

suspend replication-set

delete schedule

Description

Deletes a task schedule. If you no longer want a scheduled task to occur, you can delete the schedule. When a volume is deleted, its schedules and tasks are also deleted.

If the schedule uses a task that is not used by any other schedule, a confirmation prompt will ask whether you want to delete the schedule and the task. Reply `yes` to delete both, or `no` to delete only the schedule.

Minimum role

`manage`

Syntax

```
delete schedule
   [prompt yes|no]
   schedule
```

Parameters

`prompt yes|no`
Optional. For scripting, this specifies an automatic reply to confirmation prompts:

- `yes`: Allow the command to proceed.
- `no`: Cancel the command.

If this parameter is omitted, you must manually reply to prompts.

`schedule`
The name of the schedule to delete.

Examples

Delete schedule `Sched1`.

```
# delete schedule Sched1
```

See also

create schedule

set schedule

show schedules

delete snapshot

Description

Deletes specified snapshots. All data uniquely associated with the snapshot is deleted and associated space in the pool is freed for use. The snapshot's schedules are also deleted.

CAUTION: When a snapshot is deleted, all data in the snapshot will be lost.

This command has a confirmation prompt in interactive console mode.

Minimum role

`manage`

Syntax

```
delete snapshot
   snapshots
```

Parameters

`snapshots`
A comma-separated list of the names or serial numbers of the snapshots to delete. A name that includes a space must be enclosed in double quotes.

Examples

Delete standard snapshots `s1`, `s2`, and `s3`.

```
# delete snapshot s1,s2,s3
```

See also

delete all-snapshots

show snapshots

delete task

Description

Deletes a task. If the task is scheduled, a confirmation prompt will ask whether you want to delete the task and its schedules. Reply `yes` to delete both, or `no` to cancel the command.

Minimum role

`manage`

Syntax

```
delete task
   [prompt yes|no]
   task
```

Parameters

`prompt yes|no`
Optional. For scripting, this specifies an automatic reply to confirmation prompts:

- `yes`: Allow the command to proceed.
- `no`: Cancel the command.

If this parameter is omitted, you must manually reply to prompts.

task
The name of the task to delete.

Examples

Delete task `Task1`.

```
# delete task Task1
```

See also

create task

delete schedule

show schedules

show tasks

delete user

Description

Deletes a user account. Except for the user you are logged in as, you can delete any user, including the default users. However, the system requires at least one CLI user with the `manage` role to exist. When a user is deleted, any sessions associated with that user name are terminated.

This command has a confirmation prompt in interactive console mode.

Minimum role

`manage`

Syntax

```
delete user
   [noprompt]
   name
```

Parameters

`noprompt`
Optional. Suppresses confirmation prompts. Specifying this parameter allows the command to proceed without user interaction.

`name`
The user to delete. Names are case sensitive.

Examples

Delete user `jsmith`.

```
# delete user jsmith
```

See also

create user

show users

delete vdisks

Description

Deletes specified linear disk groups. This command applies to linear storage only.

This unmaps and deletes all volume in the disk groups and makes all the disks available.

CAUTION: Deleting a linear disk group will delete all data it contains.

NOTE: If you delete a quarantined disk group and its missing disks are later found, the disk group will reappear as quarantined or offline and you must delete it again (to clear those disks).

Minimum role

`manage`

Syntax

```
delete vdisks
   [prompt yes|no]
   vdisks
```

Parameters

`prompt yes|no`
Optional. For scripting, this specifies an automatic reply to confirmation prompts:

- `yes`: Allow the command to proceed.
- `no`: Cancel the command.

If this parameter is omitted, you must manually reply to prompts.

vdisks
A comma-separated list of the names or serial numbers of the linear disk groups to delete. A name that includes a space must be enclosed in double quotes.

Examples

Delete linear disk groups VD1 and VD2.

```
# delete vdisks VD1,VD2
```

See also

create vdisk

show vdisks

delete volume-groups

Description

Deletes specified volume groups and optionally all volumes in those groups.

Before using the option to delete all the volumes in the groups, ensure that the volumes are unmapped. If any volume is mapped, the command will fail and no changes will be made.

NOTE: For virtual storage, before you can delete a volume group that is in a replication set you must delete the replication set.

This command has a confirmation prompt in interactive console mode.

Minimum role

manage

Syntax

```
delete volume-groups
   [delete-volumes]
   volume-groups|all
```

Parameters

delete-volumes
Optional. Specifies to delete all volumes in the groups. If this parameter is omitted, the volume groups will be deleted but their volumes will not be deleted.

volume-groups|all
Specifies either:

- A comma-separated list of the names of volume groups to delete. A name that includes a space must be enclosed in double quotes.
- all: Deletes all volume groups.

Examples

Delete volume groups `VGroup1` and `VGroup2` but not the volumes in those groups.

```
# delete volume-groups VGroup1,VGroup2
```

Delete all volume groups and the volumes in those groups.

```
# delete volume-groups delete-volumes all
```

See also

delete replication-set

show volume-groups

delete volumes

Description

Deletes specified volumes.

CAUTION: Deleting a volume will delete all data it contains, and its schedules.

NOTE: For virtual storage, you cannot delete a volume that is in a replication set.

This command has a confirmation prompt in interactive console mode.

Minimum role

`manage`

Syntax

```
delete volumes
   volumes
```

Parameters

`volumes`
A comma-separated list of the names or serial numbers of the volumes to delete. A name that includes a space must be enclosed in double quotes.

Examples

Delete volumes `vol1` and `vol2`.

```
# delete volumes vol1,vol2
```

See also

create volume

show volumes

dequarantine

Description

Removes a disk group from quarantine.

NOTE: For virtual storage, this command should only be used by or with direction from technical support.

Dequarantine is supported for a RAID-3, RAID-5, RAID-6, or RAID-50 RAID-5 or RAID-6 disk group and operates as detailed below.

Dequarantine is not supported for a RAID-1 or RAID-10 disk group. For these RAID levels, if the missing disks become available, the disk group will be dequarantined automatically. Otherwise, some data will have been lost because data in the remaining disks will be invalid ("stale").

CAUTION: Carefully read this topic to determine whether to use the dequarantine command to manually remove a disk group from quarantine. The dequarantine command should only be used as part of the emergency procedure to attempt to recover data and is normally followed by use of the CLI trust command. If a disk group is manually dequarantined and does not have enough disks to continue operation, its status will change to OFFL and its data may or may not be recoverable through use of the trust command. It is recommended that you contact technical support for assistance in determining if the recovery procedure that makes use of the dequarantine and trust commands applies to your situation and for assistance to perform it. Also, see the help for the trust command.

To continue operation and not go to quarantined status, a RAID-3 or RAID-5 disk group can have only one inaccessible disk, a RAID-6 disk group can have only one or two inaccessible disks, and a RAID-10 or RAID-50 disk group can have only one inaccessible disk per subgroup. For example, a 16-disk RAID-10 disk group can remain online (critical) with 8 inaccessible disks if one disk per mirror is inaccessible.

The system will automatically quarantine a disk group having a fault-tolerant RAID level if one or more of its disks becomes inaccessible, or to prevent invalid data that may exist in the controller from being written to the disk group. Quarantine will not occur if a known-failed disk becomes inaccessible or if a disk becomes inaccessible after failover or recovery. The system will automatically quarantine an NRAID or RAID-0 disk group to prevent invalid data from being written to the disk group. If quarantine occurs because of an inaccessible disk, event 172 is logged. If quarantine occurs to prevent writing invalid data, event 485 is logged. For recommended actions for these events, see the Event Descriptions Reference Guide.

Examples of when quarantine can occur are:

- At system power-up, a disk group has fewer disks online than at the previous power-up. This may happen because a disk is slow to spin up or because an chassis is not powered up. The disk group will be automatically dequarantined if the inaccessible disks come online and the disk group status becomes `FTOL` (fault tolerant and online), or if after 60 seconds the disk group status is `QTCR` or `QTDN`.
- During system operation, a disk group loses redundancy plus one more disk. For example, three disks are inaccessible in a RAID-6 disk group or two disks are inaccessible for other fault-tolerant RAID levels. The disk group will be automatically dequarantined if after 60 seconds the disk group status is `FTOL`, `FTDN`, or `CRIT`.

Quarantine isolates the disk group from host access and prevents the system from changing the disk group status to OFFL (offline). The number of inaccessible disks determines the quarantine status. From least to most severe:

- QTDN (quarantined with a down disk): The RAID-6 disk group has one inaccessible disk. The disk group is fault tolerant but degraded. If the inaccessible disks come online or if after 60 seconds from being quarantined the disk group is QTCR or QTDN, the disk group is automatically dequarantined.
- QTCR (quarantined critical): The disk group is critical with at least one inaccessible disk. For example, two disks are inaccessible in a RAID-6 disk group or one disk is inaccessible for other fault-tolerant RAID levels. If the inaccessible disks come online or if after 60 seconds from being quarantined the disk group is QTCR or QTDN, the disk group is automatically dequarantined.
- QTOF (quarantined offline): The disk group is offline with multiple inaccessible disks causing user data to be incomplete, or is an NRAID or RAID-0 disk group.

When a disk group is quarantined, its disks become write-locked, its volumes become inaccessible, and it is not available to hosts until it is dequarantined. If there are interdependencies between the quarantined disk group's volumes and volumes in other disk groups, quarantine may temporarily impact operation of those other volumes.

Depending on the operation, the length of the outage, and the settings associated with the operation, the operation may automatically resume when the disk group is dequarantined or may require manual intervention. A disk group can remain quarantined indefinitely without risk of data loss.

A disk group is dequarantined when it is brought back online, which can occur in three ways:

- If the inaccessible disks come online, making the disk group FTOL, the disk group is automatically dequarantined.
- If after 60 seconds from being quarantined the disk group is QTCR or QTDN, the disk group is automatically dequarantined. The inaccessible disks are marked as failed and the disk group status changes to CRIT (critical) or FTDN (fault tolerant with a down disk). If the inaccessible disks later come online, they are marked as LEFTOVR (leftover).
- The dequarantine command is used to manually dequarantine the disk group. If the inaccessible disks later come online, they are marked as LEFTOVR (leftover). If event 172 was logged, do not use the dequarantine command. Instead follow the event's recommended-action text. If event 485 was logged, use the dequarantine command only as specified by the event's recommended-action text to avoid data corruption or loss.

When a disk group is dequarantined, event 173 is logged.

A quarantined disk group can be fully recovered if the inaccessible disks are restored. Make sure that all disks are properly seated, that no disks have been inadvertently removed, and that no cables have been unplugged. Sometimes not all disks in the disk group power up. Check that all chassis have restarted after a power failure. If these problems are found and then fixed, the disk group recovers and no data is lost.

If the inaccessible disks cannot be restored (for example, they failed), and the disk group's status is FTDN or CRIT, and compatible spares are available to replace the inaccessible disks, reconstruction will automatically begin.

If a replacement disk (reconstruct target) is inaccessible at power up, the disk group becomes quarantined. When the disk is found, the disk group is dequarantined and reconstruction starts. If reconstruction was in process, it continues where it left off.

NOTE: The only commands allowed for a quarantined disk group are dequarantine and delete vdisks and remove disk-groups. If you delete a quarantined disk group and its inaccessible disks later come online, the disk group will reappear as quarantined or offline and you must delete it again (to clear those disks).

This command has a confirmation prompt in interactive console mode.

Minimum role

`manage`

Syntax

`dequarantine`

`disk-group` *`disk-group`*

`vdisk` *`vdisk`*

Parameters

`disk-group` *`disk-group`*
The name or serial number of the disk group to remove from quarantine. A name that includes a space must be enclosed in double quotes.

`vdisk` *`vdisk`*
The name or serial number of the linear disk group to remove from quarantine. A name that includes a space must be enclosed in double quotes.

Examples

After determining that linear disk group `VD1` is quarantined, remove it from quarantine and re-check its status.

```
# show vdisks
Name ... Status ...
-------------------
VD1 ... QTDN ... (RAID 6 quarantined with a down disk)
-------------------
# dequarantine vdisk VD1
Info: Disk group VD1 was dequarantined. (VD1)
...
# show vdisks
Name ... Status ...
-------------------
VD1 ... FTDN ... (RAID 6 fault tolerant with a down disk)
-------------------
```

Dequarantine disk group `dgB01`.

```
# dequarantine disk-group dgB01
```

See also

show disk-groups

show vdisks

trust

exit

Description

Log off and exit the CLI session.

Minimum role

`monitor`

Syntax

`exit`

expand disk-group

Description

Adds disks to a disk group to expand its storage capacity.

This command applies to linear disk groups using any RAID level except NRAID and RAID 1 and to virtual disk groups using ADAPT.

This command applies to virtual disk groups using ADAPT.

The new disks must be the same type as disks already in the disk group. The disks need not have consistent capacity; ADAPT will use whatever space is available. The new disks must also be in the same tier as the disk group.

NOTE: If you upgraded from an earlier release that did not distinguish between enterprise and midline SAS disks, you might have disk groups that contain both types of disks. For those groups, you can designate either or both types of disks for expansion. If—through replacement of spares or failed disks—the disk group is changed to contain only one type of disk, you will only be able to add disks of that type to the disk group.

TIP: A disk group can contain a mix of 512-byte native sector size (512n) disks and 512-byte emulated sector size (512e) disks. For consistent and predictable performance, do not mix disks of different sector size types (512n, 512e).

The expansion capability for each supported RAID level is:

RAID level	Expansion capability	Maximum disks
NRAID	Cannot expand.	1
0	Can add 1–4 disks at a time.	16
1	Cannot expand.	2
3	Can add 1–4 disks at a time.	16
5	Can add 1–4 disks at a time.	16
6	Can add 1–4 disks at a time.	16
10	Can add 2 or 4 disks at a time.	16
50	Can expand the disk group one RAID-5 subgroup at a time. The added RAID-5 subgroup must contain the same number of disks as each original subgroup.	32
ADAPT	Can add up to 68 disks at a time.	128

When disks are added to an ADAPT disk group, the system will first replenish any spare capacity needed to be fully fault-tolerant, then use the remainder or expansion of user data capacity.

- When set to the default spare capacity, the system will try to replenish spare capacity to be the sum of the two largest disks in the group.
- When default spare capacity has been overridden (via the set disk-group command's `adapt-target-spare-capacity` parameter), the system will try to replenish spare capacity to meet the configured target GiB.
- If the actual spare capacity meets the target spare capacity, the new disk capacity will be allocated to user data.

IMPORTANT: Expansion of a non-ADAPT disk group can take hours or days to complete, depending on the disk group's RAID level and size, disk speed, utility priority, and other processes running on the storage system. You can stop expansion only by deleting the disk group. Expansion of an ADAPT disk group is very fast and extra capacity is immediately available when rebalancing is not needed. If rebalancing is needed, extra capacity may not be available until rebalancing is complete.

Before starting the expansion, ensure no other utilities are running on the disk group. If another operation is in progress, the expansion cannot start.

Minimum role

`manage`

Syntax

```
expand disk-group
   disks disks
   [prompt yes|no]
   disk-group
```

Parameters

`disks` *disks*
The IDs of the disks to add. For disk syntax, see Command Syntax on page 10.

`prompt yes|no`
Optional. For scripting, this specifies an automatic reply to confirmation prompts:

- `yes`: Allow the command to proceed.
- `no`: Cancel the command.

If this parameter is omitted, you must manually reply to prompts.

`disk-group`
The name or serial number of the disk group to expand. A name that includes a space must be enclosed in double quotes.

Examples

Expand disk group `DG1` to include disk `1.11`.

```
# expand disk-group disks 1.11 DG1
```

Expand a RAID-10 disk group named `R10` to include an additional mirror pair.

```
# expand disk-group disks 2.9-10 R10
```

Expand a RAID-50 linear disk group named `R50`, which has four 3-disk subgroups, to include an additional subgroup.

```
# expand disk-group disks 2.1-2,2.5 R50
```

Add 10 disks to ADAPT disk group `Data3`.

```
# expand disk-group disks 1.1-10 Data3
```

See also

show disk-groups

show disks

show vdisks

expand vdisk

Description

Adds disks to a linear disk group to expand its storage capacity.

The new disks must be the same type as disks already in the disk group. The disks need not have consistent capacity; ADAPT will use whatever space is available.

NOTE: If you upgraded from an earlier release that did not distinguish between enterprise and midline SAS disks, you might have disk groups that contain both types of disks. For those disk groups, you can designate either or both types of disks for expansion. If—through replacement of spares or failed disks—the disk group is changed to contain only one type of disk, you will only be able to add disks of that type to the disk group.

TIP: A disk group can contain a mix of 512-byte native sector size (512n) disks and 512-byte emulated sector size (512e) disks. For consistent and predictable performance, do not mix disks of different sector size types (512n, 512e).

The expansion capability for each supported RAID level is:

RAID level	Expansion capability	Maximum disks
NRAID	Cannot expand.	1
0, 3, 5, 6	Can add 1–4 disks at a time.	16
1	Cannot expand.	2
10	Can add 2 or 4 disks at a time.	16
50	Can expand the disk group one RAID-5 subgroup at a time. The added RAID-5 subgroup must contain the same number of disks as each original subgroup.	32
ADAPT	Can add up to 68 disks at a time.	128

When disks are added to an ADAPT disk group, the system will first replenish any spare capacity needed to be fully fault-tolerant, then use the remainder or expansion of user data capacity.

- When set to the default spare capacity, the system will try to replenish spare capacity to be the sum of the two largest disks in the group.
- When default spare capacity has been overridden (via the set disk-group command's `adapt-target-spare-capacity` parameter), the system will try to replenish spare capacity to meet the configured target GiB.
- If the actual spare capacity meets the target spare capacity, the new disk capacity will be allocated to user data.

IMPORTANT: Disk group expansion cannot be stopped and can take days to complete, depending on disk type, RAID level, and other factors.

Before starting the expansion, ensure no other utilities are running on the disk group. If another operation is in progress, the expansion cannot start.

Minimum role

`manage`

Syntax

```
expand vdisk
   disks disks
   [prompt yes|no]
   vdisk
```

Parameters

`disks` *disks*
The IDs of the disks to add. For disk syntax, see Command Syntax on page 10.

`prompt yes|no`
Optional. For scripting, this specifies an automatic reply to the confirmation prompts:

- `yes`: Allow the command to proceed.
- `no`: Cancel the command.

If this parameter is omitted, you must manually reply to prompts.

vdisk
The name or serial number of the linear disk group to expand. A name that includes a space must be enclosed in double quotes.

Examples

Expand linear disk group `VD1` to include disk `1.11`.

```
# expand vdisk disks 1.11 VD1
```

Expand a RAID-10 linear disk group named `R10` to include an additional mirror pair.

```
# expand vdisk disks 2.9-10 R10
```

Expand a RAID-50 linear disk group named `R50`, which has four 3-disk subgroups, to include an additional 3-disk subgroup.

```
# expand vdisk disks 2.1-2,2.5 R50
```

Add 10 disks to ADAPT disk group `Data3`.

```
# expand disk-group disks 1.1-10 Data3
```

See also

show disks

show vdisks

expand volume

Description

Expands a standard or base volume.

Volume sizes are aligned to 4.2-MB (4-MiB) boundaries. When a volume is created or expanded, if the resulting size would be less than 4.2 MB it will be increased to 4 MB; if the resulting size would be greater than 4.2 MB it will be decreased to the nearest 4.2-MB boundary.

For virtual storage, if overcommit is disabled, expansion is restricted to the space available in the pool that contains the volume. If overcommit is enabled, the volume size can exceed the physical capacity of the pool. The maximum volume size is 140 TB (128 TiB). To see whether overcommit is enabled, use the show pools command.

For linear storage, if insufficient space is available for expansion in the disk group, first expand the disk group by using expand vdisk.

You cannot expand a replication set's secondary volume. However, for virtual storage you can expand a replication set's primary volume, which will automatically expand its secondary volume—even if replication is in progress.

Minimum role

`manage`

Syntax

```
expand volume
   size size[B|KB|MB|GB|TB|KiB|MiB|GiB|TiB] | max
   volume
```

Parameters

`size size[B|KB|MB|GB|TB|KiB|MiB|GiB|TiB] | max`
Specifies either:

- The amount of space to add to the volume. The unit is optional (B represents bytes). If base 2 is in use, whether you specify a base-2 or base-10 unit, the resulting size will be in base 2. If no unit is specified, the default is 512-byte blocks.
- `max`: For linear storage, expand the volume to fill the available space in the disk group.

volume
The name or serial number of the volume to expand. A name that includes a space must be enclosed in double quotes.

Examples

Expand volume `V1` by 100 GB.

```
# expand volume size 100GB V1
```

See also

expand disk-group

expand vdisk

show volumes

fail

Description

Forces the partner controller module to crash for a non-maskable interrupt. The command causes the crash by issuing an internal kill command to the Storage Controller in the partner controller module. This might be helpful to gather debug information that is only available via a crash dump.

NOTE: Failing a controller module will reduce system redundancy and performance, and increase risk of data unavailability due to the reduced redundancy. If you are uncertain whether to use this command, contact technical support for assistance.

Minimum role

`manage`

Syntax

```
fail
   controller a|b
```

Parameters

`controller a|b`
Specifies whether to kill controller A or B. You cannot kill the controller on which the command is issued.

Examples

From controller A, fail controller B.

```
# fail controller b
```

See also

unfail controller

help

Description

Shows brief help for all available commands or full help for a specific command. This help topic also provides tips for using command shortcuts.

Minimum role

`monitor`

Syntax

To view brief descriptions of all commands that are available to the user role you logged in as, enter:

```
help
```

To view help for a command name, enter:

`help` *`command-name`*

To view information about the syntax for specifying parameters, disks, and so forth, enter:

```
help syntax
```

To view the information shown in this topic and in "Command completion, editing, and history" (page 32), enter:

```
help help
```

Examples

Show brief help for all available commands:

```
# help
```

Show full help for the show cli-parameters command:

```
# help show cli-parameters
```

map volume

Description

Maps specified volumes using settings that override the volumes' default mapping.

When a volume is created, if no mapping settings are specified the volume is not mapped. Otherwise, those settings become its default mapping, which specifies the controller host ports and access level that all connected initiators have to the volume, and the LUN presented to all initiators to identify the volume. The default mapping's LUN is known as the volume's default LUN.

The `map volume` command creates mappings with different settings for different initiators. Optionally, you can specify the LUN, ports, and access level for a mapping. A mapping can make a volume accessible to initiators, or inaccessible to initiators (known as masking). For example, assume a volume's default mapping allows read-only access using LUN 5. You can give one initiator read-write access using LUN 6, and you can give a second initiator no access to the volume.

CAUTION: Using a default mapping for a volume will allow multiple hosts to access the volume. To avoid multiple hosts mounting the volume and causing corruption, the hosts must be cooperatively managed, such as by using cluster software.

NOTE: You cannot map a replication set's secondary volume. Create a snapshot of the secondary volume or enable replication snapshot history and use the snapshot for mapping and accessing data.

NOTE: When mapping a volume to an initiator using the Linux ext3 file system, specify read-write access. Otherwise, the file system will be unable to mount/present/map the volume and will report an error such as "unknown partition table."

Minimum role

`manage`

Syntax

```
map volume
   [access read-write|rw|read-only|ro|no-access]
   [host hosts]
   initiator initiators|hosts|host-groups
   [lun LUN]
   [ports ports]
   volumes|volume-groups
```

Parameters

`access read-write|rw|read-only|ro|no-access`
Optional. The access permission to use for the mapping: `read-write` (`rw`), `read-only` (`ro`), or `no-access`. If the access parameter is specified as `read-write` or `read-only`, the `lun` parameter must be specified. For an explicit mapping, `no-access` causes the volume to be masked from specified initiators. If the `access` parameter is omitted, access is set to `read-write`.

`host` *`hosts`*
Deprecated—use the `initiator` parameter instead.

`initiator` *`initiators|hosts|host-groups`*
Optional. A comma-separated list of initiators, hosts, or host groups to which to map the volumes. For initiator, host, and host-group syntax, see Command Syntax on page 10. If the `initiator` parameter is specified, the `lun` and `ports` parameters must be specified. If the `initiator` parameter is omitted, the mapping applies to all initiators that are not explicitly mapped.

`lun` *`LUN`*
Optional. The LUN to use for the mapping. If a single volume and multiple initiators are specified, the same LUN is used for each initiator. If multiple volumes and a single initiator are specified, the LUN will increment for the second and subsequent volumes. If multiple volumes and initiators are specified, each initiator will have the same LUN for the first volume, the next LUN for the second volume, and so on. The `lun` parameter is ignored if `access` is set to `no-access`. If the `lun` parameter is omitted, the default LUN is presented.

`ports` *`ports`*

Optional. The controller host ports to use for the mapping. Any unspecified ports become unmapped. All specified ports must be the same type (FC, for example). For port syntax, see Command Syntax on page 10. If the `ports` parameter is specified, the `lun` parameter must also be specified. The `ports` parameter is ignored if `access` is set to `no-access`. If the `ports` parameter is omitted, all ports are mapped.

`volumes|volume-groups`

A comma-separated list of the names or serial numbers of the volumes or volume groups to map. For volume and volume-group syntax, see Command Syntax on page 10.

Examples

Map volume `vol2` with read-only access to initiator `Init1`, using port A1 and LUN 100.

```
# map volume access ro ports a1 lun 100 initiator Init1 vol2
```

Map volumes `vol2` and `vol3` with read-write access for `Init2`, using ports A1 and B1 and LUN 101.

```
# map volume access rw ports a1,b1 lun 101 initiator Init2 vol2,vol3
```

Mask volume `vol4` from `Init1` and `Init3`.

```
# map volume vol4 access no-access initiator Init1,Init3
```

Map volumes `vol1` and `vol2` to initiators `Init1` and `Init2`, using ports A1 and B1 starting with LUN 6, and view the results.

```
# map volume ports a1,b1 lun 6 initiator Init1,Init2 vol1,vol2
```

Map volume group `volGroupA` to host group `hostGroupA`, starting with LUN 1 on ports A0 and B0.

```
# map volume volGroupA.* initiator hostGroupA.*.* lun 1 port A0,B0
```

See also

show host-groups

show initiators

show maps

show ports

show volume-groups

show volumes

unmap volume

meta

Description

In API format only, shows all property metadata for objects. This includes data not shown in `brief` mode.

Minimum role

`monitor`

Syntax

`meta` *`basetypes`*

Parameters

`basetypes`
A basetype or a list of basetypes separated by commas (with no spaces) to specify the objects for which to show metadata. For names and descriptions of supported basetypes, see API Basetype Properties on page 351.

Examples

Show all metadata for objects returned by the show disks command:

```
# meta drives
```

See also

set cli-parameters

ping

Description

Tests communication with a remote host. The remote host is specified by IP address. Ping sends ICMP echo response packets and waits for replies.

Minimum role

`monitor`

Syntax

`ping`

`host-address`

[`count` *`count`*]

Parameters

`host-address`
The remote host's IP address in dotted decimal form.

`count` *`count`*
Optional. The number of packets to send. The default is 4 packets. Use a small count because the command cannot be interrupted. The default is 4 packets.

Examples

Send two packets to the remote computer at 10.134.50.6.

```
# ping 10.134.50.6 count 2
```

query peer-connection

Description

Queries a storage system to potentially use in a peer connection and shows information about the storage system via the in-band query. The system uses this information to determine how to set up the peer connection.

You can use this command to view information about systems you might use in a peer connection before creating the peer connection, or to view information about systems currently in a peer connection before modifying the peer connection.

For example, to create a peer connection you must specify a port address on the remote system. You can specify any port address that this command shows as having `Reachable Local Links` values.

Minimum role

`monitor`

Syntax

```
query peer-connection
   remote-port-address
```

Parameters

remote-port-address
Specifies the FC WWN or iSCSI IP address of the system to query.

Output

System information:

`System Name`
The name of the system.

`System Contact`
The name of the person who administers the system.

`System Location`
The location of the system.

`System Information`
A brief description of what the system is used for or how it is configured.

`Midplane Serial Number`
The serial number of the controller chassis midplane.

`Vendor Name`
The vendor name.

`Product ID`
The product model identifier.

`License information`
Shows output of show license.

query peer-connection

Peer controllers information:

`Controller`

- `A`: Controller A.
- `B`: Controller B.

`Storage Controller Code Version`
Storage Controller firmware version and loader version.

`Management Controller Code Version`
Management Controller firmware version and loader version.

`IP Address`
Controller network port IP address.

`Port`
The port ID.

`Type`

- `FC`: FC port.
- `iSCSI`: iSCSI port.
- `Unknown`: Port type is unknown.

`Port Health`

- `Up`
- `Down`
- `Degraded`
- `SFP Issue`
- `Unknown`

`Port Address`
The assigned port address.

`Reachable Local Links`
The IDs of ports in the local system linked to ports in the remote system.

Examples

Query the system with an IP address of 192.168.200.22.

```
# query peer-connection 192.168.200.22
```

Basetypes

peer-connection-info

status

See also

create peer-connection

delete peer-connection

set peer-connection

show peer-connections

release volume

Description

Clears initiator registrations and releases persistent reservations for all or specified volumes. Normally, reservations placed on volumes by initiators accessing those volumes can be released by host software. This command should be used only when the system is in an abnormal state, perhaps due to a configuration problem, and you need to remove all reservations for specified volumes and return them to a “clean” state.

CAUTION: Releasing reservations for volumes may allow unintended access to those volumes by other initiators, which may result in data corruption. Before issuing this command, quiesce all host initiators that have visibility to the volumes whose reservations will be released.

Minimum role

`manage`

Syntax

```
release volume
   all|volumes
```

Parameters

`all|volumes`
Specifies all volumes, or a comma-separated list of the names or serial numbers of specific volumes. A name that includes a space must be enclosed in double quotes.

Examples

Release reservations for a specific volume.

```
# release volume vd04_v0002
```

See also

show volume-reservations

show volumes

remove disk-groups

Description

Removes specified disk groups.

CAUTION: If your system gets into a state where a virtual disk group is quarantined or offline or does not have a corresponding pool, contact technical support.

CAUTION: Deleting a linear disk group will delete all data it contains.

If a specified disk group has a job running, such as media scrub, the command will prompt for confirmation to stop the job.

For a linear disk group, if the group contains volumes, the command will prompt for confirmation to delete the volumes. If the reply is yes, the command will unmap and delete all volumes in the group, delete the group and corresponding pool, and make all the disks available. If the reply is no, the command will be canceled.

For a virtual disk group, if the group contains no volume data, the group will be removed. If the group contains volume data, the command will initiate removal and try to drain (move) all volume data to other groups in the same pool. While data is being drained, the group's status will be `VDRAIN`. If the pool does not have enough space to contain the volume data, the command will immediately fail with an error. If draining begins and is successful, an event will be logged and the group will be removed. If draining begins but hosts continue to write new data to the volumes and cause an out-of-space condition, the command will fail and an event will be logged.

NOTE: Disk group removal (draining) can take a very long time depending on a number of factors in the system, including but not limited to: large pool configuration; the amount of I/O traffic to the system (e.g., active I/O pages to the draining disk group); the type of the disk group page migration (enterprise SAS, midline SAS, SSD); the size of the draining disk group(s) in the system; and the number of disk groups draining at the same time.

If you remove the last disk group in a virtual pool, the command will prompt for confirmation to remove the pool, too. If the reply is yes, the pool will be removed. If the reply is no, the disk group and the pool will remain.

In one command you can delete linear and virtual disk groups, and disk groups from more than one pool.

NOTE: You cannot remove the last disk group from the only pool in a system that is used in a peer connection, or a disk group that contains a volume that is used in a replication set.

NOTE: If you delete a quarantined disk group and its missing disks are later found, the group will reappear as quarantined or offline and you must delete it again (to clear those disks).

Minimum role

`manage`

Syntax

```
remove disk-groups
   [prompt yes|no]
   disk-groups
```

Parameters

`prompt yes|no`
Optional. For scripting, this specifies an automatic reply to confirmation prompts:

- `yes`: Allow the command to proceed.
- `no`: Cancel the command.

If this parameter is omitted, you must manually reply to prompts.

`disk-groups`
A comma-separated list of the names or serial numbers of the disk groups to delete. A name that includes a space must be enclosed in double quotes.

Examples

Remove disk groups `dg1` and `dg2`.

```
# remove disk-groups dg1,dg2
```

See also

delete pools

delete vdisks

show disk-groups

show vdisks

remove host-group-members

Description

Removes specified hosts from a host group. You cannot remove all hosts from a group. At least one host must remain. The hosts are ungrouped but not deleted.

This command has a confirmation prompt in interactive console mode.

Minimum role

manage

Syntax

```
remove host-group-members
   hosts hosts
   host-group
```

Parameters

`hosts` *`hosts`*
A comma-separated list of the names of hosts to remove from the host group. A name that includes a space must be enclosed in double quotes.

`host-group`
The name of the host group. A name that includes a space must be enclosed in double quotes.

Examples

Remove two hosts from a group that contains three hosts.

```
# remove host-group-members hosts Host2,Host3 HostGroup1
```

See also

delete host-groups

show host-groups

show initiators

remove host-members

Description

Removes specified initiators from a host. You cannot remove all initiators from a host. At least one initiator must remain. The initiators are ungrouped but not deleted.

Minimum role

manage

Syntax

```
remove host-members
   initiators initiators
   host-name
```

Parameters

`initiators` *initiators*
A comma-separated list of the names of initiators to remove from the host. A name that includes a space must be enclosed in double quotes.

host-name
The name of the host. A name that includes a space must be enclosed in double quotes.

Examples

Remove two initiators from a group that contains three initiators.

```
# remove host-members initiators FC-init2,FC-init3 FC-host11
```

See also

delete hosts

show initiators

remove spares

Description

Removes specified spares. You can remove global spares and dedicated spares (linear storage only) in the same command.

This command cannot be used to remove dedicated spares associated with a quarantined linear disk group (QTUN) that remains after upgrading from a system that supported both virtual and linear storage. Either move the disks to a system that supports linear storage or use the remove disk-groups command to remove the quarantined disk group, which will make its dedicated spares available.

Minimum role

manage

Syntax

```
remove spares
   disks
```

Parameters

disks
The IDs of the spares to remove. For disk syntax, see Command Syntax on page 10.

Examples

Remove dedicated spare 1.21 and global spare 1.22.

```
# remove spares 1.21-22
```

Remove global spare 1.22.

```
# remove spares 1.22
```

See also

add spares

show disks

remove volume-group-members

Description

Removes volumes from a volume group. You cannot remove all volumes from a group. At least one volume must remain. The volumes are ungrouped but not deleted.

NOTE: For virtual storage, you cannot add a volume to a volume group that is in a replication set.

This command has a confirmation prompt in interactive console mode.

Minimum role

manage

Syntax

```
remove volume-group-members
   volumes volume-IDs
   volume-group
```

Parameters

volumes *volume-IDs*
A comma-separated list of the names or serial numbers of volumes to remove from the volume group. A name that includes a space must be enclosed in double quotes.

volume-group
The name of the volume group. A name that includes a space must be enclosed in double quotes.

Examples

Remove volumes `Vol0002` and `Vol0003` from volume group `VolumeGroup1`.

```
# remove volume-group-members volumes Vol0002,Vol0003 VolumeGroup1
```

See also

delete replication-set

delete volume-groups

show volume-groups

show volumes

replicate

Description

Initiates replication of volumes in a replication set.

This command must be run on the replication set's primary system.

The initial replication may take a long time because it copies the allocated pages of the primary volume to the secondary volume. Subsequent replications are generally faster because those replications only copy changes made since the last successful replication.

If a replication fails, the system suspends the replication set. The replication operation will attempt to resume if it has been more than 10 minutes since the replication set was suspended. If the operation has not succeeded after six attempts using the 10-minute interval, it will switch to trying to resume if it has been over an hour since the last attempt and the peer connection is healthy.

Interaction with replication snapshot history:

- If the replication set's `snapshot-history` parameter is set to secondary, a snapshot of the secondary volume will be made on the secondary system, after the replication has completed.
- If the replication set's `snapshot-history` parameter is set to both, a snapshot of the primary volume will be made on the primary system, prior to replicating. This is in addition to a snapshot of the secondary volume that will be made on the secondary system.

Minimum role

`manage`

Syntax

```
replicate
   [last-snapshot]
   [snapshot snapshot-ID]
   replication-set-ID
```

Parameters

`last-snapshot`
Optional. Specifies to replicate the most recent snapshot of the primary volume, instead of the base volume. You cannot specify both this parameter and the snapshot parameter.

`snapshot` *`snapshot-ID`*
Optional. This advanced option enables you to replicate a particular snapshot of the primary volume, instead of the base volume or its most recent snapshot. You can specify the name or serial number of the snapshot to replicate. You cannot specify both this parameter and the `last-snapshot` parameter.

NOTE: This operation can affect the order of replication revisions, making the secondary retention set confusing to understand.

`replication-set-ID`
The name or serial number of the replication set to replicate.

Examples

Replicate the volumes in replication set `RS1`.

```
# replicate RS1
```

Replicate the most recent snapshot of volumes in replication set `RS1`.

```
# replicate last-snapshot RS1
```

Replicate snapshot `RS1V1Snap3` in replication set `RS1`.

```
# replicate snapshot RS1V1Snap3 RS1
```

See also

abort replication

rescan

Description

This command forces rediscovery of disks and chassis in the storage system.

CAUTION: Performing a rescan will temporarily pause all I/O processes.

If both Storage Controllers are online and able to communicate with both expansion modules in each connected chassis, this command rebuilds the internal SAS layout information, reassigns enclosure IDs based on controller A's chassis cabling order, and ensures that the chassis are displayed in the proper order. A manual rescan temporarily pauses all I/O processes, then resumes normal operation. It can take up to two minutes for the enclosure IDs to be corrected.

A manual rescan may be needed after system power-up to display chassis in the proper order. Whenever you replace a drive chassis or controller chassis, perform a manual rescan to force fresh discovery of all drive chassis connected to the controller chassis.

A manual rescan is not needed after inserting or removing non-FDE disks because the controllers automatically detect these changes. When disks are inserted they are detected after a short delay, which allows the disks to spin up.

Minimum role

`manage`

Syntax

`rescan`

Examples

Scan for device changes and re-evaluate enclosure IDs.

```
# rescan
```

reset all-statistics

Description

Resets performance statistics for both controllers. You can specify either to reset all live statistics to zero, or to reset (clear) all historical performance statistics for all disks. If you reset historical statistics, an event will be logged and new data samples will continue to be stored every quarter hour.

Minimum role

`manage`

Syntax

```
reset all-statistics
   [historical]
   [prompt yes|no]
```

Parameters

`historical`
Optional. Specifies to reset historical statistics instead of live statistics. If this parameter is omitted, the command will reset live statistics instead of historical statistics.

`prompt yes|no`
Optional. For scripting, this specifies an automatic reply to the confirmation prompt that will appear if the historical parameter is specified:

- `yes`: Allow the command to proceed.
- `no`: Cancel the command.

If the `historical` parameter is specified and the prompt parameter is omitted, you must manually reply to the prompt. If the `historical` parameter is omitted, the prompt parameter has no effect. There is no confirmation prompt for live statistics.

Examples

Reset all live statistics for both controllers.

```
# reset all-statistics
```

Reset all historical disk-performance statistics for both controllers.

```
# reset all-statistics historical
```

See also

reset controller-statistics

reset disk-error-statistics

reset disk-group-statistics

reset disk-statistics

reset host-port-statistics

reset pool-statistics

reset vdisk-statistics

reset volume-statistics

show controller-statistics

reset controller-statistics

Description

Resets performance statistics for controllers.

This command resets all controller statistics except Power On Time and Total Power On Hours.

Minimum role

manage

Syntax

```
reset controller-statistics
   [a|b|both]
```

Parameters

a|b|both
Optional. Specifies whether to reset statistics for controller A, B, or both. If this parameter is omitted, statistics are reset for both controllers.

Examples

Reset statistics for both controllers.

```
# reset controller-statistics
```

See also

reset controller-statistics

reset disk-error-statistics

reset disk-group-statistics

reset disk-statistics

reset host-port-statistics

reset pool-statistics

reset vdisk-statistics

reset volume-statistics

show controller-statistics

reset disk-error-statistics

Description

Resets error statistics for all or specified disks. Statistics that are reset include:

- Number of SMART events recorded
- Number of I/O timeouts accessing the disk
- Number of times the disk did not respond
- Number of attempts by the controllers to spin up the disk
- Number of media errors (errors generated by the disk as specified by its manufacturer)
- Number of non-media errors (errors generated by the controllers or by the disk and not categorized as media errors)
- Number of block reassignments
- Number of bad blocks found

To reset other disk statistics, use the reset disk-statistics command.

Minimum role

`manage`

Syntax

```
reset disk-error-statistics
   [disks]
```

Parameters

`disks`
Optional. The IDs of the disks for which to reset statistics. For disk syntax, see Command Syntax on page 10. If this parameter is omitted, statistics are reset for all disks.

Examples

Reset error statistics for disks `1.1` and `2.1`.

```
# reset disk-error-statistics 1.1,2.1
```

See also

reset all-statistics

reset controller-statistics

reset disk-group-statistics

reset disk-statistics

reset host-port-statistics

reset pool-statistics

reset vdisk-statistics

reset volume-statistics

show disk-statistics

show disks

reset disk-group-statistics

Description

Clears resettable performance statistics for specified disk groups, and resets timestamps for those statistics. This command behaves the same as the reset vdisk-statistics command.

Minimum role

`manage`

Syntax

```
reset disk-group-statistics
   disk-groups
```

Parameters

`disk-groups`
Optional. A comma-separated list of the names or serial numbers of the disk groups for which to reset statistics. A name that includes a space must be enclosed in double quotes. If this parameter is omitted, statistics are reset for all disk groups.

Examples

Reset statistics for disk group `dg1`.

```
# reset disk-group-statistics dg1
```

See also

reset all-statistics

reset controller-statistics

reset disk-error-statistics

reset disk-statistics

reset host-port-statistics

reset pool-statistics

reset vdisk-statistics

reset volume-statistics

show disk-group-statistics

show disk-groups

reset disk-statistics

Description

Resets performance statistics for disks.

This command resets basic disk statistics but not disk error statistics. To reset these, use the reset disk-error-statistics command.

Lifetime statistics are not resettable.

Minimum role

`manage`

Syntax

```
reset disk-statistics
```

Examples

Reset statistics for all disks.

```
# reset disk-statistics
```

See also

reset all-statistics

reset controller-statistics

reset disk-error-statistics

reset disk-group-statistics

reset host-port-statistics

reset pool-statistics

reset vdisk-statistics

reset volume-statistics

show disk-statistics

reset host-link

Description

Resets specified controller host ports (channels).

CAUTION: Resetting host links may cause lost connection to hosts.

For FC, you can reset a single port. For an FC host port configured to use FC-AL (loop) topology, a reset issues a loop initialization primitive (LIP).

For iSCSI, you can reset a port pair (either the first and second ports or the third and fourth ports).

For SAS, you can reset a port pair (either the first and second ports or the third and fourth ports). Resetting a host port issues a `COMINIT/COMRESET` sequence and might reset other ports.

This command has a confirmation prompt in interactive console mode.

Minimum role

`manage`

Syntax

```
reset host-link
   ports ports
```

Parameters

`ports` *ports*
A controller host port ID, a comma-separated list of IDs, a hyphenated range of IDs, or a combination of these. A port ID is a controller ID and port number, and is not case sensitive. Do not mix controller IDs in a range.

Examples

Reset the host link on port `A1`.

```
# reset host-link ports A1
```

See also

show ports

reset host-port-statistics

Description

Resets performance statistics for controller host ports.

Minimum role

`manage`

Syntax

```
reset host-port-statistics
[ports ports]
```

Parameters

`ports` *ports*
Optional. The controller ID and port number of ports for which to reset statistics. For port syntax, see Command Syntax on page 10. If this parameter is omitted, statistics are reset for all controller host ports.

Examples

Reset statistics for all controller host ports.

```
# reset host-port-statistics
```

See also

reset all-statistics

reset controller-statistics

reset disk-error-statistics

reset disk-group-statistics

reset disk-statistics

reset pool-statistics

reset vdisk-statistics

reset volume-statistics

show host-port-statistics

show ports

reset pool-statistics

Description

Clears resettable performance statistics for virtual pools, and resets timestamps for those statistics.

Minimum role

`manage`

Syntax

```
reset pool-statistics
[pool]
```

Parameters

pool
Optional. The name or serial number of the virtual pool for which to reset statistics. A name that includes a space must be enclosed in double quotes. If this parameter is omitted, statistics are reset for both pools A and B.

Examples

Reset statistics for pool `A`.

```
# reset pool-statistics A
```

See also

reset all-statistics

reset controller-statistics

reset disk-error-statistics

reset disk-group-statistics

reset disk-statistics

reset host-port-statistics

reset pool-statistics

reset vdisk-statistics

reset volume-statistics

show pool-statistics

show pools

reset smis-configuration

Description

Resets the SMI-S configuration files.

NOTE: This command is for use by or with direction from a service technician.

This command will reset the configuration of the SMI-S service to default settings. After running this command, any hosts registered via SMI-S will need to be registered again.

Messages are displayed when the SMI-S configuration is reset and SMI-S is restarted.

Minimum role

`manage`

Syntax

```
reset smis-configuration
   [a|b|both]
   [prompt yes|no]
   [noprompt]
```

Parameters

`a|b|both`
Optional. The controller module containing the controller to restart. If this parameter is omitted, the command affects the controller being accessed.

`prompt yes|no`
Optional. For scripting, this specifies an automatic reply to confirmation prompts:

- `yes`: Allow the command to proceed.
- `no`: Cancel the command.

If this parameter is omitted, you must reply to prompts.

`noprompt`
Optional. Suppresses confirmation prompts. Specifying this parameter allows the command to proceed without user interaction.

Output

Messages are displayed when the SMI-S configuration is reset and SMI-S is restarted.

Examples

Reset the SMI-S configuration on controller A, to which you are logged in.

```
# reset smis-configuration a
```

From controller A, reset the SMI-S configuration on controller B.

```
# reset smis-configuration b
```

Reset the SMI-S configuration on both Storage Controllers.

```
# reset smis-configuration both
```

See also

restore defaults

reset snapshot

Description

Replaces the data in a standard snapshot with the current data from its parent volume. The snapshot's volume characteristics are not changed.

Any snapshot in a snapshot tree can be reset, but the data source can only be the snapshot's immediate parent. For example, in the following snapshot tree:

```
Vol1
|- Vol1Snap
   |- Vol1SnapSnap
```

you can reset `Vol1Snap` to `Vol1`, or reset `Vol1SnapSnap` to `Vol1Snap`.

The command will prompt you to unmount the snapshot from all hosts before starting the reset operation to avoid data loss.

CAUTION: All data represented by the snapshot as it exists prior to issuing this command will be lost.

Minimum role

`manage`

Syntax

```
reset snapshot
   [prompt yes|no]
   snapshot
```

Parameters

`prompt yes|no`
Optional. For scripting, this specifies an automatic reply to confirmation prompts:

- `yes`: Allow the command to proceed.
- `no`: Cancel the command.

If this parameter is omitted, you must manually reply to prompts.

`snapshot`
The name or serial number of the snapshot to reset. A name that includes a space must be enclosed in double quotes.

Examples

Reset snapshot `Vol1Snap`.

```
# reset snapshot Vol1Snap
```

See also

show snapshots

reset vdisk-statistics

Description

Resets performance statistics for all or specified linear disk groups. This command applies to linear storage only.

Minimum role

`manage`

Syntax

```
reset vdisk-statistics
   [vdisks]
```

Parameters

`vdisks`
Optional. A comma-separated list of the names or serial numbers of the linear disk groups for which to reset statistics. A name that includes a space must be enclosed in double quotes. If this parameter is omitted, statistics are reset for all linear disk groups.

Examples

Reset statistics for linear disk groups `VD1` and `MyVdisk`.

```
# reset vdisk-statistics VD1,MyVdisk
```

See also

reset all-statistics

reset controller-statistics

reset disk-error-statistics

reset disk-group-statistics

reset disk-statistics

reset host-port-statistics

reset pool-statistics

reset volume-statistics

show vdisk-statistics

show vdisks

reset volume-statistics

Description

Resets performance statistics for all or specified volumes.

Minimum role

`manage`

Syntax

```
reset volume-statistics
   [volumes]
```

Parameters

volumes
Optional. A comma-separated list of the names or serial numbers of the volumes for which to reset statistics. A name that includes a space must be enclosed in double quotes. If this parameter is omitted, statistics are reset for all volumes.

Examples

Reset statistics for volume `vd1_v0001`.

```
# reset volume-statistics vd1_v0001
```

See also

reset all-statistics

reset controller-statistics

reset disk-error-statistics

reset disk-group-statistics

reset disk-statistics

reset host-port-statistics

reset pool-statistics

reset vdisk-statistics

show volume-statistics

show volumes

restart mc

Description

Restarts the Management Controller in a controller module.

When you restart a Management Controller, communication with it is lost until it successfully restarts. If the restart fails, the partner Management Controller remains active with full ownership of operations and configuration information.

Minimum role

manage

Syntax

```
restart mc
   [a|b|both]
   [noprompt]
```

Parameters

a|b|both
Optional. The controller module containing the controller to restart. If this parameter is omitted, the command affects the controller being accessed.

noprompt
Optional. Suppresses confirmation prompts. Specifying this parameter allows the command to proceed without user interaction.

Output

Messages are displayed when the controller shut down, when failover is initiated, and when the controller has restarted.

Examples

Restart the Management Controller in controller A, to which you are logged in.

```
# restart mc a
```

See also

restart sc

shutdown

restart sc

Description

Restarts the Storage Controller in a controller module.

When you restart a Storage Controller, it attempts to shut down with a proper failover sequence, which includes stopping all I/O operations and flushing the write cache to disk, and then the Storage Controller restarts. Restarting a Storage Controller restarts the corresponding Management Controller.

CAUTION: Depending on the mapping configuration, restarting one Storage Controller may cause loss of access to data.

CAUTION: If you restart both Storage Controllers, all hosts will lose access to the system and its data until the restart is complete. Additionally, both Management Controllers will be restarted and all users¡¦ sessions will need to be restarted.

NOTE: When a Storage Controller is restarted, live performance statistics that it recorded will be reset. Historical performance statistics are not affected. In a dual-controller system, disk statistics may be reduced but will not be reset to zero, because disk statistics are summed between the two controllers. For more information, see help for commands that show statistics.

Minimum role

`manage`

Syntax

```
restart sc
   [a|b|both]
   [noprompt]
```

Parameters

`a|b|both`
Optional. The controller module containing the controller to restart. If this parameter is omitted, the command affects the controller being accessed.

`noprompt`
Optional. Suppresses confirmation prompts. Specifying this parameter allows the command to proceed without user interaction.

Output

Messages are displayed when the controller shut down, when failover is initiated, and when the controller has restarted.

Examples

From controller A, restart the Storage Controller in controller B.

```
# restart sc b
```

Restart both Storage Controllers.

```
# restart sc both
```

restart sc

See also

restart mc

shutdown

restore defaults

Description

Restores the default configuration to the controllers.

NOTE: This command is for use by or with direction from a service technician.

For details about which settings are restored see "Settings changed by restore defaults" (page 842).

CAUTION: This command will restore default settings to the controllers and then restart each Management Controller. Changes to host interface settings may cause loss of data availability and require some reconfiguration to restore host access to volumes. Changes to network-port IP addresses may cause loss of access to management interfaces.

Minimum role

`manage`

Syntax

```
restore defaults
   [noprompt]
   [prompt yes|no]
```

Parameters

`noprompt`
Optional. Suppresses confirmation prompts. Specifying this parameter allows the command to proceed without user interaction.

`prompt yes|no`
Optional. For scripting, this specifies an automatic reply to confirmation prompts:

- `yes`: Allow the command to proceed.
- `no`: Cancel the command.

If this parameter is omitted, you must manually reply to prompts.

Examples

Restore the controllers' default configuration.

```
# restore defaults
```

See also

reset smis-configuration

restart mc

restart sc

resume replication-set

Description

Resumes the replication operations for the specified replication set.

You can run this command on the primary system.

When a replication set is suspended, all replications in progress are paused and no new replications are allowed to start. When you run this command to resume replications, all paused replications are resumed and new replications are allowed to occur. If you aborted a replication while the replication set was suspended, the aborted replication does not resume.

Minimum role

manage

Syntax

```
resume replication-set
   replication-set-ID
```

Parameters

replication-set-ID
The name or serial number of the replication set for which to suspend replication.

Examples

Resume replications in replication set RS1.

```
# resume replication-set RS1
```

See also

create replication-set

delete replication-set

set replication-set

show replication-sets

suspend replication-set

rollback volume

Description

Replaces the data in a parent volume with the data from one of its snapshots. This reverts the volume data to its state at an earlier point in time. The volume's characteristics are not changed.

Any parent volume in a snapshot tree can be rolled back, but the data source must be a direct child snapshot. For example, in the following snapshot tree:

```
Vol1
|- Vol1Snap
   |- Vol1SnapSnap
```

you can roll back `Vol1` from `Vol1Snap`, or roll back `Vol1Snap` from `Vol1SnapSnap`.

The command will prompt you to unmount the volume and the snapshot from all initiators before starting the rollback operation to avoid data loss.

CAUTION: All data that differs between the parent volume and the snapshot will be lost. Create a snapshot of the parent volume as it currently exists before performing a rollback.

NOTE: For virtual storage, you cannot exclude modified write data in a snapshot from being used in a rollback. If you will want to do that, plan ahead and take a snapshot of the original snapshot before writing to it. Make the child snapshot read-only and use it for the rollback.

Minimum role

`manage`

Syntax

```
rollback volume
   [prompt yes|no]
   snapshot snapshot
   volume
```

Parameters

`prompt yes|no`
Optional. For scripting, this specifies an automatic reply to confirmation prompts:

- `yes`: Allow the command to proceed.
- `no`: Cancel the command.

If this parameter is omitted, you must reply to prompts.

`snapshot` *snapshot*
The name or serial number of the snapshot containing the data to roll back to. A name that includes a space must be enclosed in double quotes.

volume
The name or serial number of the volume to roll back. A name that includes a space must be enclosed in double quotes.

Examples

Roll back volume `Vol1` from snapshot `Vol1Snap`.

```
# rollback volume snapshot Vol1Snap Vol1
```

See also

show snapshots

show volumes

scrub disk-groups

Description

Analyzes specified disk groups to find and fix errors.

For linear storage, this command acts on disks in a disk group but not dedicated spares or leftover disks. This command will fix parity mismatches for RAID 3, 5, 6, 50, and ADAPT; find mirror mismatches for RAID 1 and 10; and fix media errors for all RAID levels.

For virtual storage, this command acts on disks in a disk group but not leftover disks. This command will fix parity mismatches for RAID 5, 6, and ADAPT, and find but not fix mirror mismatches for RAID 1 and 10.

Disk-group scrub can last over an hour, depending on disk-group size, utility priority, and amount of I/O activity. However, a manual scrub performed with this command is typically faster than a background scrub enabled with the set advanced-settings command. You can use a disk group while it is being scrubbed. To check the progress of a disk-group scrub (DRSC) job, use the `show disk-groups` command.

When a disk-group scrub job starts, event 206 is logged. When a scrub job ends, event 207 is logged and specifies whether errors were found and whether user action is required.

Minimum role

`manage`

Syntax

```
scrub disk-groups
   disk-groups
```

Parameters

disk-groups
A comma-separated list of the names or serial numbers of the disk groups to scrub. A name that includes a space must be enclosed in double quotes.

Examples

Start scrubbing disk group `dg1`.

```
# scrub disk-groups dg1
```

See also

abort scrub (with the `disk-group` parameter)

set advanced-settings

show disk-groups

scrub vdisk

Description

Analyzes specified linear disk groups to find and fix disk errors. This command applies to linear storage only.

This command acts on disks in a linear disk group but not dedicated spares or leftover disks. This command will fix parity mismatches for RAID 3, 5, 6, and 50; find mirror mismatches for RAID 1 and 10; and fix media errors for all RAID levels.

Linear disk-group scrub can last over an hour, depending on disk-group size, utility priority, and amount of I/O activity. However, a "foreground" scrub performed with this command is typically faster than a background scrub enabled with the set advanced-settings command. You can use a disk group while it is being scrubbed. To check the progress of a linear disk-group scrub (VRSC) job, use the show vdisks command.

When a disk-group scrub job starts, event 206 is logged. When the scrub job ends, event 207 is logged and specifies whether errors were found and whether user action is required.

Minimum role

`manage`

Syntax

```
scrub vdisk
   vdisks
```

Parameters

`vdisks`
A comma-separated list of the names or serial numbers of the linear disk groups to scrub. A name that includes a space must be enclosed in double quotes.

Examples

Start scrubbing linear disk group `vd1`.

```
# scrub vdisk vd1
```

See also

abort scrub (with the `vdisk` parameter)

set advanced-settings

show vdisks

scrub volume

Description

Analyzes specified volumes to find and fix disk errors. This command applies to linear storage only.

This command acts on the disk portions spanned by each volume, but it does not act on dedicated spares or leftover disks. This command will fix parity mismatches for RAID 3, 5, 6, and 50; find mirror mismatches for RAID 1 and 10; and fix media errors for all RAID levels.

Volume scrub can last over an hour, depending on volume size, utility priority, and amount of I/O activity. You can use a volume while it is being scrubbed. To check the progress of a volume scrub job, use the show volumes command.

NOTE: Only one scrub operation can be running on a linear disk group at a time. If a manual scrub is started while a background scrub is in progress, the background scrub will terminate and will start over 24 hours after the manual scrub completes.

When a scrub is complete, event 207 is logged and specifies whether errors were found and whether user action is required.

Minimum role

`manage`

Syntax

```
scrub volume
   volumes
```

Parameters

`volumes`
The names or serial numbers of the volumes to scrub. A name that includes a space must be enclosed in double quotes.

Examples

Start scrubbing volume `vol1`.

```
# scrub volume vol1
```

See also

abort scrub (with the `volume` parameter)

set advanced-settings

show volumes

set advanced-settings

Description

Sets advanced system configuration parameters.

Minimum role

`manage`

Syntax

```
set advanced-settings
   [auto-stall-recovery enabled|disabled|on|off]
   [auto-write-back enabled|disabled|on|off]
   [background-disk-scrub enabled|disabled|on|off]
   [background-scrub enabled|disabled|on|off]
   [background-scrub-interval interval]
   [compact-flash-failure enabled|disabled|on|off]
   [controller-failure enabled|disabled|on|off]
   [dynamic-spares enabled|disabled|on|off]
   [emp-poll-rate rate]
   [fan-failure enabled|disabled|on|off]
   [host-cache-control enabled|disabled|on|off]
   [independent-cache enabled|disabled|on|off]
   [large-pools enabled|disabled|on|off]
   [managed-logs enabled|disabled|on|off]
   [missing-lun-response notready|illegal]
   [partner-firmware-upgrade enabled|disabled|on|off]
   [partner-notify enabled|disabled|on|off]
   [power-supply-failure enabled|disabled|on|off]
   [restart-on-capi-fail enabled|disabled|on|off]
   [single-controller]
   [smart enabled|disabled|on|off|detect-only]
   [spin-down enabled|disabled|on|off]
   [spin-down-delay delay]
   [super-cap-failure enabled|disabled|on|off]
   [sync-cache-mode immediate|flush]
   [temperature-exceeded enabled|disabled|on|off]
   [utility-priority low|medium|high]
```

Parameters

`auto-stall-recovery enabled|disabled|on|off`
Optional. Detects situations where a controller stall is preventing I/O operations from completing, and recovers the system so that at least one controller is operational, thus avoiding data-unavailability situations. This feature focuses on failover/recovery stalls. When a stall is detected, event 531 is logged.

- `disabled` or `off`: Auto stall recovery is disabled. The system will constantly perform auto stall detection in the background but will not automatically perform recovery actions.
- `enabled` or `on`: Auto stall recovery is enabled. The system will constantly perform auto stall detection in the background and automatically perform recovery actions. This is the default.

`auto-write-back enabled|disabled|on|off`
Optional. Sets whether the cache mode will change from write-through to write-back when the trigger condition is cleared.

- `disabled` or `off`: Auto-write-back is disabled.
- `enabled` or `on`: Auto-write-back is enabled. This is the default.

`background-disk-scrub enabled|disabled|on|off`
Optional. Sets whether disks that are not in disk groups are automatically checked for disk defects to ensure system health. The interval between background disk scrub finishing and starting again is 72 hours. The first time you enable this parameter, background disk scrub will start with minimal delay. If you disable and then re-enable this parameter, background disk scrub will start 72 hours after the last background disk scrub completed.

- `disabled` or `off`: Background disk scrub is disabled. This is the default.
- `enabled` or `on`: Background disk scrub is enabled.

`background-scrub enabled|disabled|on|off`
Optional. Sets whether disks in disk groups are automatically checked for disk defects to ensure system health. The interval between background disk-group scrub finishing and starting again is specified by the `background-scrub-interval` parameter.

- `disabled` or `off`: Background disk-group scrub is disabled. This is the default.
- `enabled` or `on`: Background disk-group scrub is enabled.

`background-scrub-interval` *`interval`*
Optional. Sets the interval in hours between background disk-group scrub finishing and starting again, from 0 to 360 hours. The default is 24 hours.

`compact-flash-failure enabled|disabled|on|off`
Optional. Sets whether the cache policy will change from write-back to write-through when CompactFlash memory is not detected during POST (Power-On Self-Test), fails during POST, or fails during controller operation.

- `disabled` or `off`: The CompactFlash failure trigger is disabled.
- `enabled` or `on`: The CompactFlash failure trigger is enabled. This is the default.

`controller-failure enabled|disabled|on|off`
Optional. Sets whether the cache policy will change from write-back to write-through when a controller fails.

- `disabled` or `off`: The controller failure trigger is disabled. This is the default.
- `enabled` or `on`: The controller failure trigger is enabled.

`dynamic-spares enabled|disabled|on|off`
Optional. Enables or disables the dynamic spares feature. This feature lets you use all of your disks in fault-tolerant disk groups without designating a disk as a spare. With dynamic spares enabled, if a disk fails and you replace it with a compatible disk, the storage system rescans the bus, finds the new

disk, automatically designates it a spare, and starts reconstructing the disk group. A compatible disk has enough capacity to replace the failed disk and is the same type. If a spare or available compatible disk is already present, the dynamic spares feature uses that disk to start the reconstruction and the replacement disk can be used for another purpose.

- `disabled` or `off`: The dynamic spares feature is disabled. This is the default.
- `enabled` or `on`: The dynamic spares feature is enabled.

`emp-poll-rate` *`rate`*
Optional. Sets the interval at which the storage system will poll each chassis's Enclosure Management Processor (EMP) for status changes, from 5 to 3600 seconds. Typically you can use the default, 5 seconds.

- Increasing the interval might slightly improve processing efficiency, but changes in device status are communicated less frequently. For example, this increases the amount of time before LEDs are updated to reflect status changes.
- Decreasing the interval slightly decreases processing efficiency, but changes in device status are communicated more frequently. For example, this decreases the amount of time before LEDs are updated to reflect status changes.

`fan-failure enabled|disabled|on|off`
Optional. Sets whether the cache policy will change from write-back to write-through when a fan fails.

- `disabled` or `off`: The fan failure trigger is disabled. This is the default.
- `enabled` or `on`: The fan failure trigger is enabled.

`host-cache-control enabled|disabled|on|off`
Optional. Sets whether hosts are allowed to use the SCSI `MODE SELECT` command to change the storage system's write-back cache setting.

- `disabled` or `off`: Host control of caching is disabled. This is the default.
- `enabled` or `on`: Host control of caching is enabled.

`independent-cache enabled|disabled|on|off`
Optional. Sets the cache redundancy mode for a dual-controller storage system. For the change to take effect, you must restart both Storage Controllers. You cannot enable this parameter if the `partner-firmware-update` parameter or the `single-controller` parameter is enabled.

- `disabled` or `off`: Controller failover is enabled and data in a controller's write-back cache is mirrored to the partner controller. This is the default.
- `enabled` or `on`: The controllers use Independent Cache Performance Mode, in which controller failover is disabled and data in a controller's write-back cache is not mirrored to the partner controller. This improves write performance at the risk of losing unwritten data if a controller failure occurs while there is data in controller cache.

`large-pools enabled|disabled|on|off`
Optional. Enables or disables the capability to create a virtual pool larger than 512 TiB on each controller by limiting the number of user-defined snapshots that can be created in snapshot trees.

- `enabled` or `on`: The maximum size for a virtual pool will be 1024 TiB (1 PiB). The maximum number of volumes per snapshot tree will be 9 (base volume plus 8 snapshots). You can enable this setting only if no snapshot tree has more than 15 volumes.
- `disabled` or `off`: The maximum size for a virtual pool will be 512 TiB. The maximum number of volumes per snapshot tree will be 255 (base volume plus 254 snapshots). This is the default. You can disable this setting only if each pool is less than 512 TiB.

Changing the `large-pools` setting will automatically restart both controllers, during which time data will be unavailable.

`managed-logs enabled|disabled|on|off`
Optional. Enables or disables the managed logs feature, which allows log files to be transferred from the storage system to a log collection system to avoid losing diagnostic data.

- `disabled` or `off`: The managed logs feature is disabled. This is the default.
- `enabled` or `on`: The managed logs feature is enabled.

`missing-lun-response notready|illegal`
Optional. Some operating systems do not look beyond LUN 0 if they do not find a LUN 0 or cannot handle noncontiguous LUNs. This parameter handles these situations by enabling the host drivers to continue probing for LUNs until they reach the LUN to which they have access. This parameter controls the SCSI sense data returned for volumes that are not accessible because they don't exist or have been hidden through volume mapping (this does not apply to volumes of offline disk groups). Use the default option, `notready`, unless the system is used in a VMware environment or a service technician asks you to change it to work around a problem.

- `notready`: Sends a reply that there is a LUN where a gap has been created but that it's "not ready." Sense data returned is sensekey = 2, code = 4, qualifier = 3. This option is the default.
- `illegal`: Sends a reply that there is a LUN but that the request is "illegal." Sense data returned is sensekey = 5, code = 25h, qualifier = 0. If the system is used in a VMware environment, use this option.

`partner-firmware-upgrade enabled|disabled|on|off`
Optional. Sets whether component firmware versions are monitored and will be automatically updated on the partner controller. You cannot enable this parameter if the `independent-cache` parameter is enabled.

- `disabled` or `off`: Partner firmware upgrade is disabled.
- `enabled` or `on`: Partner firmware upgrade is enabled. This is the default.

`partner-notify enabled|disabled|on|off`
Optional. Sets whether to notify the partner controller that a trigger condition occurred. Enable this option to have the partner also change to write-through mode for better data protection. Disable this option to allow the partner continue using its current caching mode for better performance. The default is `disabled`.

- `disabled` or `off`: Notification is disabled. This is the default.
- `enabled` or `on`: Notification is enabled.

`power-supply-failure enabled|disabled|on|off`
Optional. Sets whether the cache policy automatically changes to write-through when a power supply fails.

- `disabled` or `off`: The power-supply failure trigger is disabled. This is the default.
- `enabled` or `on`: The power-supply failure trigger is enabled.

`restart-on-capi-fail enabled|disabled|on|off`
Optional. Sets whether a Storage Controller that experiences a CAPI hang will be forced to restart. This is disabled by default. A CAPI hang is perceived as a management-interface hang. As part of the restart process, a dump file is created and event 107 is logged. To provide the dump file to technical support for debugging, use the Save Logs action in the Disk Management Utility.

`single-controller`
For use by a service technician only.

Optional. For a system that had two controller modules but now has only one and is intended to be used as a single-controller system, this parameter changes the operating/redundancy mode to Single Controller. This prevents the system from reporting the absent partner controller as an error condition. This parameter does not affect any other system settings. Installing a second, functional controller module will change the mode to Active-Active ULP. You cannot enable this parameter if the `independent-cache` parameter is enabled.

`smart enabled|disabled|on|off|detect-only`
Optional. Enables or disables SMART (Self-Monitoring Analysis and Reporting Technology) monitoring for all disks in the storage system. When SMART is enabled, the system checks for SMART events one minute after a restart and every five minutes thereafter. SMART events are recorded in the event log.

- `disabled` or `off`: Disables SMART for all disks in the system and for all disks added to the system.
- `enabled` or `on`: Enables SMART for all disks in the system and for all disks added to the system. This is the default.
- `detect-only`: Detects but does not change the SMART setting of each disk in the system, and for each new disk added to the system.

`spin-down enabled|disabled|on|off`
Optional. Sets whether spinning disks that are available or are global spares will spin down after a period of inactivity shown by the `spin-down-delay` parameter.

- `disabled` or `off`: Drive spin down for available disks and global spares is disabled. This is the default. Disabling spin down will set the spin-down delay to 0.
- `enabled` or `on`: Drive spin down for available disks and global spares is enabled. If the `spin-down-delay` parameter is not specified, the delay will be set to 60 minutes.

NOTE: Drive spin down is not applicable to ADAPT disk groups or virtual pools.

`spin-down-delay` *`delay`*
Optional. Sets the period of inactivity after which spinning disks that are available or are global spares will spin down. Setting the delay to 1–360 minutes will enable spin down. Setting the delay to 0 will disable spin down. The default is 15 minutes.

NOTE: Drive spin down is not applicable to ADAPT disk groups or virtual pools.

`super-cap-failure enabled|disabled|on|off`
Optional. Sets whether the cache policy will change from write-back to write-through when the supercapacitor that provides backup power for cache is not fully charged or fails.

- `disabled` or `off`: The supercapacitor failure trigger is disabled.
- `enabled` or `on`: The supercapacitor failure trigger is enabled. This is the default.

`sync-cache-mode immediate|flush`
Optional. Sets how the SCSI `SYNCHRONIZE CACHE` command is handled.

- `immediate`: Good status is returned immediately and cache content is unchanged. This option is the default.
- `flush`: Good status is returned only after all write-back data for the specified volume is flushed to disk.

`temperature-exceeded enabled|disabled|on|off`
Optional. Sets whether the system will shut down a controller when its temperature exceeds the critical operating range.

- `disabled` or `off`: The over-temperature trigger is disabled. This is the default.
- `enabled` or `on`: The over-temperature trigger is enabled.

`utility-priority low|medium|high`
Optional. Sets the priority at which data-redundancy utilities, such as disk-group verify and reconstruct, run with respect to I/O operations competing for the system's processors. (This does not affect disk-group background scrub, which always runs at “background” priority.)

- `high`: Utilities have higher priority than host I/O. Use when your highest priority is to return the system to a fully fault-tolerant state. This can cause heavy I/O to be slower than normal. This is the default.
- `medium`: Utility performance is balanced with host I/O performance.
- `low`: Utilities run at a slower rate with minimal effect on host I/O. Use when streaming data without interruption, such as for a web server, is more important than data redundancy.

Examples

Enable partner firmware upgrade.

```
# set advanced-settings partner-firmware-upgrade enabled
```

Enable managed logs.

```
# set advanced-settings managed-logs enabled
```

Disable auto stall recovery.

```
# set advanced-settings auto-stall-recovery disabled
```

See also

add spares

remove spares

scrub disk-groups

scrub vdisk

show advanced-settings

set chap-record

Description

Changes an iSCSI originator's CHAP record.

You can change the record's secret, mutual name, and mutual secret values. This command is permitted whether or not CHAP is enabled.

For a login request from an initiator to a storage system, the initiator is the originator and the storage system is the recipient. Because CHAP works during login, to make CHAP changes take effect you must reset any active iSCSI host links.

NOTE: For information about setting up CHAP for use in a peer connection, see the topic about creating a peer connection in Disk Management Utility documentation.

Minimum role

`manage`

Syntax

```
set chap-record
   name originator-name
   [secret originator-secret]
   [mutual-name recipient-name mutual-secret recipient-secret]
```

Parameters

`name` *originator-name*
The originator name, typically in IQN format.

`secret` *originator-secret*
The secret that the recipient uses to authenticate the originator. The secret is case sensitive and can include 12–16 bytes. The value can include spaces and printable UTF-8 characters except: " <

`mutual-name` *recipient-name*
Optional; for mutual CHAP only. The recipient name, typically in IQN format. The name is case sensitive and can have a maximum of 223 bytes, including 0–9, lowercase a–z, hyphen, colon, and period. To determine a storage system's IQN, use the show ports command to view the `Target ID` value for an iSCSI port. This parameter and `mutual-secret` must be set together.

`mutual-secret` *recipient-secret*
Optional; for mutual CHAP only. The secret that the originator uses to authenticate the recipient. The secret is case sensitive, can include 12–16 bytes, and must differ from the originator secret. The value can include spaces and printable UTF-8 characters except: " <

A storage system's secret is shared by both controllers. This parameter and `mutual-name` must be set together.

Examples

For mutual CHAP, add a recipient name and secret to a CHAP record.

```
# set chap-record name iqn.1991-05.com.microsoft:myhost.domain secret
123456abcDEF mutual-name iqn.1995-03.com.acme:01.storage.00c0ffd6000a
mutual-secret ABCdef123456(2012-01-21 11:54:33)
```

See also

create chap-record

delete chap-records

show chap-records

show iscsi-parameters

show ports

set cli-parameters

Description

Sets options that control CLI behavior. If you are accessing the CLI through the network port, settings apply to the current CLI session only. If you are accessing the CLI through the chassis's CLI port, settings persist across sessions.

The base, locale, precision, temperature scale, timeout, and units settings are read from the user's account, and can be overridden by using this command.

Minimum role

`manage`

Syntax

```
set cli-parameters
   [base 2|10]
   [console|api|api-embed|ipa|json|wbi]
   [brief enabled|disabled|on|off]
   [locale
   English|en|Spanish|es|French|fr|German|de|Italian|it|Japanese|ja|Kore
   an|ko
   |Dutch|nl|Chinese-simplified|zh-s|Chinese-traditional|zh-t]
   [management-mode v2|v3|linear|virtual]
   [pager enabled|disabled|on|off]
   [precision #]
   [storage-size-base 2|10]
   [storage-size-precision #]
   [storage-size-units auto|MB|GB|TB]
   [temperature-scale celsius|c|fahrenheit|f]
   [timeout #]
   [units auto|MB|GB|TB]
```

Parameters

`base 2|10`
Optional. Sets the base for entry and display of storage-space sizes:

- `2`: Sizes are shown as powers of 2, using 1024 as a divisor for each magnitude. In base 2 when you set a size, whether you specify a base-2 or base-10 size unit, the resulting size will be in base 2.
- `10`: Sizes are shown as powers of 10, using 1000 as a divisor for each magnitude. This is the default. In base 10 when you set a size, the resulting size will be in the specified size unit. This option is the default.

Operating systems usually show volume size in base 2. Disk drives usually show size in base 10. Memory (RAM and ROM) size is always shown in base 2.

`console|api|api-embed|ipa|json|wbi`
Optional. Sets the output format:

- `console`: Supports interactive use of the CLI by displaying command output in easily readable format. This format automatically sizes fields according to content and adjusts content to window resizes. This is the default.
- `api`: Supports scripting by displaying command output in XML. All objects are displayed at the same level, related by COMP elements.
- `api-embed`: Alternate form of XML output which displays "child" objects embedded (indented) under "parent" objects. Enabling this option enables the brief parameter.
- `ipa`: Alternate form of XML output which displays as `api-embed` format with `brief` mode enabled.
- `json`: Standard JavaScript Object Notation (JSON) output.
- `wbi`: A JSON-like format used internally by the Disk Management Utility.

`brief enabled|disabled|on|off`
Optional.

- `enabled` or `on`: In XML output, this setting shows a subset of attributes of object properties. The name and type attributes are always shown.
- `disabled` or `off`: In XML output, this setting shows all attributes of object properties. This is the default.

`locale English|en|Spanish|es|French|fr|German|de|Italian|it|Japanese|ja|Korean|ko|Dutch|nl|Chinese-simplified|zh-s|Chinese-traditional|zh-t`
Optional. The display language. The default is English.

`management-mode v2|v3|linear|virtual`
Optional. Sets the management mode for the current CLI session only.

- `v2` or `linear`: Uses linear-storage terminology in command output and system messages. For example, vdisk for disk groups and pools.
- `v3` or `virtual`: Uses terminology in command output and system messages that is generalized for managing virtual and linear storage. For example, disk group for disk groups and pool for pools.

To change the default management mode for the system, use the set protocols command.

`pager enabled|on|disabled|off`
Optional.

- `enabled` or `on`: Halts output after each full screen to wait for keyboard input. This is the default.
- `disabled` or `off`: Output is not halted. When displaying output in API format, which is intended for scripting, disable paging.

`precision #`
Optional. Sets the number of decimal places (1–10) for display of storage-space sizes. The default is 1.

`storage-size-base 2|10`
Optional. Alias for `base`.

`storage-size-precision #`
Optional. Alias for `precision`.

`storage-size-units auto|MB|GB|TB`
Optional. Alias for `units`.

`temperature-scale celsius|c|fahrenheit|f`
Optional. Sets the scale for display of temperature values:

- `fahrenheit` or `f`: Temperatures are shown in degrees Fahrenheit.
- `celsius` or `c`: Temperatures are shown in degrees Celsius. This is the default.

`timeout #`
Optional. Sets the timeout value in seconds for the login session. Valid values are 120–43200 seconds (2–720 minutes). The default is 1800 seconds (30 minutes).

`units auto|MB|GB|TB`
Optional. Sets the unit for display of storage-space sizes:

- `auto`: Sizes are shown in units determined by the system. This is the default.
- `MB`: Sizes are shown in megabytes.
- `GB`: Sizes are shown in gigabytes.
- `TB`: Sizes are shown in terabytes.

Based on the `precision` setting, if a size is too small to meaningfully display in the selected unit, the system uses a smaller unit for that size. For example, if `units` is set to `TB`, `precision` is set to 1, and `base` is set to 10, the size 0.11709 TB is instead shown as 117.1 GB.

Examples

Set CLI parameters.

```
# set cli-parameters timeout 600 console pager off precision 2 units GB
temperature-scale f
```

For scripting, display XML output in `api-embed` format and disable paging.

```
# set cli-parameters api-embed pager off
```

For scripting, display brief XML output in `api-embed` format and disable paging.

```
# set cli-parameters api-embed pager off brief on
```

Set the CLI to show output in console format.

```
# set cli-parameters console
```

Set the CLI to show output in JSON format.

```
# set cli-parameters json
```

Set the CLI to use virtual management mode.

```
# set cli-parameters management-mode virtual
```

See also

show cli-parameters

set controller-date

Description

Sets the date and time parameters for the system. You can set the date and time manually or configure the system to communicate with a Network Time Protocol (NTP) server. Alternatively, you can configure NTP by using the set ntp-parameters command.

NOTE: If you specify valid NTP parameters and manual date/time parameters in the same command, the NTP parameters will take precedence. If the NTP server cannot be contacted, the date and time will not be changed and no error message will be displayed. If you specify the timestamp parameter and other manual date/time parameters in the same command, the timestamp parameter will take precedence.

NOTE: If you change the time zone of the secondary system in a replication set whose primary and secondary systems are in different time zones, you must restart the system to enable management interfaces to show proper time values for replication operations.

Minimum role

manage

Syntax

To set the date and time manually:

```
set controller-date
jan|feb|mar|apr|may|jun|jul|aug|sep|oct|nov|dec
   day
   hh:mm:ss
   year
```

To set the date and time manually by specifying a timestamp:

```
set controller-date
   timestamp timestamp
   timezone +|-hh[:mm]
```

To configure use of NTP:

```
set controller-date
   ntp enabled|disabled|on|off
   ntpaddress IP-address
   timezone +|-hh[:mm]
```

Parameters

jan|feb|mar|apr|may|jun|jul|aug|sep|oct|nov|dec
The month.

day
The day number (1–31).

hh:mm:ss
The hour (0–23), the minutes (0–59), and the seconds (0–59).

year
The year as a four-digit number.

`ntp enabled|disabled|on|off`
Enables or disables use of NTP. When NTP is enabled and the specified NTP server is available, each controller's time is synchronized with the server. This is disabled by default.

`ntpaddress` *`IP-address`*
The network address of an available NTP server.

`timezone +|-`*`hh`*`[:`*`mm`*`]`
The system's time zone as an offset in hours (-12 through +14) and optionally minutes (00–59) from Coordinated Universal Time (UTC). To specify a positive offset, the '+' is optional. To specify a negative offset, the '-' is required. The hour value can have one or two digits and can omit a leading zero. If the minutes value is specified it must have two digits. If it is omitted, the minutes value is set to 00.

`timestamp` *`timestamp`*
The date and time represented as the number of seconds (not counting leap seconds) that have elapsed since 1970-01-01 00:00:00 UTC. The resulting time will be in UTC, unless you also specify the `timezone` parameter.

Examples

Manually set the system time and date to 1:45 PM on September 22, 2011.

```
# set controller-date sep 22 13:45:0 2011
```

Manually set the system date and time to 4:30:50 PM on November 2, 2011 by specifying a timestamp and an offset for the Central Time zone.

```
# set controller-date timestamp 1320273050 timezone -6
```

Set the system to use NTP with an offset for the Mountain Time zone.

```
# set controller-date ntp enabled ntpaddress 69.10.36.3 timezone -7
```

Set the system to use NTP with an offset for the Bangalore, India, time zone.

```
# set controller-date ntp enabled ntpaddress 69.10.36.3 timezone +5:30
```

See also

set ntp-parameters

show controller-date

show ntp-status

set debug-log-parameters

Description

Sets the types of debug messages to include in the Storage Controller debug log.

NOTE: This command is for use by or with direction from technical support.

Minimum role

`manage`

Syntax

```
set debug-log-parameters
message-type+|- [...]
```

Parameters

message-type+|-
One of the following message types, followed by a plus (+) to enable or a minus (-) to disable inclusion in the log:

- `autotest`: Auto-test debug messages. Disabled by default.
- `awt`: Auto-write-through cache triggers debug messages. Disabled by default.
- `bkcfg`: Internal configuration debug messages. Enabled by default.
- `cache`: Cache debug messages. Enabled by default.
- `cache2`: Extra cache debugging messages that may occur frequently enough to fill logs. Disabled by default.
- `capi`: Internal Configuration API debug messages. Enabled by default.
- `capi2`: Internal Configuration API verbose debug messages. Disabled by default.
- `cs`: Copy Services feature debug messages. Enabled by default.
- `disk`: Disk interface debug messages. Enabled by default.
- `dms`: Not used.
- `emp`: Enclosure Management Processor debug messages. Enabled by default.
- `fo`: Failover and recovery debug messages. Enabled by default.
- `fruid`: FRU ID debug messages. Enabled by default.
- `hb`: Inter-controller heartbeat debug messages. Disabled by default.
- `host`: Host interface debug messages. Enabled by default.
- `host2`: Host/SCSI debug messages. Disabled by default.
- `init`: Host-port initiator mode debug messages. Disabled by default.
- `ioa`: I/O interface driver debug messages (standard). Enabled by default.
- `iob`: I/O interface driver debug messages (resource counts). Disabled by default.
- `ioc`: I/O interface driver debug messages (upper layer, verbose). Disabled by default.
- `iod`: I/O interface driver debug messages (lower layer, verbose). Disabled by default.
- `mem`: Internal memory debug messages. Disabled by default.
- `misc`: Internal debug messages. Enabled by default.
- `msg`: Inter-controller message debug messages. Enabled by default.
- `mui`: Internal service interface debug messages. Enabled by default.
- `ps`: Paged storage debug messages. Enabled by default.
- `raid`: RAID debug messages. Enabled by default.
- `res2`: Internal debug messages. Disabled by default.
- `resmgr`: Reservation Manager debug messages. Disabled by default.
- `rtm`: Remote Target Manager debug messages. Disabled by default.

Examples

Include RAID and cache messages, exclude EMP messages, and leave other message types unchanged.

```
# set debug-log-parameters raid+ cache+ emp-
```

See also

show debug-log-parameters

set disk

Description

Performs a secure erase on a specified disk. This is called repurposing the disk, and only applies to an FDE-capable disk.

This command can only be run on disks whose status is `AVAIL`, or `UNUSABLE` due to having a foreign lock key. AVAIL disks have had all disk group information removed from them. Secure erasing such disks is an extra step to make all data on the disk irretrievable. Disks that are `UNUSABLE` due to having a foreign lock key can be imported by using the set fde-import-key command.

NOTE: If you want to repurpose more than one disk and the drive spin down (DSD) feature is enabled, disable DSD before repurposing the disks. You can re-enable it after the disks are repurposed. For information about disabling and enabling DSD for spinning disks that are available or are global spares, see information about the set advanced-settings command's `spin-down` parameter

---

Minimum role

`manage`

Syntax

```
set disk
   [noprompt]
   repurpose
   disk
```

Parameters

`noprompt`
Optional. Suppresses confirmation prompts. Specifying this parameter allows the command to proceed without user interaction.

`repurpose`
Specifies to secure erase the specified disk.

`disk`
The ID of the disk to be repurposed. Only one disk may be repurposed at a time. For disk syntax, see Command Syntax on page 10.

Examples

In a system whose FDE security status is `Secured`, `Unlocked`, perform a secure erase of all data on disk 1.2, whose status is `AVAIL`.

```
# set disk 1.2 repurpose
```

In a system whose FDE security status is `Secured`, `Locked`, perform a secure erase of all data on disk 1.2, whose status is `UNUSABLE`.

```
# set disk 1.2 repurpose

Disk 1.2 was used on another system, and its contents are unknown. The
contents will be erased. Do you want to continue? (y/n)
```

See also

set fde-lock-key

set fde-state

show disks

show fde-state

set disk-group

Description

Changes parameters for a specified disk group.

Minimum role

`manage`

Syntax

```
set disk-group
   [adapt-spare-capacity size[B|KB|MB|GB|TB|KiB|MiB|GiB|TiB]|default]
   [name new-name]
   [owner a|b]
   [spin-down-delay delay]
   disk-group
```

Parameters

`adapt-spare-capacity` *`size`*`[B|KB|MB|GB|TB|KiB|MiB|GiB|TiB]|default]`
Optional. For an ADAPT disk group, this specifies the target spare capacity.

- *`size`*[B|KB|MB|GB|TB|KiB|MiB|GiB|TiB]: Sets the target spare capacity to a specific size. The unit is optional (B represents bytes). If no unit is specified, GiB will be used, regardless of the current base. Whichever unit is set, internally the value will be rounded down to the nearest GiB. If the value is set to 0, the absolute minimum spare space will be used. If this parameter is omitted, the default setting will be used.

- `default`: Sets the target spare capacity to the sum of the two largest disks in the disk group, which is sufficient to fully recover fault tolerance after loss of any two disks in the group.

`name` *`new-name`*
Optional. A new name for the disk group. A name that includes a space must be enclosed in double quotes.

`owner a|b`
Optional for a linear disk group. Prohibited for a virtual disk group. Sets the new owner: controller A or B.

CAUTION: Before changing the owning controller for a linear disk group, you must stop host I/O to its volumes. Volume mappings are not affected.

IMPORTANT: Changing ownership of a disk group while any volumes in the disk group are mapped to live hosts is not supported and may cause data loss or unavailability. All volumes in the disk group must be unmapped or attached hosts must be shut down before the ownership of a disk group is changed.

`spin-down-delay` *`delay`*
Optional for a linear disk group. Prohibited for a virtual disk group. Not applicable for ADAPT. For spinning disks in a linear disk group, this sets the period of inactivity after which the disks and dedicated spares will automatically spin down. Setting the delay to 1–360 minutes will enable spin down; setting the delay to 0 will disable spin down.

NOTE: Drive spin down affects disk operations as follows:
- Spun-down disks are not polled for SMART events.
- Operations requiring access to disks may be delayed while the disks are spinning back up.

`disk-group`
Name or serial number of the disk group to change. A name that includes a space must be enclosed in double quotes.

Examples

Rename virtual disk group `dgA01` to `vdg`.

```
# set disk-group name vdg dgA01
```

Rename linear disk group `dg1` to `dg2` and set its spin-down delay to 10 minutes.

```
# set disk-group name dg2 spin-down-delay 10 dg1
```

See also

show disk-groups

set disk-parameters

Description

Sets parameters that affect disk operation. Two features controlled by these parameters are disk Self-Monitoring Analysis and Reporting Technology (SMART) and drive spin down.

- Disks equipped with SMART technology can alert the controller of impending disk failure. When SMART is enabled, the system checks for SMART events one minute after a restart and every five minutes thereafter. SMART events are recorded in the event log. Changes to the SMART setting take effect after a rescan or a controller restart.
- For spinning disks, the drive spin down feature monitors disk activity within system chassis and spins down inactive disks, based on user-specified settings. This command sets spin-down parameters for available disks and global spares. Spin-down settings do not affect leftover disks. To set spin-down parameters for a linear disk group, use the set vdisk command.

Drive spin down affects disk operations as follows:

- Spun-down disks are not polled for SMART events.
- Operations requiring access to disks may be delayed while the disks are spinning back up.

Minimum role

`manage`

Syntax

```
set disk-parameters
   [smart enabled|disabled|on|off|detect-only]
   [spin-down enabled|disabled|on|off]
   [spin-down-delay delay]
```

Parameters

`smart enabled|disabled|on|off|detect-only`
Optional. Sets whether SMART is enabled or disabled for disks:

- `disabled` or `off`: Disables SMART for all disks in the system and for all disks added to the system.
- `enabled` or `on`: Enables SMART for all disks in the system and for all disks added to the system. This is the default.
- `detect-only`: Detects but does not change the SMART setting of each disk in the system, and for each new disk added to the system.

`spin-down enabled|disabled|on|off`
Optional. Sets whether spinning disks that are available or are global spares will spin down after a period of inactivity shown by the `spin-down-delay` parameter.

- `disabled` or `off`: Drive spin down for available disks and global spares is disabled. This is the default. Disabling spin down will set the spin-down delay to 0.
- `enabled` or `on`: Drive spin down for available disks and global spares is enabled. If the `spin-down-delay` parameter is not specified, the delay will be set to 60 minutes.

NOTE: Drive spin down is not applicable to ADAPT disk groups or virtual pools.

`spin-down-delay` *delay*
Optional. Sets the period of inactivity after which spinning disks that are available or are global spares will spin down.

Setting the delay to 1–360 minutes will enable spin down. Setting the delay to 0 will disable spin down. The default is 15 minutes.

Examples

Enable SMART and drive spin down, and set the spin-down delay to 10 minutes.

```
# set disk-parameters smart on spin-down on spin-down-delay 10
```

See also

show disk-parameters

set email-parameters

Description

Sets SMTP notification parameters for events and managed logs.

Minimum role

`manage`

Syntax

```
set email-parameters
   domain domain
   email-list email-addresses
   [include-logs enabled|disabled|on|off]
   notification-level crit|error|warn|resolved|info|none
   [port port-number]
   security-protocol tls|ssl|none
   [sender sender]
   [sender-password password]
   server server
```

Parameters

`domain` *domain*
The domain name that is joined with an @ symbol to the sender name to form the “from” address for remote notification. The domain name can have a maximum of 255 bytes. Because this name is used as part of an email address, do not include spaces. For example: `MyDomain.com`. If the domain name is not valid, some email servers will not process the mail.

`email-list` *`email-addresses`*
Enter from one to four comma-separated email addresses for recipients of event notifications. Each email address can have a maximum of 320 bytes. The first three email addresses are used as destinations for events.

If the managed logs feature is enabled, you can set the fourth email-address to the address of the log collection system. For example: `IT-team@MyDomain.com,,,LogCollector@MyDomain.com`

`include-logs enabled|disabled|on|off`
Optional. When the managed logs feature is enabled, this option activates the "push" mode, automatically attaching system log files to managed-logs email notifications that are sent to the log collection system. This option is disabled by default.

`notification-level crit|error|warn|resolved|info|none`
The minimum severity for which the system should send notifications:

- `crit`: Sends notifications for Critical events only.
- `error`: Sends notifications for Error and Critical events.
- `warn`: Sends notifications for Warning, Error, and Critical events.
- `resolved`: Sends notifications for Resolved, Warning, Error, and Critical events.
- `info`: Sends notifications for all events.
- `none`: Disables email notification. This is the default. If this option is specified, no other parameters are required and their current values are not changed.

`port` *`port-number`*
Optional. The port number to use for communication with the SMTP server. Configure this parameter only if you want to override use of standard SMTP network port 25.

`security-protocol tls|ssl|none`
Specifies whether to use a security protocol when communicating with the SMTP server.

- `tls`: Enables Transport Layer Security (TLS) authentication. The standard ports for TLS are 25 or 587.
- `ssl`: Enables Secure Sockets Layer (SSL) authentication. The standard port for SSL is 465.
- `none`: Do not use a security protocol. The standard port is 25. This setting is the system default.

`sender` *`sender`*
Optional, unless `security-protocol` is set to `tls` or `ssl`.

The sender name that is joined with an `@` symbol to the domain name to form the "from" address for remote notification. This name provides a way to identify the system that is sending the notification. The sender name can have a maximum of 64 bytes.

The value cannot include a space or: \ " , : ; < > ( ) [ ] @

For example: `Storage-1`.

When a secure protocol is used, this sender name must correspond to the password specified by the `sender-password` parameter, and be a valid user on the configured SMTP server.

If this parameter is omitted, the system name is used as the sender name.

`sender-password` *`password`*
Optional. This parameter is required for a secure SMTP server (using TLS or SSL) and must correspond to the user name specified by the `sender` parameter. This parameter is not applicable if the `security-protocol` parameter is set to `none`. If the `security-protocol` parameter is set to `tls` or `ssl` and this parameter is omitted, the command prompts you to enter and re-enter a value, which is displayed obscured for security reasons.

`server` *`server`*
The IP address of the SMTP mail server to use for the email messages.

Examples

For a server that requires TLS authentication through standard port 587 for SMTP notifications, set the system to do the following:

- Send an email from `RAIDsystem@mydomain.com` to both `sysadmin@mydomain.com` and `JSmith@domain2.com` when a non-Informational event occurs.
- Send an email with attached logs to `logcollector@mydomain.com` when logs need to be transferred.

```
# set email-parameters server 10.1.9.10 sender RAIDsystem
security-protocol tls port 587 sender-password Abcd%1234 domain
mydomain.com notification-level warn include-logs enabled email-list
sysadmin@mydomain.com,JSmith@domain2.com,,
logcollector@mydomain.com
```

See also

show email-parameters

test (with the `email` parameter)

set enclosure

Description

Sets an chassis's name, location, rack number, and rack position. Set these parameters to values that help you identify and locate the chassis. These values are used when user interfaces show chassis-related data, such as in output of the show enclosures command and in event-log entries related to chassis.

Minimum role

`manage`

Syntax

```
set enclosure
   [name new-name]
   [location location]
   [rack-number rack-number]
   [rack-position rack-position]
   enclosure-number
```

Parameters

`name` *`new-name`*
Optional. A new name for the chassis. Input rules:

- The value is case sensitive.
- The value can have a maximum of 20 bytes.
- The value can include spaces and printable UTF-8 characters except: " , < \

- A value that includes a space must be enclosed in double quotes.

`location` *`location`*
The location of the chassis. Input rules:

- The value is case sensitive.
- The value can have a maximum of 20 bytes.
- The value can include spaces and printable UTF-8 characters except: " , < \
- A value that includes a space must be enclosed in double quotes.

`rack-number` *`rack-number`*
The number of the rack containing the chassis, from 0 to 255.

`rack-position` *`rack-position`*
The chassis's position in the rack, from 0 to 255.

`enclosure-number`
The enclosure ID.

Examples

Set parameters for chassis 1.

```
# set enclosure 1 name Storage-5 location Lab rack-number 9 rack-position
3
```

See also

show enclosures

set expander-fault-isolation

Description

Temporarily disables PHY fault isolation for a specific Expander Controller.

NOTE: This command is for use by or with direction from technical support.

By default, the Expander Controller in each I/O module performs fault-isolation analysis of SAS expander PHY statistics. When one or more error counters for a specific PHY exceed the built-in thresholds, the PHY is disabled to maintain storage system operation.

While troubleshooting a storage system problem, a service technician can use this command to temporarily disable fault isolation for a specific Expander Controller in a specific chassis.

NOTE: If fault isolation is disabled, be sure to re-enable it before placing the system back into service. Serious problems can result if fault isolation is disabled and a PHY failure occurs.

Minimum role

`manage`

Syntax

```
set expander-fault-isolation
   [controller a|b|both]
   enabled|disabled|on|off
   [encl enclosure-ID]
   [wwn enclosure-wwn]
```

Parameters

`controller a|b|both`
Optional. The I/O module containing the Expander Controller whose setting you want to change: A, B, or both. If this parameter is omitted, the setting is changed in both I/O modules.

`enabled|disabled|on|off`
Specifies whether to enable or disable PHY fault isolation.

`encl` *`enclosure-ID`*
Optional. The enclosure ID of the chassis containing the PHY. Specify either this parameter or the `wwn` parameter.

`wwn` *`enclosure-wwn`*
Optional. The WWN of the chassis containing the PHY. Specify either this parameter or the `encl` parameter.

Examples

Disable PHY fault isolation for Expander Controller A in chassis 1.

```
# set expander-fault-isolation encl 1 controller a disabled
```

Re-enable PHY fault isolation for Expander Controller A in chassis 1.

```
# set expander-fault-isolation encl 1 controller a enabled
```

See also

set expander-phy

show enclosures

show expander-status

set expander-phy

Description

Disables or enables a specific PHY.

NOTE: This command is for use by or with direction from technical support.

CAUTION: Disabling PHYs can prevent access to system devices, which can cause data unavailability or data loss.

Minimum role

manage

Syntax

```
set expander-phy
  controller a|b|both
  enabled|disabled|on|off
  [encl enclosure-ID]
  phy phy-ID
  type
  drive|inter-exp|sc|sc-0|sc-1|sc-p|sc-a|sca-p|scb-p|sca-a|scb-a|ingres
  s|
  expander-ingress-0|expander-ingress-1|egress|expander-egress-0|
  expander-egress-1|drawer0-egress|drawer1-egress|drawer2-egress|
  drawer0-ingress|drawer1-ingress|drawer2-ingress|expander-universal|
  expander-universal-0|expander-universal-1|expander-universal-2|
  drawer0-ingress-0|drawer0-ingress-1|drawer0-ingress-2|drawer0-egress-
  0|
  drawer0-egress-1|drawer0-egress-2|drawer1-ingress-0|drawer1-ingress-1
  |
  drawer1-ingress-2|drawer1-egress-0|drawer1-egress-1|drawer1-egress-2|
  drawer2-ingress-0|drawer2-ingress-1|drawer2-ingress-2|drawer2-egress-
  0|
  drawer2-egress-1|drawer2-egress-2
  [wwn enclosure-WWN]
```

Parameters

`controller a|b|both`
The I/O module containing the PHY to enable or disable: A, B, or both.

`enabled|disabled|on|off`
Whether to enable or disable the specified PHY.

`encl` *enclosure-ID*
Optional. The enclosure ID of the chassis containing the PHY. Specify either this parameter or the `wwn` parameter.

`phy` *phy-ID*
The logical PHY number.

`type`
`drive|inter-exp|sc|sc-0|sc-1|sc-p|sc-a|sca-p|scb-p|sca-a|scb-a|ingress|`
`expander-ingress-0|expander-ingress-1|egress|expander-egress-0|`
`expander-egress-1|drawer0-egress|drawer1-egress|drawer2-egress|`
`drawer0-ingress|drawer1-ingress|drawer2-ingress|expander-universal|`
`expander-universal-0|expander-universal-1|expander-universal-2|`
`drawer0-ingress-0|drawer0-ingress-1|drawer0-ingress-2|drawer0-egress-0|`
`drawer0-egress-1|drawer0-egress-2|drawer1-ingress-0|drawer1-ingress-1|`
`drawer1-ingress-2|drawer1-egress-0|drawer1-egress-1|drawer1-egress-2|`
`drawer2-ingress-0|drawer2-ingress-1|drawer2-ingress-2|drawer2-egress-0|`
`drawer2-egress-1|drawer2-egress-2`
The PHY type:

- `drive`: Drive slot PHY.
- `inter-exp`: Inter-expander PHY.
- `sc`: Storage Controller PHY.
- `sc-0`: Storage Controller primary PHY.
- `sc-1`: Storage Controller alternate PHY.
- `sc-p`: Storage Controller primary PHY.
- `sc-a`: Storage Controller alternate PHY.
- `sca-p`: Storage Controller A primary PHY.
- `scb-p`: Storage Controller B primary PHY.
- `sca-a`: Storage Controller A alternate PHY.
- `scb-a`: Storage Controller B alternate PHY.
- `ingress`: Expansion port ingress PHY.
- `expander-ingress-0`: Expansion port 0 ingress PHY.
- `expander-ingress-1`: Expansion port 1 ingress PHY.
- `egress`: Expansion port egress PHY.
- `expander-egress-0`: Expansion port 0 egress PHY.
- `expander-egress-1`: Expansion port 1 egress PHY.
- `drawer0-egress`: Drawer 0 egress PHY.
- `drawer1-egress`: Drawer 1 egress PHY.
- `drawer2-egress`: Drawer 2 egress PHY
- `drawer0-ingress`: Drawer 0 ingress PHY.
- `drawer1-ingress`: Drawer 1 drawer ingress PHY.
- `drawer2-ingress`: Drawer 2 ingress PHY.
- `expander-universal`: Expansion port universal PHYs.
- `expander-universal-0`: Expansion port 0 universal PHY.
- `expander-universal-1`: Expansion port 1 universal PHY.
- `expander-universal-2`: Expansion port 2 universal PHY.
- `drawer0-ingress-0`: Drawer 0 ingress PHY 0.
- `drawer0-ingress-1`: Drawer 0 ingress PHY 1.
- `drawer0-ingress-2`: Drawer 0 ingress PHY 2.
- `drawer0-egress-0`: Drawer 0 egress PHY 0.
- `drawer0-egress-1`: Drawer 0 egress PHY 1.
- `drawer0-egress-2`: Drawer 0 egress PHY 2.
- `drawer1-ingress-0`: Drawer 1 ingress PHY 0.
- `drawer1-ingress-1`: Drawer 1 ingress PHY 1.
- `drawer1-ingress-2`: Drawer 1 ingress PHY 2.
- `drawer1-egress-0`: Drawer 1 egress PHY 0.
- `drawer1-egress-1`: Drawer 1 egress PHY 1.

- `drawer1-egress-2`: Drawer 1 egress PHY 2.
- `drawer2-ingress-0`: Drawer 2 ingress PHY 0.
- `drawer2-ingress-1`: Drawer 2 ingress PHY 1.
- `drawer2-ingress-2`: Drawer 2 ingress PHY 2.
- `drawer2-egress-0`: Drawer 2 egress PHY 0.
- `drawer2-egress-1`: Drawer 2 egress PHY 1.
- `drawer2-egress-2`: Drawer 2 egress PHY 2.

`wwn` *`enclosure-WWN`*
Optional. The WWN of the chassis containing the PHY. Specify either this parameter or the `encl` parameter.

Examples

Disable the first egress PHY in controller A in chassis 1.

```
# set expander-phy encl 1 controller a type egress phy 0 disabled
```

Enable the PHY for disk 5 in controller B in chassis 1.

```
# set expander-phy encl 1 controller b type drive phy 5 enabled
```

For a 5U84 chassis's left-hand drawer, disable egress PHY 0.

```
# set expander-phy encl 1 controller a type drawer0-egress-0 phy 0
disabled
```

See also

set expander-fault-isolation

show enclosures

show expander-status

set fde-import-key

Description

Sets or changes the import lock key for the use of Full Disk Encryption. The import lock key is derived from the passphrase and is used to unlock secured disks that are inserted into the system from a different secure system.

Minimum role

`manage`

Syntax

```
set fde-import-key
   [noprompt]
   passphrase value
```

Parameters

`noprompt`
Optional. Suppresses confirmation prompts. Specifying this parameter allows the command to proceed without user interaction.

`passphrase` *value*
A customer-supplied password associated with securing the system. Input rules:

- The value is case sensitive.
- The value can have 8–32 characters.
- The value can include printable UTF-8 characters except: , < > \
  (Any double-quote characters in the passphrase are automatically removed.)

Examples

Set an import lock key in order to import locked disks from another secure system:

```
# set fde-import-key passphrase "Customer lock--01/10/2014"
```

```
Please re-enter the import passphrase to confirm: "Customer
lock--01/10/2014"
```

See also

clear fde-keys

set fde-lock-key

set fde-state

show fde-state

set fde-lock-key

Description

Sets or changes the lock key for the use of Full Disk Encryption. The lock key is derived from the passphrase and stored within the system.

You must retain the value of the passphrase and the lock key ID that the command returns. If you lose the passphrase, you could be locked out of your data.

When a system and its disks are in the `Secured, Locked` state, you must enter the passphrase for the system's lock key ID to restore access to data. Disk groups will be dequarantined, pool health will be restored, and volumes will become accessible.

Minimum role

`manage`

Syntax

```
set fde-lock-key
   [current-passphrase value]
   [noprompt]
   passphrase value
```

Parameters

`current-passphrase` *value*
Optional. If the system is secured, the current passphrase can be provided when using the noprompt option. The command will prompt for this current passphrase if it is not supplied.

`noprompt`
Optional. Suppresses confirmation prompts. Specifying this parameter allows the command to proceed without user interaction.

`passphrase` *value*
A customer-supplied password associated with securing the system. Input rules:

- The value is case sensitive.
- The value can have 8–32 characters.
- The value can include printable UTF-8 characters except: , < > \
  (Any double-quote characters in the passphrase are automatically removed.)

Examples

Set a lock key in preparation for securing the system using FDE.

```
# set fde-lock-key passphrase "Customer lock--01/10/2014"
```

See also

clear fde-keys

set fde-import-key

set fde-state

show fde-state

set fde-state

Description

Changes the overall state of the system for the use of Full Disk Encryption. The system can be secured, where each disk becomes secured and not accessible outside the system. Alternatively, the system can be repurposed, where each disk is secure erased.

Minimum role

`manage`

Syntax

```
set fde-state
   [noprompt]
   [repurpose]
   [secure passphrase value]
```

Either the `repurpose` parameter or the `secure` parameter must be specified.

Parameters

`noprompt`
Optional. Suppresses confirmation prompts. Specifying this parameter allows the command to proceed without user interaction.

`repurpose`
Optional. The system will be repurposed, which secure erases all disks. Before issuing the command, all data (such as volumes and disk groups) must be deleted from the disks.

`secure passphrase` *`value`*
Optional. The system and all its disks will become secured, using the specified FDE system passphrase, which must have been previously configured. A value that includes a space must be enclosed in double quotes. If the disks are not all FDE-capable the command will fail, and no changes will be made.

Examples

Secure the system using Full Disk Encryption.

```
# set fde-state secure passphrase "Customer lock--01/10/2014"
```

```
A lost passphrase will result in unrecoverable data loss. Please re-enter
the passphrase to confirm: "Customer lock--01/10/2014"
```

See also

clear fde-keys

set fde-import-key

set fde-lock-key

show fde-state

set host

Description

Sets the name of a host and optionally the profile of the host and the initiators it contains.

Minimum role

`manage`

Syntax

```
set host
   [name new-name]
   [profile standard|hp-ux|openvms]
   host-name
```

Parameters

`name` *`new-name`*
Optional. Changes the host's nickname to the specified name. Input rules:

- The value is case sensitive.
- The value can have a maximum of 32 bytes.
- The value can include spaces and printable UTF-8 characters except: " , . < \
- A value that includes a space must be enclosed in double quotes

`profile standard|hp-ux|openvms`
Optional.

- `standard`: Default profile.
- `hp-ux`: The host uses Flat Space Addressing.
- `openvms`: The host does not allow LUN 0 to be assigned to a mapping.

CAUTION: Changing this parameter can disrupt access from connected hosts.

`host-name`
The current name of the host. A value that includes a space must be enclosed in double quotes.

Examples

Change the name of `Host1` to `MyHost` and the profile to `HP-UX`.

```
# set host name MyHost profile hp-ux Host1
```

See also

show initiators

set host-group

Description

Sets the name of a host group.

Minimum role

`manage`

Syntax

```
set host-group
   name new-name
   host-group
```

Parameters

`name` *new-name*
A new name for the host group. Input rules:

- The value is case sensitive.
- The value can have a maximum of 32 bytes.
- The value can include spaces and printable UTF-8 characters except: " , . < \
- A value that includes a space must be enclosed in double quotes

host-group
The current name of the host group. A value that includes a space must be enclosed in double quotes.

Examples

Change the name of `HostGroup1` to `MyHostGroup`.

```
# set host-group name MyHostGroup HostGroup1
```

See also

show host-groups

set host-parameters

Description

Sets controller host-port parameters for communication with attached hosts.

For a 4-port controller, host ports can be configured as FC or iSCSI ports. FC ports support use of qualified 8-Gbit/s or 16-Gbit/s SFPs. You can set FC ports to auto-negotiate the link speed or to use a specific link speed. iSCSI ports support use of qualified 1-Gbit/s or 10-Gbit/s SFPs. iSCSI port speeds are auto-negotiated.

CAUTION: Parameter changes will immediately take effect and may affect access to data. The exception is that attempting to change FC loop IDs requires restarting the controllers.

Minimum role

`manage`

Syntax

To set FC port parameters:

```
set host-parameters
   [controller a|b|both]
   [fibre-connection-mode loop|point-to-point|auto]
   [fibre-loop-id values]
   [noprompt]
   [ports ports|all]
```

[prompt yes|no|expert]

[speed 4g|8g|16g|auto]

To set iSCSI port parameters:

```
set host-parameters
   [controller a|b|both]
   [default-router address]
   [gateway address]
   [ip address]
   [iscsi-ip-version ipv4|ipv6]
   [netmask address]
   [noprompt]
   [ports ports|all]
   [prompt yes|no|expert]
```

Parameters

`controller a|b|both`
Deprecated—use the `ports` parameter instead.

`fibre-connection-mode loop|point-to-point|auto`
Optional. For FC, sets the topology for the specified ports to:

- `loop`: Fibre Channel-Arbitrated Loop (public or private). Loop mode cannot be used with 16-Gbit/s link speed.
- `point-to-point`: Fibre Channel point-to-point. This is the default.
- `auto`: Automatically sets the mode based on the detected connection type.

You must also specify the `ports` parameter.

`fibre-loop-id values`
Optional. For FC, specifies comma-separated loop ID values to request for host ports when controllers arbitrate during a LIP. Use this option if you want ports to have specific addresses, if your system checks addresses in reverse order (lowest address first), or if an application requires that specific IDs be assigned to recognize the controller. If the loop ID is changed for one port, the same ID is used for other ports in the same controller. If the ports parameter is specified, loop IDs are set based on the controllers that the ports are in. You cannot specify the same value for ports on different controllers.

- `soft` or `255`: Soft target addressing enables the LIP to determine the loop ID. Use this setting if the loop ID is permitted to change after a LIP or power cycle.
- `0–125`: Specify a hard target address if you do not want the loop ID to change after a LIP or power cycle. If the port cannot acquire the specified ID, it is assigned a soft target address.

You must restart affected controllers to make loop ID changes take effect.

`default-router address`
Optional. For iSCSI IPv6 only, the default router for the port IP address. This parameter requires the `ports` parameter.

`gateway address`
Optional. For iSCSI, the port gateway address. This parameter requires the `ports` parameter.

`ip address`
Optional. For iSCSI, the port IP address. Ensure that each iSCSI host port in the storage system is assigned a different IP address. This parameter requires the `ports` parameter.

`iscsi-ip-version ipv4|ipv6`
Optional. Specifies whether to use IP version 4 (IPv4) or 6 (IPv6) for addressing controller iSCSI ports. When you change this setting, iSCSI-port address values are converted to the new format.

- `ipv4`: Lets you specify addresses in dot-decimal format, where the four octets of the address use decimal values without leading zeroes and the octets are separated by a period. For example, `10.132.2.205`. The first octet may not be zero, with the exception that 0.0.0.0 can be used to disable the interface (stop I/O). This option is the default.
- `ipv6`: Lets you specify addresses using eight groups of four hexadecimal digits, where the groups are separated by a colon. All groups must be specified. For example, 0000:0000:0000:0000:0000:0000:0A90:3442.

`netmask` *`address`*
Optional. For iSCSI IPv4 only, the subnet mask for the port IP address. This parameter requires the `ports` parameter.

`noprompt`
Optional. Suppresses confirmation prompts. Specifying this parameter allows the command to proceed without user interaction.

`ports` *`ports`*`|all`
Optional. Specific host port numbers or all ports. For port syntax, see Command Syntax on page 10.

`prompt yes|no|expert`
Optional. For scripting, this specifies an automatic reply to confirmation prompts:

- `yes`: Allow the command to proceed.
- `no`: Cancel the command.
- `expert`: Allow the command to proceed.

If this parameter is omitted, you must manually reply to prompts.

`speed 4g|8g|16g|auto`
Optional. For FC, sets a forced link speed in Gbit/s or lets the speed be auto-negotiated (`auto`). Because a speed mismatch prevents communication between the port and host, set a speed only if you need to force the port to use a known speed for testing, or you need to specify a mutually supported speed for more than two FC devices connected in an arbitrated loop. Loop mode cannot be used with 16-Gbit/s link speed. This parameter requires the `ports` parameter.

Examples

On a system with FC ports, set the link speed to 8 Gbit/s for ports A1 and B1.

```
# set host-parameters speed 8g ports a1,b1
```

On a system with FC ports, set the link speed to `auto` for ports A1 and B1 and suppress the confirmation prompt.

```
# set host-parameters speed auto ports a1,b1 noprompt
```

On a system with iSCSI ports using IPv4 addressing, change the IP address of port A3.

```
# set host-parameters ip 10.134.50.6 ports a3
```

On a system with iSCSI ports, specify to use IPv6 addressing and change the IP address and default router for port A1.

```
# set host-parameters ports A1 iscsi-ip-version ipv6 ip ::8576:246a
default-router ::0a0a:1
```

See also

restart mc

restart sc

set host-port-mode

set iscsi-parameters

show ports

set host-port-mode

Description

Changes host-interface characteristics for host ports in a CNC controller module.

For both controller modules, all ports can be set to FC, all ports can be set to iSCSI, or the first two ports in each controller module can be set to FC and the second two ports can be set to iSCSI.

This command will immediately change the host port configuration, stop I/O, restart both controllers, and log event 236. After the controllers have restarted, you can use the set host-parameters command to configure the individual ports.

NOTE: If you change the configuration of host ports used for replication peer connections, you will have to reconfigure the peer connections.

Minimum role

`manage`

Syntax

```
set host-port-mode
   [FC|iSCSI|FC-and-iSCSI]
   [noprompt]
```

Parameters

`FC|iSCSI|FC-and-iSCSI`
Sets the port mode for each controller.

- `FC`: Sets all ports to FC.
- `iSCSI`: Sets all ports to iSCSI.
- `FC-and-iSCSI`: Sets the first two ports to FC and the second two ports to iSCSI.

NOTE: The FC-and-iSCSI parameter is only applicable to 4-port CNC controller modules.

`noprompt`
Optional. Suppresses confirmation prompts. Specifying this parameter allows the command to proceed without user interaction.

Examples

For both controllers, set all ports to use iSCSI protocol.

```
# set host-port-mode iSCSI
```

For both controllers, set the first two ports to use FC protocol and the second two ports to use iSCSI protocol.

```
# set host-port-mode FC-and-iSCSI
```

See also

set host-parameters

show ports

set initiator

Description

Sets the name of an initiator and optionally its profile.

Minimum role

`manage`

Syntax

```
set initiator
   id initiator
   [nickname name]
   [profile standard|hp-ux|openvms]
```

Parameters

`id initiator`
The ID of the initiator.

For FC, the ID is a WWPN. For SAS, the ID is a WWPN. For iSCSI, the ID is an IQN. A WWPN can include a colon between each byte but the colons will be discarded.

`nickname name`
Optional. Sets the name of the initiator to the specified name. Input rules:

- The value is case sensitive.
- The value can have a maximum of 32 bytes.
- The value can include spaces and printable UTF-8 characters except: " , . < \
- A value that includes a space must be enclosed in double quotes

`profile standard|hp-ux|openvms`
Optional.

- `standard`: Default profile.
- `hp-ux`: The host uses Flat Space Addressing.

- `openvms`: The host does not allow LUN 0 to be assigned to a mapping.

CAUTION: Changing this parameter can disrupt access from connected initiators.

Examples

For FC initiator 21000024ff3dfed1, set its name to `FC-port1` and profile to OpenVMS.

```
# set initiator id 21000024ff3dfed1 nickname FC-port1 profile openvms
```

For SAS initiator 21000024ff3dfed1, set its name to `SAS-port1` and profile to HP-UX.

```
# set initiator id 21000024ff3dfed1 nickname SAS-port1 profile hp-ux
```

For iSCSI initiator iqn.1991-05.com.microsoft:myhost.domain, set its name to iSCSI-port1 and profile to HP-UX.

set initiator id iqn.1991-05.com.microsoft:myhost.domain nickname `iSCSI-port1` profile hp-ux

See also

show initiators

set iscsi-parameters

Description

Changes system-wide parameters for iSCSI ports.

CAUTION: Applying new parameters may disrupt access from connected hosts.

Minimum role

`manage`

Syntax

```
set iscsi-parameters
   [chap enabled|disabled|on|off]
   [iscsi-ip-version ipv4|ipv6]
   [isns enabled|disabled|on|off]
   [isns-alt-ip iSNS-IP]
   [isns-ip iSNS-IP]
   [jumbo-frame enabled|disabled|on|off]
   [speed auto|1gbps]
```

Parameters

`chap enabled|disabled|on|off`
Optional. Enables or disables use of Challenge Handshake Authentication Protocol. Disabled by default.

When CHAP is enabled and the storage system is the recipient of a login request from a known originator (initiator), the system will request a known secret. If the originator supplies the secret, the connection will be allowed.

`iscsi-ip-version ipv4|ipv6`
Optional. Specifies whether to use IP version 4 (IPv4) or 6 (IPv6) for addressing controller iSCSI ports.

- `ipv4`: Lets you specify addresses in dot-decimal format, where the four octets of the address use decimal values without leading zeroes and the octets are separated by a period. For example, `10.132.2.205`. This option is the default.
- `ipv6`: Lets you specify addresses using eight groups of four hexadecimal digits, where the groups are separated by a colon. All groups must be specified. For example, 0000:0000:0000:0000:0000:0000:0A90:3442.

`isns enabled|disabled|on|off`
Optional. Enables or disables registration with a specified Internet Storage Name Service server, which provides name-to-IP-address mapping. Disabled by default.

`isns-alt-ip` *`iSNS-IP`*
Optional. Specifies the IP address of an alternate iSNS server, which can be on a different subnet. The default address is all zeroes.

`isns-ip` *`iSNS-IP`*
Optional. Specifies the IP address of an iSNS server. The default address is all zeroes.

`jumbo-frame enabled|disabled|on|off`
Optional. Enables or disables support for jumbo frames. Allowing for 100 bytes of overhead, a normal frame can contain a 1400-byte payload whereas a jumbo frame can contain a maximum 8900-byte payload for larger data transfers. Use of jumbo frames can succeed only if jumbo-frame support is enabled on all network components in the data path. Disabled by default.

`speed auto|1gbps`
Sets the host port link speed.

- `auto`: Auto-negotiates the proper speed. This is the default.
- `1gbs`: Forces the speed to 1 Gbit/s, overriding a downshift that can occur during auto-negotiation with 1-Gbit/s HBAs. This setting does not apply to 10-Gbit/s HBAs.

Examples

For a storage system using IPv4 addressing whose host ports are connected to different subnets, enable CHAP, specify the IP address of the iSNS server on each subnet, and enable registration with either server.

```
# set iscsi-parameters chap enabled isns enabled isns-ip 10.10.10.93
isns-alt-ip 10.11.10.90
```

Specify that iSCSI ports will use IPv6 addressing.

```
# set iscsi-parameters iscsi-ip-version ipv6
```

See also

set host-parameters

show iscsi-parameters

set led

Description

Turns a specified device's identification LED on or off to help you locate the device. For LED descriptions, see your product's installation or FRU documentation.

Minimum role

`manage`

Syntax

To set a disk LED:

```
set led
   disk ID
   enable|disable|on|off
```

To set the LEDs for an chassis and its I/O modules:

```
set led
   [controller a|b]
   enable|disable|on|off
   enclosure ID
```

Parameters

`controller a|b`
Optional; for use with the chassis parameter. Specifies the I/O module to locate. This affects the identification LED on the I/O module and on the chassis.

`disk ID`
Specifies the disk to locate. For disk syntax, see Command Syntax on page 10. This overrides the fault LED on the disk.

`enable|disable|on|off`
Specifies to turn the LED on or off.

`enclosure ID`
Specifies the chassis to locate. This affects the identification LED on the chassis and on each I/O module.

Examples

Identify disk 5 in chassis 1.

```
# set led disk 1.5 on
```

Stop identifying chassis 1.

```
# set led enclosure 1 off
```

Identify controller B in chassis 1.

```
# set led enclosure 1 controller b on
```

set network-parameters

Description

Sets parameters for controller module network ports.

You can manually set static IP values for each controller, or you can specify that IP values should be set automatically for both controllers through communication with a Dynamic Host Configuration Protocol (DHCP) server.

Each controller has the following factory-default IP settings:

- DHCP: disabled
- Controller A IP address: 10.0.0.2
- Controller B IP address: 10.0.0.3
- IP subnet mask: 255.255.255.0
- Gateway IP address: 10.0.0.1

When DHCP is enabled, the following initial values are set and remain set until the system is able to contact a DHCP server for new addresses.

- Controller IP addresses: 169.254.x.x (where the value of *x.x* is the lowest 16 bits of the controller serial number)
- IP subnet mask: 255.255.0.0
- Gateway IP address: 0.0.0.0

169.254.*x.x* addresses (including gateway 169.254.0.1) are on a private subnet that is reserved for unconfigured systems and the addresses are not routable. This prevents the DHCP server from reassigning the addresses and possibly causing a conflict where two controllers have the same IP address. As soon as possible, change these IP values to proper values for your network.

To switch a controller from DHCP addressing to static addressing, you must set the IP address, netmask, and gateway values.

NOTE: The following IP addresses are reserved for internal use by the storage system: 169.254.255.1, 169.254.255.2, 169.254.255.3, 169.254.255.4, and 127.0.0.1. Because these addresses are routable, do not use them anywhere in your network.

Minimum role

manage

Syntax

```
set network-parameters
   [controller a|b]
   [dhcp]
   [gateway gateway]
   [ip address]
   [netmask netmask]
   [ping-broadcast enabled|disabled|on|off]
```

Parameters

`controller a|b`
Optional. For IP-related parameters, this specifies whether to apply settings to controller A or B. If this parameter is omitted, settings are applied to the controller being accessed. This parameter does not apply to Ethernet switch-related parameters, whose settings are always applied to the controller being accessed.

`dhcp`
Optional. Specifies to use DHCP to set both controllers' IP values.

`gateway` *`gateway`*
Optional. A gateway IP address for the port.

`ip` *`address`*
Optional. An IP address for the port. Specify the address in dot-decimal format, where the four octets of the address use decimal values and the octets are separated by a period; for example, `10.132.2.205`. The first octet may not be zero, with the exception that 0.0.0.0 can be used to disable the interface (stop I/O). This is the default.

`netmask` *`netmask`*
Optional. An IP subnet mask for the port.

`ping-broadcast enabled|disabled|on|off`
Optional. Enables the storage system to respond when a ping to a broadcast address is issued on the system's subnet. This is disabled by default.

Examples

Use DHCP to set network port IP values.

```
# set network-parameters dhcp
```

Manually set network port IP values for controller A (disabling DHCP for both controllers, if it was enabled) using IPv4 addressing.

```
# set network-parameters ip 192.168.0.10 netmask 255.255.255.0 gateway
192.168.0.1 controller a
```

See also

show network-parameters

set ntp-parameters

Description

Sets Network Time Protocol (NTP) parameters for the system. You can manually set system date and time parameters by using the set controller-date command. You must specify at least one of the optional parameters for the command to succeed.

NOTE: If you change the time zone of the secondary system in a replication set whose primary and secondary systems are in different time zones, you must restart the system to enable management interfaces to show proper time values for replication operations.

Minimum role

manage

Syntax

```
set ntp-parameters
   [ntp enabled|disabled|on|off]
   [ntpaddress IP-address]
   [timezone +|-hh[:mm]]
```

Parameters

`ntp enabled|disabled|on|off`
Optional. Enables or disables use of NTP. When NTP is enabled and the specified NTP server is available, each controller's time is synchronized with the server. This is disabled by default.

`ntpaddress` *`IP-address`*
Optional. The network address of an available NTP server.

`timezone +|-`*`hh`*`[:`*`mm`*`]`
Optional. The system's time zone as an offset in hours (-12 through +14) and optionally minutes (00–59) from Coordinated Universal Time (UTC). To specify a positive offset, the '+' is optional. To specify a negative offset, the '-' is required. The hour value can have one or two digits and can omit a leading zero. If the minutes value is specified it must have two digits. If it is omitted, the minutes value is set to 00.

Examples

Set the system to use NTP with an offset for the Mountain Time zone.

```
# set ntp-parameters ntp enabled ntpaddress 69.10.36.3 timezone -7
```

Set the system to use NTP with an offset for the Bangalore, India, time zone.

```
# set ntp-parameters ntp enabled ntpaddress 69.10.36.3 timezone +5:30
```

See also

set controller-date

show controller-date

show ntp-status

set password

Description

Sets a user's password for system interfaces (such as the CLI). A password can be entered as part of the command, or the command prompts you to enter and re-enter the new password.

Minimum role

manage

Syntax

```
set password
   [password password]
   [user]
```

Parameters

`password password`
Optional. Sets a new password for the user. Input rules:

- The value is case sensitive.
- The value can have 8–32 characters.
- The value can include printable UTF-8 characters except a space or: \" \' , < > \\
- A value that includes only printable ASCII characters must include at least one upper-case character, one lower-case character, one numeric character, and one non-alphanumeric character.

If this parameter is omitted, the command prompts you to enter and re-enter a value, which is displayed obscured for security reasons. For an SNMPv3 user whose `authentication-type` parameter is set to use authentication, this specifies the authentication password.

user
Optional. The user name for which to set the password. If this parameter is omitted, this command affects the logged-in user's password.

Examples

Change the password for the user called "`manage`":

```
# set password manage
Enter new password: ********
Re-enter new password: ********
```

Change the password for user `JDoe`.

```
# set password JDoe password Abcd%1234
```

See also

show users

set peer-connection

Description

Modifies a peer connection between two systems.

You can use this command to change the name of a current peer connection or to change the port address of the remote system without changing the peer connection configurations. For example, you could configure a peer connection and then move one of the peers to a different network.

You can run this command on either the local system or the remote system. You must specify the username and password of a user with the manage role on the remote system.

Changing the peer connection name will not affect the network connection so any running replications will not be interrupted.

Changing the remote port address will modify the network connection, which is permitted only if there are no active replications using the connection. Abort all replications before modifying the peer connection. Additionally, either suspend the replication set to prevent any scheduled replications from running during the operation, or make sure the network connection is offline. After you have modified the peer connection, you can resume the replication set.

Minimum role

`manage`

Syntax

```
set peer-connection
   [name new-name]
   [remote-password password]
   [remote-port-address remote-port-address]
   remote-username username
   peer-connection-ID
```

Parameters

`name` *new-name*
Optional. A new name for the peer connection. If you specify this parameter you may not specify the

`remote-port-address` parameter. Input rules:

- The value is case sensitive.
- The value can have a maximum of 32 bytes.
- The value can include spaces and printable UTF-8 characters except: " , < \
- A value that includes a space must be enclosed in double quotes.

`remote-password` *password*
Optional in console format; required for API format. The password of the user specified by the `remote-username` parameter. If this parameter is omitted, the command prompts you to enter and re-enter a value, which is displayed obscured for security reasons.

`remote-port-address` *remote-port-address*
Optional. Specifies a new FC WWN or iSCSI IP address for the remote system. If you specify this parameter you may not specify the `name` parameter.

`remote-username` *username*
The name of a user in the remote system. This must be a user with the manage role to remotely configure or provision that system.

peer-connection-ID
Specifies the name or serial number of the peer connection to modify.

Examples

Connect the current peer connection `Peer1` to the remote system's new IP address, 192.168.202.22, using the credentials of remote user `John`.

```
# set peer-connection remote-port-address 192.168.202.22 remote-username
John remote-password John1234 Peer1
```

Rename `Peer1` to `PeerCon1`.

```
# set peer-connection name PeerCon1 remote-username John remote-password
John1234 Peer1
```

See also

create peer-connection

delete peer-connection

query peer-connection

show peer-connections

set pool

Description

Sets parameters for a virtual pool.

Each virtual pool has three thresholds for page allocation as a percentage of pool capacity. You can set the low and middle thresholds. The high threshold is automatically calculated based on the available capacity of the pool minus 200 GB of reserved space.

When the low or middle threshold is exceeded, event 462 is logged with Informational severity. If the high threshold is exceeded and the pool is not overcommitted, event 462 is logged with Informational severity. If the high threshold is exceeded and the pool is overcommitted, event 462 is logged with Warning severity. If the pool's capacity threshold is reached, event 462 is logged with Error severity. When pool usage falls back below any threshold, event 463 is logged with Informational severity.

NOTE: If the pool size is small (approximately 500 GB) and/or the middle threshold is relatively high, the high threshold may not guarantee 200 GB of reserved space in the pool. The controller will not automatically adjust the low and middle thresholds in such cases.

You can also set overcommit, which controls whether the pool uses thin provisioning. If you try to disable overcommit and the total space allocated to thin-provisioned volumes exceeds the physical capacity of their pool, an error will state that there is insufficient free disk space to complete the operation and overcommit will remain enabled. If your system has a replication set, the pool might be unexpectedly overcommitted because of the size of the internal snapshots of the replication set. To check if the pool is overcommitted, view the `over-committed` and `over-committed-numeric` properties shown by the show pools command in API mode. You can also view the Pool Overcommitted value in the Disk Management Utility, as described in help for the Pools topic.

Minimum role

`manage`

Syntax

```
set pool
   [low-threshold #%]
   [middle-threshold #%]
```

```
[overcommit enabled|disabled|on|off]
pool
```

Parameters

`low-threshold #%`
Optional. Sets the low threshold for page allocation as a percentage of pool capacity. This value must be less than the middle-threshold value. The default low-threshold value is 25%.

`middle-threshold #%`
Optional. Sets the middle threshold for page allocation as a percentage of pool capacity. This value must be between the low-threshold value and the high-threshold value. The default middle-threshold value is 50%.

`overcommit enabled|disabled|on|off`
Optional.

- `enabled` or `on`: The pool will use thin provisioning, which means that more capacity can be allocated to volumes than physically exists in the pool. When stored data approaches the limit of physical capacity, the administrator can add more chassis to the system. This is the default.
- `disabled` or `off`: The pool will use full provisioning, which means that the capacity allocated to volumes when they are created cannot exceed the physical capacity of the pool.

NOTE: If you try to disable overcommit and the total space allocated to thin-provisioned volumes exceeds the physical capacity of their pool, an error will say that there is insufficient free disk space to complete the operation and overcommit will remain enabled.

---

pool
The name of the storage pool for which to change settings.

Examples

For pool A, set the low threshold to 30%.

```
# set pool low-threshold 30% A
```

For pool B, disable overcommit.

```
# set pool overcommit off B
```

See also

delete pools

show pools

set prompt

Description

Sets the prompt for the current CLI session. This setting does not persist beyond the current session.

Minimum role

`manage`

Syntax

```
set prompt
   prompt
```

Parameters

prompt
The new prompt. Input rules:

- The value is case sensitive.
- The value can have a maximum of 16 characters.
- The value can include printable UTF-8 characters except: " < \
- A value that includes a space must be enclosed in double quotes.

Examples

Change the prompt from `"# "` to `"CLI$ "` and start entering a `show` command.

```
# set prompt "CLI$ "
Success: Command completed successfully. (2014-07-17 16:44:25)
CLI$ show ...
```

set protocols

Description

Enables or disables management services and protocols. In console format, if you enable an unsecured protocol the command will prompt for confirmation.

Minimum role

`manage`

Syntax

```
set protocols
   [activity enabled|disabled|on|off]
   [debug enabled|disabled|on|off]
```

[ftp enabled|disabled|on|off]

[http enabled|disabled|on|off]

[https enabled|disabled|on|off]

[management-mode v2|v3|linear|virtual]

[ses enabled|disabled|on|off]

[sftp enabled|disabled|on|off]

[sftp-port *port*]

[slp enabled|disabled|on|off]

[smis enabled|disabled|on|off]

[snmp enabled|disabled|on|off]

[ssh enabled|disabled|on|off]

[ssh-port *port*]

[telnet enabled|disabled|on|off]

[usmis enabled|disabled|on|off]

Parameters

activity enabled|disabled|on|off
Optional. Enables or disables access to the activity progress interface via HTTP port 8081. This mechanism reports whether a firmware update or partner firmware update operation is active and shows the progress through each step of the operation. In addition, when the update operation completes, status is presented indicating either the successful completion, or an error indication if the operation failed. This is disabled by default.

debug enabled|disabled|on|off
Optional. Enables or disables debug capabilities, including Telnet debug ports and privileged diagnostic user IDs. This is disabled by default.

NOTE: Properly shut down the debug console by using the `set protocols debug disable` command. Do not just close the console directly or by using the `exit` command.

---

ftp enabled|disabled|on|off
Optional. Enables or disables File Transfer Protocol (FTP), a secondary interface for installing firmware updates, installing security certificates and keys, installing a license, and downloading logs. This is enabled by default.. Using SFTP is preferred.

http enabled|disabled|on|off
Optional. Enables or disables the standard Disk Management Utility web server. This is enabled by default.

https enabled|disabled|on|off
Optional. Enables or disables the secure Disk Management Utility web server. This is enabled by default.

management-mode v2|v3|linear|virtual
Optional. Sets the default management mode for the system.

- `v2` or `linear`: Uses linear-storage terminology in command output and system messages. For example, vdisk for disk groups and pools.

- `v3` or `virtual`: Uses terminology in command output and system messages that is generalized for managing virtual and linear storage. For example, disk group for disk groups and pool for pools. This is the default.

To change the management mode for the current CLI session only, use the set cli-parameters command.

`ses enabled|disabled|on|off`
Optional. Enables or disables the in-band SCSI Enclosure Services (SES) management interface. This is disabled by default.

`sftp enabled|disabled|on|off`
Optional. Enables or disables SSH File Transfer Protocol (SFTP), a secure secondary interface for installing firmware updates, installing security certificates and keys, installing a license, and downloading logs. All data sent between the client and server will be encrypted. This is enabled by default.

To set the port numbers to use for SFTP and SSH, set the `sftp-port` and `ssh-port` parameters, respectively. The port numbers must differ.

`sftp-port` *port*
Optional. Specifies the port number to use for SFTP. The default is 1022.

`slp enabled|disabled|on|off`
Optional. Enables or disables the Service Location Protocol (SLP) interface. SLP is a discovery protocol that enables computers and other devices to find services in a LAN without prior configuration. This system uses SLP v2. This is enabled by default.

SMI-S uses SLP to advertise WBEM interfaces. If SMI-S is enabled, disabling SLP will prevent WBEM interfaces from being advertised.

`smis enabled|disabled|on|off`
Optional. Enables or disables the secure Storage Management Initiative Specification interface (SMI-S) interface. This option allows SMI-S clients to communicate with each controller's embedded SMI-S provider via HTTPS port 5989. HTTPS port 5989 and HTTP port 5988 cannot be enabled at the same time, so enabling this option will disable port 5988. This is disabled by default.

SMI-S uses SLP to advertise WBEM interfaces. To use SMI-S and advertise WBEM interfaces you must enable the `smis` parameter and the `slp` parameter.

`snmp enabled|disabled|on|off`
Optional. Enables or disables the Simple Network Management Protocol interface. Disabling this option disables all SNMP requests to the MIB and disables SNMP traps. To configure SNMP traps use the set snmp-parameters command.

This is enabled by default.

`ssh enabled|disabled|on|off`
Optional. Enables or disables the secure shell CLI. This is enabled by default.

`telnet enabled|disabled|on|off`
Optional. Enables or disables the standard CLI. This is enabled by default.

`ssh-port` *port*
Optional. Specifies the port number to use for SSH. The default is 22.

`usmis enabled|disabled|on|off`
Optional. Enables or disables the unsecure Storage Management Initiative Specification (SMI-S) interface. This option allows SMI-S clients to communicate with each controller's embedded SMI-S provider via HTTP port 5988. HTTP port 5988 and HTTPS port 5989 cannot be enabled at the same time, so enabling this option will disable port 5989. This is disabled by default.

SMI-S uses SLP to advertise WBEM interfaces. To use SMI-S and advertise WBEM interfaces you must enable the `smis` parameter and the `slp` parameter.

Examples

Disable unsecure HTTP connections and enable FTP.

```
# set protocols http disabled ftp enabled
```

Enable Telnet, which is an unsecured protocol.

```
# set protocols telnet enabled
```

Set the default management mode to virtual.

```
# set protocols management-mode virtual
```

Enable SFTP and set it to use port 2020.

```
# set protocols sftp enabled sftp-port 2020
```

See also

set cli-parameters

show protocols

set replication-set

Description

Changes parameters for a replication set.

For a replication set with a single primary volume, you can change the name, queue policy, snapshot history, and snapshot-retention policy settings.

For a replication set with a primary volume group, you can change the name and queue policy only.

Volume membership cannot change for the life of the replication set.

You can run this command on either the primary or secondary system.

Minimum role

manage

Syntax

```
set replication-set
   [name new-name]
   [queue-policy discard|queue-latest]
   [snapshot-basename basename]
   [snapshot-count #]
   [snapshot-history disabled|off|secondary|both]
   [snapshot-retention-priority never-delete|high|medium|low]
   current-replication-set-ID
```

Parameters

`name` *`new-name`*
Optional. Specifies a new name for the replication set. Input rules:

- The value is case sensitive.
- The value can have a maximum of 32 bytes.
- The value can include spaces and printable UTF-8 characters except: " , < \
- A value that includes a space must be enclosed in double quotes. If you change this parameter while a replication is running, the replication set will be immediately renamed but the current replication will not be affected.

`queue-policy discard|queue-latest`
Optional. Specifies the action to take when a replication is running and a new replication is requested.

- `discard`: Discard the new replication request.
- `queue-latest`: Take a snapshot of the primary volume and queue the new replication request. If the queue contained an older replication request, discard that older request. A maximum of one replication can be queued. This is the default.

If you change this parameter while a replication is running, the change will affect subsequent replications but not the current replication.

NOTE: If the queue policy is `queue-latest` and a replication is running and another is queued, you cannot change the queue policy to discard. You must manually remove the queued replication before you can change the policy.

`snapshot-basename` *`basename`*
Optional if `snapshot-history` is set to `disabled` or `off`. Required if `snapshot-history` is set to `secondary` or `both`.

Specifies a prefix to help you identify replication snapshots. Input rules:

- The value is case sensitive.
- The value can have 1–26 bytes.
- The value can include spaces and printable UTF-8 characters except: " , < \
- A value that includes a space must be enclosed in double quotes.

If you change this parameter while a replication is running, for the current replication it will affect the name of the snapshot on the secondary system. For that replication only, the names of the snapshots on the primary and secondary systems will differ.

`snapshot-count #`
Optional if `snapshot-history` is set to `disabled` or `off`. Required if `snapshot-history` is set to `secondary` or `both`.

Specifies the number of snapshots taken of the replication volume to retain, from 1 to 16. When a new snapshot exceeds this limit, the oldest snapshot in the snapshot history is deleted.

The `snapshot-count` setting can be changed at any time. Its value must be greater than the number of existing snapshots in the replication set, regardless of whether `snapshot-history` is enabled.

If you change this parameter while a replication is running, for the current replication it will affect only the secondary system. In this case the value can only be increased, so you might have one less expected snapshot on the primary system than on the secondary system.

`snapshot-history disabled|off|secondary|both`
Optional. Specifies whether to maintain a replication snapshot history for the replication set, as described above.

- `disabled` or `off`: A snapshot history will not be kept. If this parameter is disabled after a replication set has been established, any existing snapshots will be kept, but not updated. This option is the default.
- `secondary`: A snapshot history set will be kept on the secondary system for the secondary volume, using `snapshot-count` and `snapshot-basename` settings.
- `both`: A snapshot history will be kept for the primary volume on the primary system and for the secondary volume on the secondary system. Both snapshot histories will use the same `snapshot-count` and `snapshot-basename` settings.

If you change this parameter while a replication is running, for the current replication it will affect only the snapping of the secondary volume.

`snapshot-retention-priority never-delete|high|medium|low`
Optional. For virtual storage, this specifies the retention priority for history snapshots, which is used when automatic deletion of snapshots is enabled by using the set snapshot-space command. In a snapshot tree, only leaf snapshots can be deleted automatically. Deletion based on retention priority is unrelated to deleting the oldest snapshots to maintain a snapshot count.

- `never-delete`: Snapshots will never be deleted automatically to make space. The oldest snapshot in the snapshot history will be deleted once the `snapshot-count` value has been exceeded. This is the default.
- `high`: Snapshots can be deleted after all eligible medium-priority snapshots have been deleted.
- `medium`: Snapshots can be deleted after all eligible low-priority snapshots have been deleted.
- `low`: Snapshots can be deleted.

If you change this parameter while a replication is running, for the current replication it will affect just the secondary snapshot. An optional primary snapshot will already be created before the change takes affect.

`current-replication-set-ID`
Specifies the current name or serial number of the replication set for which to change the name.

Examples

Rename the replication set `Rep1` to `RepSet1`.

```
# set replication-set name RepSet1 Rep1
```

Change replication set `RepSet1`'s queue policy to discard a new replication request when a replication is running.

```
# set replication-set queue-policy discard RepSet1
```

For replication set `RepSet1` with primary volume `Data`, enable snapshot history for the secondary volume only, allowing up to 10 replication snapshots with the basename `repsnapData` to be retained for that volume.

```
# set replication-set snapshot-history secondary snapshot-basename
repsnapData snapshot-count 10 RepSet1
```

See also

create replication-set

delete replication-set

resume replication-set

show replication-sets

suspend replication-set

set schedule

Description

Changes parameters for a specified schedule. If you want to change the schedule name, create a new schedule to replace the existing one. You must specify at least one of the optional parameters for the command to succeed.

You can schedule a replication task on the primary system only.

Virtual replication tasks are not queued: if a replication task is running and the time comes for that replication task to start again, that task will be skipped, though it will be counted against the schedule's count constraint (if set).

Minimum role

`manage`

Syntax

```
set schedule
   [schedule-specification "specification"]
   [task-name task-name]
   schedule-name
```

Parameters

`schedule-specification "`*`specification`*`"`
Optional. Defines when the task will first run, and optionally when it will recur and expire. You can use a comma to separate optional conditions. Dates cannot be in the past. For times, if neither `AM` nor `PM` is specified, a 24-hour clock is used.

- `start yyyy-mm-dd hh:mm [AM|PM]`
  Specifies a date and a time in the future to be the first instance when the scheduled task will run, and to be the starting point for any specified recurrence.
- `[every # minutes|hours|days|weeks|months|years]`
  Specifies the interval at which the task will run.
  For better performance when scheduling a `TakeSnapshot` task that will run under heavy I/O conditions or on more than three volumes, the retention count and the schedule interval should be set to similar values. For example if the retention count is 10, then the interval should be set to 10 minutes.
  For a `Replicate` task, the minimum interval is 30 minutes.
- `[between hh:mm [AM|PM] and hh:mm [AM|PM]]`
  Constrains the time range during which the task is permitted to run. Ensure that the start time is within the specified time range.

- `[only any|first|second|third|fourth|fifth|last|#st|#nd|#rd|#th day|weekday|weekendday|Sunday|Monday|Tuesday|Wednesday|Thursday|Friday|Saturday of year|month|January|February|March|April|May|June|July|August|September|October|November|December]`
  Constrains the days or months when the task is permitted to run. Ensure that this constraint includes the start date.
- `[count #]`
  Constrains the number of times the task is permitted to run.
- `[expires yyyy-mm-dd hh:mm [AM|PM]]`
  Specifies when the schedule expires, after which the task will no longer run.

`task-name` *`task-name`*
Optional. The name of an existing task to run. A name that includes a space must be enclosed in double quotes.

`schedule-name`
The name of the schedule to change. A name that includes a space must be enclosed in double quotes.

Examples

Change parameters, including the associated task, for schedule `Sched1`.

```
# set schedule schedule-specification "start 2015-01-01 00:01 every 1
days expires 2015-12-31 00:01" task-name Task1 Sched1
```

See also

show schedules

show tasks

set snapshot-space

Description

Sets the snapshot space usage as a percentage of the pool and thresholds for notification.

You can set the percent of the pool that can be used for snapshots (the snapshot space).

NOTE: If the percentage of the pool used by snapshots is higher than the percentage specified in this command, the command will fail.

You can specify a limit policy to enact when the snapshot space reaches the percentage. You can set the policy to either notify you via the event log that the percentage has been reached (in which case the system continues to take snapshots, using the general pool space), or to notify you and trigger automatic deletion of snapshots. If automatic deletion is triggered, snapshots are deleted according to their configured retention priority. Snapshots that are mapped or are not leaves of a volume's snapshot tree are not eligible for automatic deletion.

The system generates events when the percentage of snapshot space used crosses low, middle, or high thresholds. The event is generated when the percentage exceeds or drops below the threshold. You can set the percentages for the thresholds.

Minimum role

manage

Syntax

```
set snapshot-space
   [high-threshold percent-of-snap-space%]
   [limit percent-of-pool%]
   [limit-policy notify-only|delete]
   [low-threshold percent-of-snap-space%]
   [middle-threshold percent-of-snap-space%]
   pool A|B
```

Parameters

`high-threshold` *`percent-of-snap-space%`*
Optional. Specifies a percentage of the snapshot space for the high threshold. Enter a value from 1% to 100%. It must be greater than or equal to the middle threshold. The default is 99%. When this threshold is exceeded, event 571 is logged with Warning severity.

`limit` *`percent-of-pool%`*
Optional. Specifies the snapshot space. Enter a value from 1% to 100%. The default is 10%.

`limit-policy notify-only|delete`
Optional. Specifies the limit policy for when the percentage of the pool designated for snapshots is reached.

- `notify-only`: When the snapshot space is reached an event is generated and logged. This is the default.
- `delete`: When the snapshot space is reached an event is generated and logged and automatic deletion of snapshots occurs.

`low-threshold` *`percent-of-snap-space%`*
Optional. Specifies a percentage of the snapshot space for the low threshold. Enter a value from 1% to 100%. The default is 75%. When this threshold is exceeded, event 571 is logged with Informational severity.

`middle-threshold` *`percent-of-snap-space%`*
Optional. Specifies a percentage of the snapshot space for the middle threshold. Enter a value from 1% to 100%. It must be greater than or equal to the low threshold. The default is 90%. When this threshold is exceeded, event 571 is logged with Informational severity.

`pool A|B`
The pool for which to create the snapshot space usage.

Examples

For pool A, limit the maximum amount of pool space that can be occupied by snapshot data to 15%, set the middle-threshold warning event to be logged when 85% of that space has filled, and set a policy to automatically delete snapshots (per deletion rules) when the 15% limit is reached.

```
# set snapshot-space pool A limit 15% middle-threshold 85% limit-policy
delete
```

See also

show snapshot-space

show pools

set snmp-parameters

Description

Sets SNMP parameters for event notification. To enable or disable SNMP requests to the MIB use the set protocols command.

Minimum role

`manage`

Syntax

```
set snmp-parameters
   [add-trap-host address]
   [del-trap-host address]
   [enable crit|error|warn|resolved|info|none]
   [read-community string]
   [trap-host-list trap-host-list]
   [write-community string]
```

Parameters

`add-trap-host` *address*
Optional. Specifies the IP address of a destination host that will receive traps. Three trap hosts can be set.

`del-trap-host` *address*
Optional. Deletes a trap destination host.

`enable crit|error|warn|resolved|info|none`
Optional. Sets the level of trap notification:

- `crit`: Sends notifications for Critical events only.
- `error`: Sends notifications for Error and Critical events.
- `warn`: Sends notifications for Warning, Error, and Critical events.
- `resolved`: Sends notifications for Resolved, Warning, Error, and Critical events.
- `info`: Sends notifications for all events.
- `none`: All events are excluded from trap notification and traps are disabled. This is the default. However, Critical events and managed-logs events 400–402 are sent regardless of the notification setting.

`read-community` *string*
Optional. Sets a community string for read-only access. This string must differ from the write-community string. Input rules:

- The value is case sensitive.
- The value can have a maximum of 31 bytes.
- The value can include any character except: " < >
- A value that includes a space must be enclosed in double quotes.

`trap-host-list` *`trap-hosts`*
Optional. Replaces the current list.

`write-community` *`string`*
Optional. Sets a community string for write access. This string must differ from the read-community string. Input rules:

- The value is case sensitive.
- The value can have a maximum of 31 bytes.
- The value can include any character except: " < >
- A value that includes a space must be enclosed in double quotes.

Examples

Enable Critical events only, specify a trap host, and set the community string for read-only access.

```
# set snmp-parameters enable crit add-trap-host 172.22.4.171
read-community public
```

See also

set protocols

show snmp-parameters

test (with the `snmp` parameter)

set syslog-parameters

Description

Sets remote syslog notification parameters for events and managed logs. This allows events to be logged by the syslog of a specified host computer. Syslog is a protocol for sending event messages across an IP network to a logging server. This feature supports User Datagram Protocol (UDP) but not Transmission Control Protocol (TCP).

Minimum role

`manage`

Syntax

```
set syslog-parameters
   [host-ip IP-address]
   [host-port port-number]
   notification-level crit|error|warn|resolved|info|none
```

Parameters

`host-ip` *`IP-address`*
Optional. An IP address for the host. If `notification-level` is other than `none`, `host-ip` must be specified.

`host-port` *`port-number`*
Optional. A specific port number on the host.

`notification-level crit|error|warn|resolved|info|none`
The minimum severity for which the system should send notifications:

- `crit`: Sends notifications for Critical events only.
- `error`: Sends notifications for Error and Critical events.
- `warn`: Sends notifications for Warning, Error, and Critical events.
- `resolved`: Sends notifications for Resolved, Warning, Error, and Critical events.
- `info`: Sends notifications for all events.
- `none`: Disables syslog notification.

If `notification-level` is other than `none`, `host-ip` must be specified.

Examples

Set the system to send an entry to the remote server at 10.1.1.10 on port 514 when a critical event occurs.

```
# set syslog-parameters notification-level crit host-ip 10.1.1.10
host-port 514
```

See also

show syslog-parameters

test

set system

Description

Sets the system's name, contact person, location, and description. The name, location, and contact are included in event messages. All four values are included in system debug logs for reference by service personnel. When using the Disk Management Utility, the system name appears in the browser title bar or tab.

Input rules for each value:

- The value is case sensitive.
- The value can have a maximum of 79 bytes.
- The value can include spaces and printable UTF-8 characters except: " < > \
- A value that includes a space must be enclosed in double quotes.

Minimum role

`manage`

Syntax

```
set system
   [contact value]
   [info value]
   [location value]
   [name value]
```

Parameters

`contact value`
Optional. The name of the person who administers the system. The default is `Uninitialized Contact`.

`info value`
Optional. A brief description of what the system is used for or how it is configured. The default is `Uninitialized Info`.

`location value`
Optional. The location of the system. The default is `Uninitialized Location`.

`name value`
Optional. A name to identify the system. The default is `Uninitialized Name`.

Examples

Set the system name to `Test` and the contact to `J. Doe`.

```
# set system name Test contact "J. Doe"
```

See also

show system

set task

Description

Changes parameters for a TakeSnapshot or VolumeCopy task. For these types of tasks, you can change parameters other than name, type, or associated volumes. If you change the parameters for a running task, the changes will take effect the next time the task runs.

If you want to change parameters for a ResetSnapshot task or the name, type, or associated volumes for another type of task, create a new task to replace the existing one.

Minimum role

`manage`

Syntax

```
set task
   [last-snapshot]
   [replication-set]
```

```
[retention-count #]
[snapshot-prefix prefix]
name
```

Parameters

`last-snapshot`
Optional. For a `Replicate` task this specifies to replicate the most recent snapshot of the primary volume. This snapshot may have been created either manually or by the snapshot history feature.

`replication-set` *`replication-set-ID`*
Optional. For a `Replicate` task this specifies the ID of the replication set to replicate.

`retention-count #`
Optional. For a `TakeSnapshot` task this specifies the number of snapshots created by this task to retain, from 1 to 8 if the large-pools feature is enabled, or from 1 to 16 if the large-pools feature is disabled. When a new snapshot exceeds this limit, the oldest snapshot with the same prefix is deleted. If you reduce the retention count for a task, excess snapshots will be removed the next time the task runs.

`snapshot-prefix` *`prefix`*
Optional. For a `TakeSnapshot` task this specifies a label to identify snapshots created by this task. Input rules:

- The value is case sensitive.
- The value can have a maximum of 26 bytes.
- The value can include spaces and printable UTF-8 characters except: " , < \
- A value that includes a space must be enclosed in double quotes.

`name`
The name of the task to change. Input rules:

- The value is case sensitive.
- The value can have a maximum of 32 bytes.
- The value can include spaces and printable UTF-8 characters except: " , < \
- A value that includes a space must be enclosed in double quotes.

Examples

Change parameters for a `TakeSnapshot`-type task named `Snap`.

```
# set task snapshot-prefix VD1v1 retention-count 2 Snap
```

See also

create task

delete task

set schedule

show schedules

show tasks

set user

Description

Changes user preferences for the session or permanently. The system requires at least one CLI user with the `manage` role to exist.

A user with the `manage` role can change any parameter except name. A user with the monitor role can change any parameter for that user except name, roles, and interfaces.

NOTE: User changes take effect when the user next logs in.

Minimum role

`monitor`

Syntax

```
set user
   [authentication-type MD5|SHA|none]
   [base 2|10]
   [interfaces interfaces]
   [locale
   English|en|Spanish|es|French|fr|German|de|Italian|it|Japanese|ja|
   Korean|ko|Dutch|nl|Chinese-simplified|zh-s|Chinese-traditional|zh-t]
   [password password]
   [precision #]
   [privacy-password encryption-password]
   [privacy-type DES|AES|none]
   [roles roles]
   [session-preferences]
   [storage-size-base 2|10]
   [storage-size-precision #]
   [storage-size-units auto|MB|GB|TB]
   [temperature-scale celsius|c|fahrenheit|f]
   [timeout #]
   [trap-host IP-address]
   [type novice|standard|advanced|diagnostic]
   [units auto|MB|GB|TB]
   name
```

Parameters

`authentication-type MD5|SHA|none`
Optional. For an SNMPv3 user, this specifies whether to use a security authentication protocol. This parameter requires the `password` parameter and, for the `snmptarget` interface, the `trap-host` parameter.

- `MD5`: MD5 authentication. This is the default.
- `SHA`: SHA-1 authentication.
- `none`: No authentication.

`base 2|10`
Optional. Sets the base for entry and display of storage-space sizes:

- `2`: Sizes are shown as powers of 2, using 1024 as a divisor for each magnitude. In base 2 when you set a size, whether you specify a base-2 or base-10 size unit, the resulting size will be in base 2.
- `10`: Sizes are shown as powers of 10, using 1000 as a divisor for each magnitude. This is the default. In base 10 when you set a size, the resulting size will be in the specified unit. This option is the default.

Operating systems usually show volume size in base 2. Disk drives usually show size in base 10. Memory (RAM and ROM) size is always shown in base 2.

`interfaces` *`interfaces`*
Optional. Specifies the interfaces that the user can access. Multiple values must be separated by commas and no spaces. A command that specifies `snmpuser` or `snmptarget` cannot also specify a non-SNMP interface.

- `cli`: Command-line interface. This is enabled by default.
- `wbi`: Web-browser interface (the Disk Management Utility). This is enabled by default.
- `ftp`: FTP or SFTP interface.
- `smis`: Storage Management Initiative Specification (SMI-S) interface.
- `snmpuser`: Allows an SNMPv3 user to view the SNMP MIB.
- `snmptarget`: Allows an SNMPv3 user to receive SNMP trap notifications. This option requires the `trap-host` parameter.
- `none`: No interfaces.

To enable or disable protocols that can be used to access interfaces, use the set protocols command.

`locale English|en|Spanish|es|French|fr|German|de|Italian|it|Japanese|ja|Korean|ko|Dutch|nl|Chinese-simplified|zh-s|Chinese-traditional|zh-t`
Optional. The display language. The default is English.

`password` *`password`*
Optional in console format; required for API format. Input rules:

- The value is case sensitive.
- The value can have 8–32 characters.
- The value can include printable UTF-8 characters except a space or: " ' , < > \
- A value that includes only printable ASCII characters must include at least one uppercase character, one lowercase character, one numeric character, and one non-alphanumeric character.
- For an SNMPv3 user whose `authentication-type` parameter is set to use authentication, this specifies the authentication password.

`precision #`
Optional. Sets the number of decimal places (1–10) for display of storage-space sizes. The default is 1.

`privacy-password` *`encryption-password`*
Optional. For an SNMPv3 user whose privacy-type parameter is set to use encryption, this specifies the encryption password. The value is case sensitive and must contain 8–32 characters. A password cannot contain the following characters: angle brackets, backslash, comma, double quote, single quote, or space. If the password contains only printable ASCII characters then it must contain at least one uppercase character, one lowercase character, one numeric character, and one non-alphanumeric character.

`privacy-type DES|AES|none`
Optional. For an SNMPv3 user, this specifies whether to use a security encryption protocol. This parameter requires the `privacy-password` parameter and the `authentication-type` parameter.

- `DES`: Data Encryption Standard.
- `AES`: Advanced Encryption Standard.
- `none`: No encryption. This is the default.

`roles` *`roles`*
Optional. Specifies the user's roles as one or more of the following values:

- `monitor`: User can view but not change system settings. This is the default.
- `manage`: User can view and change system settings.
- `diagnostic`: User can view and change system settings.

Multiple values must be separated with a comma (with no spaces). If multiple values are specified, the user's access to commands will be determined by the highest role specified.

`session-preferences`
Optional. Specifies that the current CLI settings will become permanent settings for the user. This parameter cannot be combined with any other parameter.

`storage-size-base 2|10`
Optional. Alias for `base`.

`storage-size-precision #`
Optional. Alias for `precision`.

`storage-size-units auto|MB|GB|TB`
Optional. Alias for `units`.

`temperature-scale celsius|c|fahrenheit|f`
Optional. Sets the scale for display of temperature values:

- `fahrenheit` or `f`: Temperatures are shown in degrees Fahrenheit.
- `celsius` or `c`: Temperatures are shown in degrees Celsius. This is the default.

`timeout #`
Optional. Sets the timeout value in seconds for the login session. Valid values are 120–43200 seconds (2–720 minutes). The default is 1800 seconds (30 minutes).

`trap-host` *`IP-address`*
Optional. For an SNMPv3 user whose interface parameter is set to `snmptarget`, this specifies the IP address of the host that will receive SNMP traps.

`type novice|standard|advanced|diagnostic`
Optional. Identifies the user's experience level. This parameter is informational only and does not affect access to commands. The default is `standard`.

`units auto|MB|GB|TB`
Optional. Sets the unit for display of storage-space sizes:

- `auto`: Sizes are shown in units determined by the system. This is the default.

- MB: Sizes are shown in megabytes.
- GB: Sizes are shown in gigabytes.
- TB: Sizes are shown in terabytes.

Based on the precision setting, if a size is too small to meaningfully display in the selected unit, the system uses a smaller unit for that size. For example, if units is set to TB, precision is set to 1, and base is set to 10, the size 0.11709 TB is instead shown as 117.1 GB.

name
Specifies the user account to change. A name that includes a space must be enclosed in double quotes.

Examples

Change the temperature scale and accessible interfaces for user jsmith.

```
# set user jsmith temperature-scale f interfaces wbi,cli
```

Change the password for user JDoe.

```
# set user JDoe password Abcd%1234
```

Change the authentication type for SNMPv3 user Traps.

```
# set user Traps authentication-type MD5 password Snmp3%Trap
```

See also

set password

show users

set vdisk

Description

Changes parameters for a specified linear disk group. This command applies to linear storage only.

Minimum role

manage

Syntax

```
set vdisk
   [adapt-spare-capacity size[B|KB|MB|GB|TB|KiB|MiB|GiB|TiB]|default]
   [name new-name]
   [owner a|b]
   [spin-down-delay delay]
   vdisk
```

Parameters

`adapt-spare-capacity size[B|KB|MB|GB|TB|KiB|MiB|GiB|TiB]|default`
Optional. For an ADAPT disk group, this specifies the target spare capacity.

- *size*[B|KB|MB|GB|TB|KiB|MiB|GiB|TiB]: Sets the target spare capacity to a specific size. The unit is optional (B represents bytes). If no unit is specified, GiB will be used, regardless of the current base. Whichever unit is set, internally the value will be rounded down to the nearest GiB. If the value is set to 0, the absolute minimum spare space will be used. If this parameter is omitted, the default setting will be used.
- `default`: Sets the target spare capacity to the sum of the two largest disks in the disk group, which is sufficient to fully recover fault tolerance after loss of any two disks in the group.

`name` *new-name*
Optional. A new name for the disk group. A name that includes a space must be enclosed in double quotes.

`owner a|b`
Optional. The new owner: controller A or B.

CAUTION: Before changing the owning controller for a disk group, you must stop host I/O to the disk group's volumes. Volume mappings are not affected.

IMPORTANT: Changing ownership of a disk group while any volumes in the disk group are mapped to live hosts is not supported and may cause data loss or unavailability. All volumes in the disk group must be unmapped or attached hosts must be shut down before the ownership of a disk group is changed.

`spin-down-delay` *delay*
Optional. For spinning disks in non-ADAPT disk groups, this sets the period of inactivity after which the disk group's disks and dedicated spares will automatically spin down. Setting the delay to 1–360 minutes will enable spin down. Setting the delay to 0 will disable spin down.

Drive spin down affects disk operations as follows:

- Spun-down disks are not polled for SMART events.
- Operations requiring access to disks may be delayed while the disks are spinning back up.

vdisk
The name or serial number of the linear disk group to change. Input rules:

- The value is case sensitive.
- The value can have a maximum of 32 bytes.
- The value can include spaces and printable UTF-8 characters except: " , < \
- A value that includes a space must be enclosed in double quotes.

Examples

Rename linear disk group `VD1` to `VD2` and set its spin-down delay to 10 minutes.

```
# set vdisk name VD2 spin-down-delay 10 VD1
```

See also

show vdisks

set volume

Description

Changes parameters for a volume.

CAUTION: Applying new parameters may disrupt access from connected hosts.

For virtual storage, you can set the retention priority for snapshots of the volume. If automatic deletion of snapshots is enabled, snapshots will be considered for automatic deletion first by priority and then by date, so the oldest low-priority snapshot will be deleted first. A snapshot is eligible for deletion if all the following are true:

- The snapshot has a retention priority other than never-delete.
- The snapshot has no child snapshots.
- The snapshot is not mapped to a host.

NOTE: For virtual storage, changing the retention priority for a volume does not change the retention priority for existing child snapshots.

Minimum role

`manage`

Syntax

```
set volume
   [identifying-information description]
   [large-virtual-extents enabled|disabled|on|off]
   [name new-name]
   [ovms-uid ID]
   [snapshot-retention-priority never-delete|high|medium|low]
   [tier-affinity no-affinity|archive|performance]
   volume
```

Parameters

`identifying-information` *`description`*
Optional. A description of the volume to help a host-side user identify it. Input rules:

- The value is case sensitive.
- The value can have a maximum of 127 bytes.
- The value can include spaces and printable UTF-8 characters except: < \
- A value that includes a space must be enclosed in double quotes.

`large-virtual-extents enabled|disabled|on|off`
Optional. For a virtual volume, this sets whether the system will try to allocate pages in a sequentially optimized way to reduce I/O latency in SSD applications and improve performance.

- `disabled` or `off`: Optimized page allocation is disabled. This is the default.
- `enabled` or `on`: Optimized page allocation is enabled.

`name` *`new-name`*
Optional. A new name for the volume. Input rules:

- The value is case sensitive.
- The value can have a maximum of 32 bytes.
- The value can include spaces and printable UTF-8 characters except: " , < \
- A value that includes a space must be enclosed in double quotes.

`ovms-uid` *`ID`*
Optional. For a volume to be accessed by an OpenVMS host, assign a volume ID in the range 1–32767 to identify the volume to the host. If you specify this parameter you cannot specify the `identifying-information` parameter.

`snapshot-retention-priority never-delete|high|medium|low`
Optional. For virtual storage, this specifies the retention priority for snapshots of the volume.

- `never-delete`: Snapshots will never be deleted.
- `high`: Snapshots may be deleted after all eligible medium-priority snapshots have been deleted.
- `medium`: Snapshots may be deleted after all eligible low-priority snapshots have been deleted. This is the default.
- `low`: Snapshots may be deleted.

`tier-affinity no-affinity|archive|performance`
Optional. For virtual storage, this specifies how to tune the tier-migration algorithm for the volume. The `tier-affinity` setting affects all members of a snapshot tree.

- `no-affinity`: This setting uses the highest available performing tiers first and only uses the Archive tier when space is exhausted in the other tiers. Volume data will swap into higher performing tiers based on frequency of access and tier space availability. This is the default.
- `archive`: This setting prioritizes the volume data to the least performing tier available. Volume data can move to higher performing tiers based on frequency of access and available space in the tiers.
- `performance`: This setting prioritizes volume data to the higher performing tiers. If no space is available, lower performing tier space is used. Performance affinity volume data will swap into higher tiers based upon frequency of access or when space is made available.

`volume`
The name or serial number of the volume to change. A name that includes a space must be enclosed in double quotes.

Examples

Rename volume `Vol1` to `Vol2`.

```
# set volume name Vol2 Vol1
```

Set identifying information for `Vol3`.

```
# set volume identifying-information "Project X data" Vol3
```

Set volume `OldFiles` to have affinity for the Archive tier.

```
# set volume tier-affinity archive OldFiles
```

Change the snapshot retention priority for `Vol1` to low.

```
# set volume snapshot-retention-priority low Vol1
```

See also

show maps

show volumes

set volume-cache-parameters

Description

Sets cache options for a specified volume or specified volumes.

NOTE: Only change the read-ahead cache settings if you fully understand how the host operating system, application, and adapter move data so that you can adjust the settings accordingly. Be prepared to monitor system performance and adjust read-ahead size until you find the optimal size for your application.

CAUTION: Changing the cache optimization setting while I/O is active can cause data corruption or loss. Before changing this setting, quiesce I/O from all initiators.

Minimum role

`manage`

Syntax

set volume-cache-parameters

[optimization standard|no-mirror]

[read-ahead-size disabled|adaptive|stripe|512KB|1MB|2MB|4MB|8MB|16MB|32MB]

[write-policy write-back|write-through|wb|wt]

volume|all

Parameters

`optimization standard|no-mirror`
Optional. Sets the cache optimization mode:

- `standard`: This controller cache mode of operation is optimized for sequential and random I/O and is the optimization of choice for most workloads. In this mode, the cache is kept coherent with the partner controller. This mode gives you high performance and high redundancy. This is the default.
- `no-mirror`: In this mode of operation, the controller cache performs the same as the standard mode with the exception that the cache metadata is not mirrored to the partner. While this improves the response time of write I/O, it comes at the cost of redundancy. If this option is used, the user can expect higher write performance but is exposed to data loss if a controller fails.

`read-ahead-size disabled|adaptive|stripe|512KB|1MB|2MB|4MB|8MB|16MB|32MB`
Optional. Controls the use and size of read-ahead cache. You can optimize a volume for sequential reads or streaming data by changing the amount of data read in advance. Read ahead is triggered by sequential accesses to consecutive logical block address (LBA) ranges. Read ahead can be forward

(increasing LBAs) or reverse (decreasing LBAs). Increasing the read-ahead size can greatly improve performance for multiple sequential read streams. However, increasing read-ahead size will likely decrease random read performance.

- `disabled`: Disables read ahead.
- `adaptive`: Enables adaptive read-ahead, which allows the controller to dynamically calculate the optimum read-ahead size for the current workload. This is the default.
- `stripe`: Sets the read-ahead size to one stripe. The controllers treat NRAID and RAID-1 disk groups internally as if they have a stripe size of 512 KB, even though they are not striped.
- `512KB, 1MB, 2MB, 4MB, 8MB, 16MB, or 32MB`: Sets a specific read-ahead size.

`write-policy write-back|write-through|wb|wt`
Optional. Sets the cache write policy, which determines when cached data is written to the disks. The ability to hold data in cache while it is being written to disk can increase storage device speed during sequential reads.

- `write-back` or `wb`: Write-back caching does not wait for data to be completely written to disk before signaling the host that the write is complete. This is the preferred setting for a fault-tolerant environment because it improves the performance of write operations and throughput. This is the default.
- `write-through` or `wt`: Write-through caching significantly impacts performance by waiting for data to be completely written to disk before signaling the host that the write is complete. Use this setting only when operating in an environment with low or no fault tolerance.

You can configure the write policy to automatically change from write-back to write-through when certain environmental events occur, such as a fan failure. For details, see help for the set advanced-settings command.

`volume`
The name or serial number of the volume to change. A name that includes a space must be enclosed in double quotes.

`volume``|all`
Specifies either:

- The name or serial number of the volume to change. A name that includes a space must be enclosed in double quotes.
- `all`: Apply the changes to all volumes.

Examples

Set the cache policy, optimization mode, and read-ahead size for volume `V1`.

```
# set volume-cache-parameters write-policy wb optimization standard
read-ahead-size stripe V1
```

See also

show cache-parameters

show volumes

set volume-group

Description

Sets the name of a volume group.

NOTE: You cannot rename a volume group that is in a replication set.

Minimum role

`manage`

Syntax

```
set volume-group
   name new-name
   volume-group
```

Parameters

`name` *new-name*
A new name for the volume group. Input rules:

- The value is case sensitive.
- The value can have a maximum of 32 bytes.
- The value can include spaces and printable UTF-8 characters except: " , < \
- A value that includes a space must be enclosed in double quotes

volume-group
The current name of the volume group. A value that includes a space must be enclosed in double quotes.

Examples

Change the name of `VGroup1` to `MyVGroup`.

```
# set volume-group name MyVGroup VGroup1
```

See also

show volume-groups

show advanced-settings

Description

Shows the settings for advanced system-configuration parameters.

Minimum role

`monitor`

Syntax

```
show advanced-settings
```

Output

`Disk Group Background Scrub (v3)`
Shows whether disks in disk groups are automatically checked for disk defects to ensure system health. The interval between a scrub finishing and starting again is specified by the Disk Group `Background Scrub Interval` field.

- `Disabled`: Background disk-group scrub is disabled.
- `Enabled`: Background disk-group scrub is enabled.

`Vdisk Background Scrub (v2)`
Shows whether disks in disk groups are automatically checked for disk defects to ensure system health. The interval between a scrub finishing and starting again is specified by the Vdisk `Background Scrub Interval` field.

- `Disabled`: Background disk-group scrub is disabled.
- `Enabled`: Background disk-group scrub is enabled.

`Disk Group Background Scrub Interval (v3)`
Shows the interval between background disk-group scrub finishing and starting again, from 0 to 360 hours.

`Vdisk Background Scrub Interval (v2)`
Shows the interval between background disk-group scrub finishing and starting again, from 0 to 360 hours.

`Partner Firmware Upgrade`
Shows whether component firmware versions are monitored and will be automatically updated on the partner controller.

- `Disabled`: Partner firmware upgrade is disabled.
- `Enabled`: Partner firmware upgrade is enabled.

`Utility Priority`
Priority at which data-redundancy utilities, such as disk-group verify and reconstruct, run with respect to I/O operations competing for the system's processors. (This does not affect disk-group background scrub, which always runs at “background” priority.)

- `High`: Utilities have higher priority than host I/O. This can cause heavy I/O to be slower than normal.
- `Medium`: Utility performance is balanced with host I/O performance.
- `Low`: Utilities run at a slower rate with minimal effect on host I/O.

SMART
Shows whether SMART (Self-Monitoring Analysis and Reporting Technology) is enabled or disabled for disks.

- Detect-Only: Each disk in the system retains its individual SMART setting, as will new disks added to the system.
- Enabled: SMART is enabled for all disks in the system and will be enabled for new disks added to the system.
- Disabled: SMART is disabled for all disks in the system and will be disabled for new disks added to the system.

Dynamic Spare Configuration
Shows whether the storage system will automatically use a compatible disk as a spare to replace a failed disk in a disk group if no compatible spare is available.

- Disabled: The dynamic spares feature is disabled.
- Enabled: The dynamic spares feature is enabled.

Enclosure Polling Rate
Shows the interval in seconds at which the storage system will poll each chassis's Enclosure Management Processor (EMP) for status changes, from 5 to 3600 seconds.

Host Control of Caching
Shows whether hosts are allowed to use the SCSI MODE SELECT command to change the storage system's write-back cache setting.

- Disabled: Host control of caching is disabled.
- Enabled: Host control of caching is enabled.

Sync Cache Mode
Shows how the SCSI SYNCHRONIZE CACHE command is handled:

- Immediate: Good status is returned immediately and cache content is unchanged.
- Flush To Disk: Good status is returned only after all write-back data for the specified volume is flushed to disk.

Independent Cache Performance Mode
Shows the cache redundancy mode for a dual-controller storage system.

- Disabled: Controller failover is enabled and data in a controller's write-back cache is mirrored to the partner controller.
- Enabled: The controllers use Independent Cache Performance Mode, in which controller failover is disabled and data in a controller's write-back cache is not mirrored to the partner controller. This improves write performance at the risk of losing unwritten data if a controller failure occurs while there is data in controller cache.

Missing LUN Response
Shows whether host drivers may probe for LUNs until the host drivers reach the LUN to which they have access.

- Not Ready: Sends a reply that there is a LUN where a gap has been created but that it's "not ready." Sense data returned is sensekey = 2, code = 4, qualifier = 3.
- Illegal Request: Sends a reply that there is a LUN but that the request is "illegal." Sense data returned is sensekey = 5, code = 25h, qualifier = 0.

Controller Failure
Shows whether the cache policy will change from write-back to write-through when a controller fails.

- Disabled: The controller failure trigger is disabled.
- Enabled: The controller failure trigger is enabled.

`Supercap Failure`
Shows whether the cache policy will change from write-back to write-through when the supercapacitor that provides backup power for cache is not fully charged or fails.

- `Disabled`: The supercapacitor failure trigger is disabled.
- `Enabled`: The supercapacitor failure trigger is enabled.

`CompactFlash Failure`
Shows whether the cache policy will change from write-back to write-through when CompactFlash memory is not detected during POST (Power-On Self-Test), fails during POST, or fails during controller operation.

- `Disabled`: The CompactFlash failure trigger is disabled.
- `Enabled`: The CompactFlash failure trigger is enabled.

`Power Supply Failure`
Shows whether the cache policy will change from write-back to write-through when a power supply fails.

- `Disabled`: The power-supply failure trigger is disabled.
- `Enabled`: The power-supply failure trigger is enabled.

`Fan Failure`
Shows whether the cache policy will change from write-back to write-through when a fan fails.

- `Disabled`: The fan failure trigger is disabled.
- `Enabled`: The fan failure trigger is enabled.

`Temperature Exceeded`
Shows whether the system will shut down a controller when its temperature exceeds the critical operating range.

- `Disabled`: The over-temperature failure trigger is disabled.
- `Enabled`: The over-temperature failure trigger is enabled.

`Partner Notify`
Shows whether the partner controller will be notified when a trigger condition occurs.

- `Disabled`: Notification is disabled. The partner controller will continue using its current caching mode.
- `Enabled`: Notification is enabled. The partner controller will change to write-through mode for better data protection.

`Auto Write Back`
Shows whether the cache mode will change from write-through to write-back when the trigger condition is cleared.

- `Disabled`: Auto-write-back is disabled.
- `Enabled`: Auto-write-back is enabled.

`Inactive Drive Spin Down`
Shows whether spinning disks that are available or are global spares will spin down after a period of inactivity shown by the `Inactive Drive Spin Down Delay` field.

- `Disabled`: Drive spin down for available disks and global spares is disabled.
- `Enabled`: Drive spin down for available disks and global spares is enabled.

`Inactive Drive Spin Down Delay`
Shows the period of inactivity in minutes after which spinning disks that are available or are global spares will spin down, from 1 to 360 minutes. The value 0 means spin down is disabled.

`Disk Background Scrub`
Shows whether disks that are not in disk groups are automatically checked for disk defects to ensure system health. The interval between background disk scrub finishing and starting again is 72 hours.

- `Disabled`: Background disk scrub is disabled.
- `Enabled`: Background disk scrub is enabled.

`Managed Logs`
Shows whether the managed logs feature is enabled, which allows log files to be transferred from the storage system to a log collection system to avoid losing diagnostic data as logs fill.

- `Disabled`: The managed logs feature is disabled.
- `Enabled`: The managed logs feature is enabled.

`Single Controller Mode`
For a system that had two controller modules but now has only one and is intended to be used as a single-controller system, this property shows whether the operating/redundancy mode is set to Single Controller. This prevents the system from reporting the absent partner controller as an error condition. This parameter does not affect any other system settings. Installing a second, functional controller module will change the mode to Active-Active ULP.

- `Enabled`: Single Controller mode is enabled.
- `Disabled`: Single Controller mode is disabled.

`Auto Stall Recovery`
Shows whether the auto stall recovery feature is enabled, which detects situations where a controller stall is preventing I/O operations from completing, and recovers the system so that at least one controller is operational, thus avoiding data-unavailability situations. This feature focuses failover/recovery stalls. When a stall is detected, event 531 is logged.

- `Disabled`: Auto stall recovery is disabled. The system will constantly perform auto stall detection in the background but will not automatically perform recovery actions.
- `Enabled`: Auto stall recovery is enabled. The system will constantly perform auto stall detection in the background and automatically perform recovery actions.

`Restart on CAPI Fail`
Shows whether a Storage Controller that experiences a CAPI hang will be forced to restart. A CAPI hang is perceived as a management-interface hang. As part of the restart process, a dump file is created and event 107 is logged. To provide the dump file to technical support for debugging, use the Save Logs action in the Disk Management Utility.

`Large Pools`
Shows whether the large-pools feature is enabled. This option provides the capability to create a virtual pool larger than 512 TiB on each controller by limiting the number of user-defined snapshots that can be created in snapshot trees.

- `Enabled`: The maximum size for a virtual pool will be 1024 TiB (1 PiB). The maximum number of volumes per snapshot tree will be 9 (base volume plus 8 snapshots).
- `Disabled`: The maximum size for a virtual pool will be 512 TiB. The maximum number of volumes per snapshot tree will be 255 (base volume plus 254 snapshots).

Examples

Show advanced system-configuration settings.

```
# show advanced-settings
```

Basetypes

advanced-settings-table

status

See also

set advanced-settings

show cache-parameters

Description

Shows cache settings and status for the system and optionally for a volume.

Minimum role

`monitor`

Syntax

```
show cache-parameters
   [volume]
```

Parameters

volume
Optional. Name or serial number of the volume for which to show settings. A name that includes a space must be enclosed in double quotes. If this parameter is not specified, only system-wide settings are shown.

Output

System cache parameters:

`Operation Mode`
Shows the system's operating mode, also called the cache redundancy mode:

- `Independent Cache Performance Mode`: For a dual-controller system, controller failover is disabled and data in a controller's write-back cache is not mirrored to the partner controller. This improves write performance at the risk of losing unwritten data if a controller failure occurs while there is data in controller cache.
- `Active-Active ULP`: Both controllers are active using ULP (Unified LUN Presentation). Data for volumes configured to use write-back cache is automatically mirrored between the two controllers to provide fault tolerance.
- `Single Controller`: The chassis contains a single controller.
- `Failed Over`: Operation has failed over to one controller because its partner is not operational. The system has lost redundancy.
- `Down`: Both controllers are not operational.

Controller cache parameters:

`Write Back Status`
Shows the current, system-wide cache policy as determined by auto-write-through logic. This value is not settable by users. If an auto-write-through trigger condition (such as a CompactFlash failure) is met, the cache policy for all volumes changes to write-through, overriding the volume-specific settings. When the problem is corrected, the cache policy reverts to the value configured for each individual volume.

- `Enabled`: Write-back. This is the normal state.
- `Disabled`: Write-through.
- `Not up`: The controller is not up.

`CompactFlash Status`

- `Not Installed`: The CompactFlash card is not installed.
- `Installed`: The CompactFlash card is installed.

`CompactFlash Health`

- `OK`
- `Degraded`
- `Fault`
- `N/A`
- `Unknown`

`Cache Flush`

- `Enabled`: If the controller loses power, it will automatically write cache data to the CompactFlash card. Cache flush is normally enabled, but is temporarily disabled during controller shut down.
- `Disabled`: Cache flush is disabled.

Volume cache parameters:

`Serial Number`
If a volume is specified, its serial number.

`Name`
If a volume is specified, its name.

`Cache Write Policy`
If a volume is specified, its cache write policy:

- `write-back`: Write-back caching does not wait for data to be completely written to disk before signaling the host that the write is complete. This is the preferred setting for a fault-tolerant environment because it improves the performance of write operations and throughput.
- `write-through`: Write-through caching significantly impacts performance by waiting for data to be completely written to disk before signaling the host that the write is complete. Use this setting only when operating in an environment with low or no fault tolerance.

`Cache Optimization`
If a volume is specified, its cache optimization mode:

- `standard`: This controller cache mode of operation is optimized for sequential and random I/O and is the optimization of choice for most workloads. In this mode, the cache is kept coherent with the partner controller. This mode gives you high performance and high redundancy.
- `no-mirror`: In this mode of operation, the controller cache performs the same as the standard mode with the exception that the cache metadata is not mirrored to the partner. While this

improves the response time of write I/O, it comes at the cost of redundancy. If this option is used, the user can expect higher write performance but is exposed to data loss if a controller fails.

`Read Ahead Size`
If a volume is specified, its read-ahead cache setting:

- `Disabled`: Read-ahead is disabled.
- `Adaptive`: Adaptive read-ahead is enabled, which allows the controller to dynamically calculate the optimum read-ahead size for the current workload.
- `Stripe`: Read-ahead is set to one stripe. The controllers treat NRAID and RAID-1 disk groups internally as if they have a stripe size of 512 KB, even though they are not striped.
- `512 KB`, `1 MB`, `2 MB`, `4 MB`, `8 MB`, `16 MB`, or `32 MB`: Size selected by a user.

Examples

Show the cache parameters for the system and for volume `V1`.

```
# show cache-parameters V1
```

Basetypes

cache-settings

cache-parameter

status

See also

set volume-cache-parameters

show volumes

show certificate

Description

Shows the status of the system's security certificate.

Minimum role

`manage`

Syntax

```
show certificate
   [a|b|both]
```

Parameters

`a|b|both`
Optional. Specifies whether to show information for controller A, B, or both. If this parameter is omitted, information is shown for both controllers.

Output

Properties are described in alphabetical order.

`Certificate Status`

- `Customer-supplied`: The controller is using a certificate that you have uploaded.
- `System-generated`: The controller is using system-generated certificates.
- `Unknown status`: The controller's certificate cannot be read. This most often occurs when a controller is restarting or the certificate replacement process is still in process.

`Certificate Text`
The full text of the certificate.

`Controller`

- `A`: Controller A.
- `B`: Controller B.

`Time Created`
The date and time in the format `year-month-day hour:minutes:seconds` when the certificate was created.

Examples

Show certificate status for the system.

```
# show certificate
```

Basetypes

certificate-status

status

See also

create certificate

show chap-records

Description

Shows CHAP records for iSCSI originators.

This command is permitted whether or not CHAP is enabled.

Minimum role

`monitor`

Syntax

```
show chap-records
   [name originator-name]
   [show-secrets]
```

Parameters

`name originator-name`
Optional. The originator name, typically in IQN format. If this parameter is omitted, all CHAP records are shown.

`show-secrets`
Optional. Minimum role: `manage`. Shows `Initiator Secret` and `Mutual CHAP Secret` values in command output. If this parameter is omitted, secret values are not shown.

Output

`Initiator Name`
The originator name.

`Initiator Secret`
The secret that the recipient uses to authenticate the originator.

`Mutual CHAP Name`
For mutual CHAP, the recipient name.

`Mutual CHAP Secret`
For mutual CHAP, the secret that the originator uses to authenticate the recipient.

Examples

As a user with the `monitor` role, show the CHAP record for a specific host initiator.

```
# show chap-records name iqn.1991-05.com.microsoft:myhost.domain
```

As a user with the `manage` role, show the CHAP record for a specific host initiator.

```
# show chap-records name iqn.1991-05.com.microsoft:myhost.domain
show-secrets
```

Basetypes

chap-records

status

See also

create chap-record

delete chap-records

set chap-record

show iscsi-parameters

show cli-parameters

Description

Shows the current CLI session preferences.

Minimum role

`monitor`

Syntax

```
show cli-parameters
```

Output

`Timeout`
The time in seconds that the session can be idle before it automatically ends. Valid values are 120–43200 seconds (2–720 minutes).

`Output Format`

- `Console`: Supports interactive use of the CLI by displaying command output in easily readable format. This format automatically sizes fields according to content and adjusts content to window resizes.
- `api`: Supports scripting by displaying command output in XML. All objects are displayed at the same level, related by `COMP` elements.
- `api-embed`: Alternate form of XML output which displays "child" objects embedded (indented) under "parent" objects.
- `ipa`: Alternate form of XML output output which displays like `api-embed` format with `brief` mode enabled.
- `json`: Standard JavaScript Object Notation (JSON) output.
- `wbi`: A JSON-like format used internally by the Disk Management Utility.

`Brief Mode`

- `Enabled`: In XML output, shows a subset of attributes of object properties. The name and type attributes are always shown.
- `Disabled`: In XML output, shows all attributes of object properties.

`Base`
The base for entry and display of storage-space sizes:

- `2`: Sizes are shown as powers of 2, using 1024 as a divisor for each magnitude.
- `10`: Sizes are shown as powers of 10, using 1000 as a divisor for each magnitude.

Operating systems usually show volume size in base 2. Disk drives usually show size in base 10. Memory (RAM and ROM) size is always shown in base 2.

`Pager`

- `Enabled`: Halts output after each full screen to wait for keyboard input.
- `Disabled`: Output is not halted. When displaying output in API format, which is intended for scripting, disable paging.

`Locale`
The display language.

`Precision`
The number of decimal places (1–10) shown for display of storage-space sizes.

`Units`
The unit for display of storage-space sizes:

- `Auto`: Sizes are shown in units determined by the system.
- `MB`: Sizes are shown in megabytes.
- `GB`: Sizes are shown in gigabytes.
- `TB`: Sizes are shown in terabytes.

Based on the precision setting, if a size is too small to meaningfully display in the selected unit, the system uses a smaller unit for that size. For example, if `Units` is set to TB, `Precision` is set to 1, and `Base` is set to 10, the size 0.11709 TB is instead shown as 117.1 GB.

`Temperature Scale`

- `Fahrenheit`: Temperatures are shown in degrees Fahrenheit.
- `Celsius`: Temperatures are shown in degrees Celsius.

`Management Mode`
The management mode used in the current CLI session.

- `Linear`: Uses linear-storage terminology in command output and system messages. For example, vdisk for disk groups and pools.
- `Virtual`: Uses terminology in command output and system messages that is generalized for managing virtual and linear storage. For example, disk group for disk groups and pool for pools.

To see the default management mode, use the show protocols command.

Examples

Show current CLI settings.

```
# show cli-parameters
```

Basetypes

cli-parameters

status

See also

set cli-parameters

show protocols

show configuration

Description

Shows system configuration information.

NOTE: Output for this command is lengthy. To control whether the output halts after each full screen to wait for keyboard input, enable or disable the pager parameter of the set cli-parameters command.

Minimum role

`monitor`

Syntax

```
show configuration
```

Output

- System information from show system
- Controller information from show controllers
- Controller firmware and hardware version information from show versions with the `detail` parameter
- Host and expansion port information from show ports
- Disk information from show disks
- Disk-slot information from show disks with the `encl` parameter
- Vdisk information from show vdisks
- Disk-group information from show disk-groups
- Pool information from show pools
- Chassis information from show enclosures
- Field-replaceable unit (FRU) information from show frus

Show information about the system configuration.

```
# show configuration
```

Basetypes

system

controllers

versions

port

drives

enclosure-list

virtual-disks

disk-groups

pools

enclosures

enclosure-fru

status

show controller-date

Description

Shows the system's current date and time.

Minimum role

`monitor`

Syntax

```
show controller-date
```

Output

`Controller Date`
Date and time in the format *`year-month-day hour:minutes:seconds`*.

`Time-Zone Offset`
The system's time zone as an offset in hours and minutes from Coordinated Universal Time (UTC). This is shown only if NTP is enabled.

Examples

Show the system date and time.

```
# show controller-date
```

Basetypes

time-settings-table

status

See also

set controller-date

set ntp-parameters

show ntp-status

show controllers

Description

Shows information about each controller module in the storage system.

Minimum role

monitor

Syntax

```
show controllers
```

Output

Controller ID

- A: Controller A.
- B: Controller B.

Serial Number

- Serial number of the controller module.
- Not Available: The controller module is down or not installed.

Hardware Version
Controller module hardware version.

CPLD Version
Complex Programmable Logic Device firmware version.

MAC Address
Controller network port MAC address.

WWNN
Storage system World Wide Node Name (WWNN).

IP Address
Controller network port IP address.

IP Subnet Mask
Controller network port IP subnet mask.

IP Gateway
Controller network port gateway IP address.

Disks
Number of disks in the storage system.

Virtual Pools
Number of virtual pools in the storage system.

Disk Groups (v3)
Number of disk groups in the storage system.

Vdisks (v2)
Number of disk groups in the storage system.

System Cache Memory (MB)
Controller module cache memory size, in MB, including CPU memory available to I/O.

`Host Ports`
Number of host ports in the controller module.

`Disk Channels`
Number of expansion ports in the controller chassis.

`Disk Bus Type`
Type of interface between the controller module and disks:

- `SAS`

`Status`

- `Operational`
- `Down`
- `Not Installed`

`Failed Over to This Controller`
Indicates whether the partner controller has failed over to this controller:

- `No`: The partner controller has not failed over to this controller.
- `Yes`: The partner controller has either failed or been shut down, and its responsibilities have been taken over by this controller. There will be a delay between the time that the value of Status becomes Down for one controller and the time that the value of Failed Over to This Controller becomes Yes for the other controller. This time period is the time that it takes for a controller to take over the responsibilities of its partner.

`Fail Over Reason`
If `Failed Over to This Controller` is `Yes`, a reason for the failover appears; otherwise, `Not applicable` appears.

`Multi-core`
Shows whether the controller module is using multiple processing cores.

- `Enabled`: Multiple cores are active.
- `Disabled`: A single core is active.

`Health`

- `OK`
- `Degraded`
- `Fault`
- `N/A`
- `Unknown`

`Health Reason`
If Health is not `OK`, this field shows the reason for the health state.

`Health Recommendation`
If Health is not `OK`, this field shows recommended actions to take to resolve the health issue.

`Position`
Position of the controller in the chassis:

- `Left`: The controller is in the left slot.
- `Right`: The controller is in the right slot.
- `Top`: The controller is in the top slot.
- `Bottom`: The controller is in the bottom slot.

`Phy Isolation`
Shows whether the automatic disabling of SAS expander PHYs having high error counts is enabled or disabled for this controller.

- `Enabled`: PHY fault isolation is enabled.
- `Disabled`: PHY fault isolation is disabled.

`Controller Redundancy Mode`
Shows the system's operating mode, also called the cache redundancy mode:

- `Independent Cache Performance Mode`: For a dual-controller system, controller failover is disabled and data in a controller's write-back cache is not mirrored to the partner controller. This improves write performance at the risk of losing unwritten data if a controller failure occurs while there is data in controller cache.
- `Active-Active ULP`: Both controllers are active using ULP (Unified LUN Presentation). Data for volumes configured to use write-back cache is automatically mirrored between the two controllers to provide fault tolerance.
- `Single Controller`: The chassis contains a single controller.
- `Failed Over`: Operation has failed over to one controller because its partner is not operational. The system has lost redundancy.
- `Down`: Both controllers are not operational.

`Controller Redundancy Status`

- `Redundant with independent cache`: Both controllers are operational but are not mirroring their cache metadata to each other.
- `Redundant`: Both controllers are operational.
- `Operational but not redundant`: In active-active mode, one controller is operational and the other is offline. In single-controller mode, the controller is operational.
- `Down`: This controller is not operational.
- `Unknown`: Status information is not available.

Examples

Show controller information.

```
# show controllers
```

Basetypes

controllers

status

See also

show configuration

show frus

show controller-statistics

Description

Shows live performance statistics for controller modules. For controller performance statistics, the system samples live data every 15 seconds.

Statistics shown only in API output are described in API Basetype Properties on page 351.

Minimum role

`monitor`

Syntax

```
show controller-statistics
   [a|b|both]
```

Parameters

`a|b|both`
Optional. Specifies whether to show information for controller A, B, or both. If this parameter is omitted, information is shown for both controllers.

Output

`Durable ID`
The controller ID in the format `controller_ID`.

`CPU Load`
The percentage of time the CPU is busy, from 0 to 100.

`Power On Time (Secs)`
The number of seconds since the controller was restarted.

`Bps`
The data transfer rate, in bytes per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.

`IOPS`
The input/output operations per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.

`Reads`
The number of read operations since these statistics were last reset or since the controller was restarted.

`Writes`
The number of write operations since these statistics were last reset or since the controller was restarted.

`Data Read`
The amount of data read since these statistics were last reset or since the controller was restarted.

`Data Written`
The amount of data written since these statistics were last reset or since the controller was restarted.

`Num Forwarded Cmds`
The current count of commands that are being forwarded or are queued to be forwarded to the partner controller for processing. This value will be zero if no commands are being forwarded or are queued to be forwarded.

`Reset Time`
The date and time, in the format *`year-month-day hour:minutes:seconds`*, when these statistics were last reset, either by a user or by a controller restart.

`Total Power On Hours`
The total amount of hours the controller has been powered on in its life time.

Examples

Show statistics for controller A.

```
# show controller-statistics a
```

Basetypes

controller-statistics

status

See also

reset all-statistics

reset controller-statistics

show debug-log-parameters

Description

Shows which debug message types are enabled (`On`) or disabled (`Off`) for inclusion in the Storage Controller debug log.

NOTE: This command is for use by or with direction from technical support.

Minimum role

`monitor`

Syntax

```
show debug-log-parameters
```

Output

For a description of each message type parameter, see set debug-log-parameters.

Examples

Show debug log parameters.

```
# show debug-log-parameters
```

Basetypes

debug-log-parameters

status

See also

set debug-log-parameters

show disk-groups

Description

Shows information about disk groups. The command will show information for all disk groups by default, or you can use parameters to filter the output.

Minimum role

monitor

Syntax

```
show disk-groups
   [detail]
   [pool pool]
   [disk-groups]
```

Parameters

`detail`
Optional. This parameter shows additional detail about disk groups.

`pool` *`pool`*
Optional. Specifies the name or serial number of the pool that contains the disk groups for which to show information. If this parameter is omitted, information is shown for disk groups in all pools.

`disk-groups`
Optional. A comma-separated list of the names or serial numbers of the disk groups for which to show information. A name that includes a space must be enclosed in double quotes. If this parameter is omitted, information is shown for all disk groups.

Output

Properties are described in alphabetical order.

`% of Pool`
Shown by the detail parameter. The percentage of pool capacity that the disk group occupies.

`Action`
If Health is not `OK`, this field shows recommended actions to take to resolve the health issue.

`Active Drive Spin Down Delay`
Shown by the detail parameter. For spinning disks in a linear disk group, the period of inactivity after which the disks and dedicated spares will automatically spin down, from 1 to 360 minutes. The value 0 means spin down is disabled. For virtual storage, not applicable.

`Active Drive Spin Down Enable`
Shown by the `detail` parameter.

- `Disabled`: DSD is disabled for the disk group.
- `Enabled - all spinning`: DSD is enabled for the disk group.
- `Partial spin-down`: DSD is enabled for the disk group and its disks are partially spun down to conserve power.
- `Full spin-down`: DSD is enabled for the disk group and its disks are fully spun down to conserve power.

`ADAPT Actual Spare Capacity`
Shown by the `detail` parameter.

- For an ADAPT disk group, the actual spare capacity in GiB.
- For a non-ADAPT disk group, `N/A`.

`ADAPT Critical Disk Capacity`
Shown by the `detail` parameter. For an ADAPT disk group, the amount of storage space that is not currently protected against disk loss, in GiB. (Normally all data is protected against loss of two disks.)

`ADAPT Degraded Disk Capacity`
Shown by the `detail` parameter. For an ADAPT disk group, the amount of storage space that is protected against loss of a single disk only, in GiB. (Normally all data is protected against loss of two disks.)

`ADAPT Target Spare Capacity`
Shown by the `detail` parameter.

- *`size`*: The target spare capacity in GiB. If the value is 0, the absolute minimum spare space will be used.
- `default`: The target spare capacity will be the sum of the two largest disks in the disk group, which is sufficient to fully recover fault tolerance after loss of any two disks in the group.
- For a non-ADAPT disk group, `N/A`.

`Blocksize`
Shown by the `detail` parameter. The size of a block, in bytes.

`Chunk Size`
Shown by the `detail` parameter.

- For RAID levels except NRAID and RAID 1 and RAID 50, the chunk size for the disk group.
- For NRAID and RAID 1, chunk-size has no meaning and is therefore shown as not applicable (N/A).
- For RAID 50, the disk-group chunk size calculated as: *configured-chunk-size* × (*subgroup-members* - 1). For a disk group configured to use 64-KB chunk size and 4-disk subgroups, the value would be 192k (64KB x 3).

`Class`
Shown by the `detail` parameter.

- `Linear`: The disk group acts as a linear pool.
- `Virtual`: The disk group is in a virtual pool.

`Current Job Completion`
Shown by the `detail` parameter. See `Job%`, below.

`Current Job`

- `DRSC`: A disk is being scrubbed.
- `EXPD`: The disk group is being expanded.

- INIT: The disk group is initializing.
- RBAL: The ADAPT disk group is being rebalanced.
- RCON: At least one disk in the disk group is being reconstructed.
- VDRAIN: The virtual disk group is being removed and its data is being drained to another disk group.
- VPREP: The virtual disk group is being prepared for use in a virtual pool.
- VRECV: The virtual disk group is being recovered to restore its membership in the virtual pool.
- VREMV: The disk group and its data are being removed.
- VRFY: The disk group is being verified.
- VRSC: The disk group is being scrubbed.
- Blank if no job is running.

Current Owner
Shown by the detail parameter. See Own, below.

Disks
The number of disks in the disk group.

Free
The amount of free space in the disk group, formatted to use the current base, precision, and units.

Health

- OK
- Degraded
- Fault
- N/A
- Unknown

Health Reason
Shown by the detail parameter. See Reason, below.

Health Recommendation
Shown by the detail parameter. See Action, above.

Job%

- 0%-99%: Percent complete of running job
- Blank if no job is running (job has completed)

Name
The name of the disk group.

Own
Either the preferred owner during normal operation or the partner controller when the preferred owner is offline.

Pool
The name of the pool that contains the disk group.

Preferred Owner
Shown by the detail parameter. Controller that owns the disk group and its volumes during normal operation.

RAID
The RAID level of the disk group.

Reason
If Health is not OK, this field shows the reason for the health state.

Sec Fmt
The sector format of disks in the disk group.

- 512n: All disks use 512-byte native sector size. Each logical block and physical block is 512 bytes.
- 512e: All disks use 512-byte emulated sector size. Each logical block is 512 bytes and each physical block is 4096 bytes. Eight logical blocks will be stored sequentially in each physical block. Logical blocks may or may not be aligned with physical block boundaries.
- Mixed: The disk group contains a mix of 512n and 512e disks. This is supported, but for consistent and predictable performance, do not mix disks of different sector size types (512n, 512e).

Sector Format
Shown by the detail parameter. See Sec Fmt, above.

Serial Number
Shown by the detail parameter. The serial number of the disk group.

Size
The capacity of the disk group, formatted to use the current base, precision, and units.

Spares
Shown by the detail parameter. For a linear disk group, the number of spares assigned to the disk group. For a virtual disk group, 0.

Status

- CRIT: Critical. The disk group is online but isn't fault tolerant because some of its disks are down.
- DMGD: Damaged. The disk group is online and fault tolerant, but some of its disks are damaged.
- FTDN: Fault tolerant with a down disk. The disk group is online and fault tolerant, but some of its disks are down.
- FTOL: Fault tolerant and online.
- MSNG: Missing. The disk group is online and fault tolerant, but some of its disks are missing.
- OFFL: Offline. Either the disk group is using offline initialization, or its disks are down and data may be lost.
- QTCR: Quarantined critical. The disk group is critical with at least one inaccessible disk. For example, two disks are inaccessible in a RAID-6 disk group or one disk is inaccessible for other fault-tolerant RAID levels. If the inaccessible disks come online or if after 60 seconds from being quarantined the disk group is QTCR or QTDN, the disk group is automatically dequarantined.
- QTDN: Quarantined with a down disk. The RAID-6 disk group has one inaccessible disk. The disk group is fault tolerant but degraded. If the inaccessible disks come online or if after 60 seconds from being quarantined the disk group is QTCR or QTDN, the disk group is automatically dequarantined.
- QTOF: Quarantined offline. The disk group is offline with multiple inaccessible disks causing user data to be incomplete, or is an NRAID or RAID-0 disk group.
- STOP: The disk group is stopped.
- UNKN: Unknown.
- UP: Up. The disk group is online and does not have fault-tolerant attributes.

Tier

- Performance: The disk group is in the highest storage tier, which uses SSDs (high speed).

- `Standard`: The disk group is in the storage tier that uses enterprise-class spinning SAS disks (10k/15k RPM, higher capacity).
- `Archive`: The disk group is in the lowest storage tier, which uses midline spinning SAS disks (<10k RPM, high capacity).
- `Read Cache`: The disk is an SSD providing high-speed read cache for a storage pool.

Examples

Show information about all disk groups.

```
# show disk-groups pool A
```

Show information about disk group `dg0002` in pool `B`.

```
# show disk-groups pool B dg0002
```

Basetypes

disk-groups

status

See also

show disks

show pools

show disk-group-statistics

Description

Shows live performance statistics for disk groups. The command will show information for all disk groups by default, or you can use parameters to filter the output. For disk-group performance statistics, the system samples live data every 30 seconds.

Properties shown only in API format are described in API Basetype Properties on page 351.

Minimum role

`monitor`

Syntax

```
show disk-group-statistics
   [disk-group disk-group]
   [type linear|virtual]
```

Parameters

`disk-group` *`disk-group`*
Optional. Specifies the disk group for which to show information. If this parameter is omitted, information will be shown for all disk groups. A value that includes a space must be enclosed in double quotes.

`type linear|virtual`
Optional. Specifies whether to show information for linear disk groups or for virtual disk groups. If this parameter is omitted, information will be shown for both types.

Output

`Name`
The name of the disk group.

`Time Since Reset`
The amount of time, in seconds, since these statistics were last reset, either by a user or by a controller restart.

`Reads`
Number of read operations since these statistics were last reset or since the controller was restarted.

`Writes`
Number of write operations since these statistics were last reset or since the controller was restarted.

`Data Read`
Amount of data read since these statistics were last reset or since the controller was restarted.

`Data Written`
Amount of data written since these statistics were last reset or since the controller was restarted.

`Bps`
The data transfer rate, in bytes per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.

`IOPS`
Input/output operations per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.

`I/O Resp Time`
Average response time in microseconds for read and write operations, calculated over the interval since these statistics were last requested or reset.

`Read Resp Time`
Average response time in microseconds for all read operations, calculated over the interval since these statistics were last requested or reset.

`Write Resp Time`
Average response time in microseconds for all write operations, calculated over the interval since these statistics were last requested or reset.

`Pages Allocated per Min`
Shown for a virtual disk group. The rate, in pages per minute, at which pages are allocated to volumes in the disk group because they need more space to store data.

`Pages Deallocated per Min`
Shown for a virtual disk group. The rate, in pages per minute, at which pages are deallocated from volumes in the disk group because they no longer need the space to store data.

`Pages Reclaimed`
Shown for a virtual disk group. The number of 4-MB pages that have been automatically reclaimed and deallocated because they are empty (they contain only zeroes for data).

`Pages Unmapped per Minute`
Shown for a virtual disk group. The number of 4-MB pages that host systems have unmapped per minute, through use of the SCSI `UNMAP` command, to free storage space as a result of deleting files or formatting volumes on the host.

Examples

Show live performance statistics for all disk groups.

```
# show disk-group-statistics
```

Show live performance statistics for disk group `dg0001`.

```
# show disk-group-statistics disk-group dg0001
```

Basetypes

disk-group-statistics

status

See also

reset all-statistics

reset disk-group-statistics

show disk-groups

show disk-statistics

show disk-parameters

Description

Shows disk settings.

Minimum role

`monitor`

Syntax

```
show disk-parameters
```

Output

`SMART`
Shows whether SMART (Self-Monitoring Analysis and Reporting Technology) is enabled or disabled for disks.

- `Detect-Only`: Each disk in the system retains its individual SMART setting, as will new disks added to the system.
- `Enabled`: SMART is enabled for all disks in the system and will be enabled for new disks added to the system.
- `Disabled`: SMART is disabled for all disks in the system and will be disabled for new disks added to the system.

`Drive Write Back Cache`

- `Disabled`: Disk write-back cache is disabled for all disks in the system and will be disabled for new disks added to the system. This value cannot be changed.

`Timeout Retry Maximum`
Maximum number of times a timed-out I/O operation can be retried before the operation is failed. This value cannot be changed.

`Attempt Timeout`
Number of seconds before an I/O operation is aborted and possibly retried. This value cannot be changed.

`Overall Timeout`
Total time in seconds before an I/O operation is failed regardless of the `Attempt Timeout` and `Timeout Retry Maximum` settings. This value cannot be changed.

`Inactive Drive Spin Down`
Shows whether spinning disks that are available or are global spares will spin down after a period of inactivity shown by the `Inactive Drive Spin Down Delay` field.

- `Disabled`: Drive spin down for available disks and global spares is disabled.
- `Enabled`: Drive spin down for available disks and global spares is enabled.

`Inactive Drive Spin Down Delay`
Shows the period of inactivity in minutes after which spinning disks that are available or are global spares will spin down, from 1 to 360 minutes. The value 0 means spin down is disabled.

Examples

Show disk settings.

```
# show disk-parameters
```

Basetypes

drive-parameters

status

See also

set disk-parameters

show disks

Description

Shows information about all disks or disk slots in the storage system. The command will show information about all installed disks by default, or you can use parameters to filter the output.

NOTE: In console format, to aid reading, disks are sorted to display in order by chassis and disk number. In API formats, output is not sorted because it is expected to be manipulated by a host application.

Minimum role

`monitor`

Syntax

To show information about disks:

```
show disks
   [disk-group disk-groups]|[vdisk vdisks]|[disks]
   [detail]|[fde]|[perf]|[temp]
```

To show information about disks having specific `Usage` values:

```
show disks usage available|failed|leftover|pool|spares|unusable
```

To show information about all disk slots:

```
show disks encl
```

Parameters

`detail`
Optional. This parameter shows additional detail about the disk.

`disk-group` *`disk-groups`*
Optional. A comma-separated list of the names or serial numbers of disk groups for which to show disk information. A value that includes a space must be enclosed in double quotes.

`encl`
Optional. Shows information about each disk slot, whether it contains a disk or not. You cannot use this parameter with any other parameter.

`fde`
Optional. For all or specified disks, this option shows Full Disk Encryption information. Information shown includes the FDE state and lock key ID.

`perf`
Optional. For all or specified disks, this parameter shows performance statistics from the latest historical sample for each disk. Statistics shown include total I/Os (reads and writes), total amount of data transferred, and average I/O response time.

`temp`
Optional. Shows the temperature for all installed disks.

`vdisk` *`vdisks`*
Optional. A comma-separated list of the IDs or serial numbers of linear disk groups for which to show disk information. A name that includes a space must be enclosed in double quotes.

`usage available|failed|leftover|pool|spares|unusable`
Shows information about disks having specific `Usage` values:

- `available`: Disks whose usage is `AVAIL`.
- `failed`: Disks whose usage is `FAILED`.
- `leftover`: Disks whose usage is `LEFTOVR`.
- `pool`: Disks whose usage is `VIRTUAL POOL`. Disks whose usage is `LINEAR POOL` or `VDISK`. Disks whose usage is `LINEAR POOL`, `VIRTUAL POOL`, or `VDISK`.
- `spares`: Disks whose usage is `GLOBAL SP`. Disks whose usage is `DEDICATED SP`, `GLOBAL SP`, or `VDISK SP`. Disks whose usage is `DEDICATED SP`, `GLOBAL SP`, or `VDISK SP`.
- `unusable`: Disks whose usage is `UNUSABLE`.

For explanation of usage values, see the `Usage` property description below.

You cannot use this parameter with any other parameter.

`disks`
Optional. Either:

- A comma-separated list of the IDs of disks about which to show information. For disk syntax, see Command Syntax on page 10.
- `all`: Shows information about all installed disks.
- `free`: Shows information about all disks that are available.

Output

Properties are described in alphabetical order.

`Copyback State`
Shown by the `detail` parameter.

- `N/A`: Not applicable.

`Current Job`
Shown by the `detail` parameter. See `Jobs`, below.

`Data Transferred`
Shown by the `perf` parameter. The total number of bytes transferred.

`Description`
Shown by default or by the `detail` or `fde` or `perf` parameter.

- `SAS`: Enterprise SAS spinning disk.
- `SAS MDL`: Midline SAS spinning disk.
- `SSD SAS`: SAS solid-state disk.

`Disk Group` (v3)
Shown by default or by the `detail` parameter. The name of the disk group that contains the disk.

`Drawer ID`
Shown by the `detail` parameter. The ID of the drawer containing the disk.

`Drive Spin Down Count`
Shown by the `detail` parameter. The number of times the DSD feature has spun down this disk.

`Encl`
Shown by the `encl` parameter. The number of the chassis where the disk is located.

`FDE State`
Shown by the `detail` or `fde` parameter. The FDE state of the disk:

- `Unknown`: The FDE state is unknown.
- `Not FDE Capable`: The disk is not FDE-capable.
- `Not Secured`: The disk is not secured.
- `Secured, Unlocked`: The system is secured and the disk is unlocked.
- `Secured, Locked`: The system is secured and the disk is locked to data access, preventing its use.
- `FDE Protocol Failure`: A temporary state that can occur while the system is securing the disk.

`Health`
Shown by default or by the detail or fde or perf parameter.

- `OK`
- `Degraded`

- Fault
- N/A
- Unknown

Health Reason
Shown by the detail parameter. If Health is not OK, this field shows the reason for the health state.

Health Recommendation
Shown by the detail parameter. If Health is not OK, this field shows recommended actions to take to resolve the health issue.

I/O Resp Time
Shown by the perf parameter. The average time in microseconds to complete I/O.

Jobs
Shown by default.

- DRSC: The disk is being scrubbed.
- EXPD: The disk group is being expanded.
- INIT: The disk group is being initialized.
- RBAL: The ADAPT disk group is being rebalanced.
- RCON: The disk is being used in a reconstruct operation.
- VDRAIN: The virtual disk group is being removed and its data is being drained to another disk group.
- VPREP: The virtual disk group is being prepared for use in a virtual pool.
- VRECV: The virtual disk group is being recovered to restore its membership in the virtual pool.
- VREMV: The disk group and its data are being removed.
- VRFY: The disk group is being verified.
- VRSC: The disk group is being scrubbed.
- Blank if no job is running.

LED Status
Shown by the detail parameter. The disk LED status:

- Rebuild: The disk's disk group is being reconstructed.
- Fault: The disk has a fault.
- ID: The disk's identification LED is illuminated.
- Remove: The disk is ready to be removed from the chassis.
- Blank if the disk is not part of a disk group or is spun down.

Location
Shown by default and by any parameter except encl. The disk location in the format *enclosure-ID.slot-number.*

Lock Key ID
Shown by the fde parameter. The current lock key ID.

Model
Shown by the encl parameter. The model number of the disk.

Pool
Shown by default. The name of the pool that contains the disk.

`Pool Name`
Shown by the `detail` parameter. See `Pool`, above.

`Power On Hours`
Shown by the `detail` parameter. The total number of hours that the disk has been powered on since it was manufactured. This value is stored in disk metadata and is updated in 30-minute increments.

`Recon State`
Shown by the `detail` parameter. The state of the disk (source or destination) if it is involved in a reconstruct operation.

- `From`: This disk is being used as the source of a reconstruct operation.
- `To`: This disk is being used as the target of a reconstruct operation.
- `N/A`: This disk is not being used in a reconstruct operation.

`Rev`
Shown by default or by the `detail` or `fde` or `perf` parameter. The firmware revision number.

`Revision`
Shown by the `detail` parameter. See `Rev`, above.

`Sec Fmt`
Shown by default or by the `detail` or `perf` parameter. The disk sector format.

- `512n`: The disk uses 512-byte native sector size. Each logical block and physical block is 512 bytes.
- `512e`: The disk uses 512-byte emulated sector size. Each logical block is 512 bytes and each physical block is 4096 bytes. Eight logical blocks will be stored sequentially in each physical block. Logical blocks may or may not be aligned with physical block boundaries.

`Serial Number`
Shown by default and by any parameter except `temp`. The serial number of the disk.

`Single Pathed`
Shown by the `detail` parameter.

- A or B: A dual-ported disk is communicating through a single port to the connected controller. A failure is preventing communication through the second port to the other controller.
- (blank): The disk is operating normally.

`Size`
Shown by default and by any parameter except `fde` or `temp`. The disk capacity, formatted to use the current base, precision, and units.

`Slot`
Shown by the `encl` parameter. The slot number in the chassis where the disk is located.

`SMART`
Shown by the detail parameter. Shows whether SMART (Self-Monitoring Analysis and Reporting Technology) is enabled or disabled for disks.

- `Detect-Only`: Each disk in the system retains its individual SMART setting, as will new disks added to the system.
- `Enabled`: SMART is enabled for all disks in the system and will be enabled for new disks added to the system.
- `Disabled`: SMART is disabled for all disks in the system and will be disabled for new disks added to the system.

`Speed (kr/min)`
Shown by default or by the `detail` or `fde` or `perf` parameter. The speed of a spinning disk, in thousands of revolutions per minute, as specified by the disk vendor. For an SSD, `0` is shown.

`SSD Life Remaining%`
Shown by the `detail` parameter.

- `100%-0%`: For an SSD, this field shows the percentage of disk life remaining. This value is polled every 5 minutes. When the value decreases to 20%, event 502 is logged with Informational severity. Event 502 is logged again with Warning severity when the value decreases to 5%, 2% or 1%, and 0%. If a disk crosses more than one percentage threshold during a polling period, only the lowest percentage will be reported.
- `N/A`: The disk is not an SSD.

`Status`
Shown by the `encl` parameter.

- `Up`: The disk is present and is properly communicating with the expander.
- `Spun Down`: The disk is present and has been spun down by the drive spin down feature.
- `Warning`: The disk is present but the system is having communication problems with the disk LED processor. For disk and midplane types where this processor also controls power to the disk, power-on failure will result in `Error` status.
- `Error`: The disk is present but is not detected by the expander.
- `Unknown`: Initial status when the disk is first detected or powered on.
- `Not Present`: The disk slot indicates that no disk is present.
- `Unrecoverable`: The disk is present but has unrecoverable errors.
- `Unavailable`: The disk is present but cannot communicate with the expander.
- `Unsupported`: The disk is present but is an unsupported type.

`Temperature`
Shown by the `detail` or `temp` parameter. The temperature of the disk.

`Temperature Status`
Shown by the `temp` parameter.

- `OK`: The disk sensor is present and detects no error condition.
- `Warning`: The disk sensor detected a non-critical error condition. The temperature is between the warning and critical thresholds.
- `Critical`: The disk sensor detected a critical error condition. The temperature currently exceeds the critical threshold.
- `Unknown`: The disk sensor is present but status is not available.

`Tier`
Shown by default or by the `detail` parameter.

- `Performance`: The disk is in the highest storage tier, which uses SSDs (high speed).
- `Standard`: The disk is in the storage tier that uses enterprise-class spinning SAS disks (10k/15k RPM, higher capacity).
- `Archive`: The disk is in the lowest storage tier, which uses midline spinning SAS disks (<10k RPM, high capacity).
- `Read Cache`: The disk is an SSD providing high-speed read cache for a storage pool.

`Total I/Os`
Shown by the `perf` parameter. The total number of I/O operations (reads and writes).

`Transfer Rate`
Shown by the `detail` parameter. The data transfer rate in Gbit/s. A footnote indicates that it is normal behavior for the rate to vary.

Some 6-Gbit/s disks might not consistently support a 6-Gbit/s transfer rate. If this happens, the controller automatically adjusts transfers to those disks to 3 Gbit/s, increasing reliability and reducing error messages with little impact on system performance. This rate adjustment persists until the controller is restarted or power-cycled.

`Usage`
Shown by default or by the `detail` parameter

- `AVAIL`: Available
- `DEDICATED SP`: The disk is a spare assigned to a linear disk group.
- `FAILED`: The disk is unusable and must be replaced. Reasons for this status include: excessive media errors, SMART error, disk hardware failure, or unsupported disk.
- `GLOBAL SP`: The disk is a global spare.
- `LEFTOVR`: The disk is a leftover.
- `LINEAR POOL`: The disk is a member of a linear disk group.
- `UNUSABLE`: The disk cannot be used in a disk group. Possible reasons include:
  - The system is secured and the disk is data locked with a different passphrase.
  - The system is secured/locked (no passphrase available) and the disk is data/locked.
  - The system is secured and the disk is not FDE capable.
- `VDISK`: The disk is a member of a linear disk group.
- `VDISK SP`: The disk is a spare assigned to a linear disk group.
- `VIRTUAL POOL`: The disk is a member of a disk group in a virtual pool.

`Vdisk` (v2)
Shown by default or by the `detail` parameter. The name of the disk group that contains the disk.

`Vendor`
Shown by default and by any parameter except `temp`. The vendor of the disk.

Examples

Show disk information.

```
# show disks
```

Show disk-slot information.

```
# show disks encl
```

Show disk performance statistics.

```
# show disks perf
```

Show Full Disk Encryption information.

```
# show disks fde
```

Show disk temperature information.

```
# show disks temp
```

Show detailed information for disk 1.1:

```
# show disks 1.1 detail
```

Show information about available disks only:

```
# show disks usage available
```

Basetypes

drives

enclosure-list

status

See also

show disk-groups

show vdisks

show disk-statistics

Description

Shows live or historical performance statistics for disks. For disk performance statistics, the system samples live data every 15 seconds and historical data every quarter hour, and retains historical data for 6 months.

The historical option allows you to specify a time range or a number (count) of data samples to include. It is not recommended to specify both the `time-range` and `count` parameters. If both parameters are specified, and more samples exist for the specified time range, the samples' values will be aggregated to show the required number of samples.

Statistics shown only in API output are described in API Basetype Properties on page 351.

Minimum role

`monitor`

Syntax

To show live statistics:

```
show disk-statistics
   [error-stats]
   [disks]
```

To show historical statistics:

```
show disk-statistics
   [all]
   [count number-of-data-samples]
   [filename filename.csv]
   historical
   [time-range "date/time-range"]
   disks
```

Parameters

`all`
Optional. Specifies to show the full set of performance metrics. If this parameter is omitted, the default set of performance metrics will be shown.

`count` *`number-of-data-samples`*
Optional. Specifies the number of data samples to display, from 1 to 100. Each sample will be shown as a separate row in the command output. If this parameter is omitted, 100 samples will be shown. If you specify this parameter, do not specify the `time-range` parameter.

`error-stats`
Optional. Specifies to show live error statistics for all disks or specified disks. If you specify this parameter, do not specify the `all`, `count`, `historical`, or `time-range` parameters.

`filename` *`filename`*`.csv`
Optional. Specifies to save historical statistics, in CSV format, to a file on the controller. To access the file, use SFTP or FTP.

`historical`
Optional. Specifies to show historical statistics. If this parameter is omitted, live statistics will be shown.

`time-range "`*`date/time-range`*`"`
Optional. Specifies the date/time range of historical statistics to show, in the format `"start` *`yyyy-mm-dd hh:mm`* `[AM|PM]` *`end yyyy-mm-dd hh:mm`* `[AM|PM]"`. If the start date/time is specified but no end date/time is specified, the current date/time will be used as the end date/time. The system will return the oldest sample taken after the start time and the latest sample taken before the end time. If the specified start date/time is earlier than the oldest sample, that sample will be used as the start date/time. If you specify this parameter, do not specify the `count` parameter. If this parameter is omitted, the most recent 100 data samples will be displayed.

`disks`
Optional. Specifies a comma-separated list of disks for which to show information. If this parameter is omitted, information will be shown for all disks. For disk syntax, see Command Syntax on page 10.

Output

Live

`Location`
The disk location in the format *`disk_enclosure-ID.slot-number`*.

`Serial Number`
The serial number of the disk.

`Pwr Hrs`
The total number of hours that the disk has been powered on since it was manufactured. This value is stored in disk metadata and is updated in 30-minute increments.

`Bps`
The data transfer rate, in bytes per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.

`IOPS`
The number of input/output operations per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.

`Reads`
The number of read operations since these statistics were last reset or since the controller was restarted.

`Writes`
The number of write operations since these statistics were last reset or since the controller was restarted.

`Data Read`
The amount of data read since these statistics were last reset or since the controller was restarted.

`Data Written`
The amount of data written since these statistics were last reset or since the controller was restarted.

`Lifetime Read`
The amount of data read from the disk in its lifetime.

`Lifetime Written`
The amount of data written to the disk in its lifetime.

`Reset Time`
Date and time, in the format *`year-month-day hour:minutes:seconds`*, when these statistics were last reset, either by a user or by a controller restart.

Live, error-stats

`Location`
The disk location in the format `disk_`*`enclosure-ID.slot-number`*.

`Serial Number`
The serial number of the disk.

`SMART` *`port#`*

The number of SMART events recorded.

`Time` *`port#`*
The number of timeouts accessing the disk.

`NResp` *`port#`*
The number of times the disk did not respond.

`Spin` *`port#`*
The number of attempts by the storage system to spin up the disk.

`Med` *`port#`*
The number of media errors generated by the disk, as specified by its manufacturer.

`NMed` *`port#`*
The number of other errors generated by the storage system, or generated by the disk and not categorized as media errors.

`BAsgn` *`port#`*
The number of times blocks were reassigned to alternate locations.

`BBlk` *`port#`*
The number of bad blocks encountered.

Historical

`Durable ID`
The disk ID in the format `disk_`*`enclosure-number.disk-number`*.

`Serial Number`
The serial number of the disk.

`Total I/Os`
The total number of read and write operations since the last sampling time.

`Reads`
Shown by the `all` parameter. The number of read operations since the last sampling time.

`Writes`
Shown by the `all` parameter. The number of write operations since the last sampling time.

`Data Transferred`
The total amount of data read and written since the last sampling time.

`Data Read`
Shown by the `all` parameter. The amount of data read since the last sampling time.

`Data Written`
Shown by the `all` parameter. The amount of data written since the last sampling time.

`Total IOPS`
The total number of read and write operations per second since the last sampling time.

`Read IOPS`
Shown by the `all` parameter. The number of read operations per second since the last sampling time.

`Write IOPS`
Shown by the `all` parameter. The number of write operations per second since the last sampling time.

`Total B/s`
The total data transfer rate, in bytes per second, since the last sampling time.

`Read B/s`
Shown by the `all` parameter. The data transfer rate, in bytes per second, for read operations since the last sampling time.

`Write B/s`
Shown by the `all` parameter. The data transfer rate, in bytes per second, for write operations since the last sampling time.

`Queue Depth`
Shown by the `all` parameter. The average number of pending read and write operations being serviced since the last sampling time. This value represents periods of activity only and excludes periods of inactivity.

`I/O Resp Time`
The average response time, in microseconds, for read and write operations since the last sampling time.

`Read Resp Time`
Shown by the `all` parameter. The average response time, in microseconds, for read operations since the last sampling time.

`Write Resp Time`
Shown by the `all` parameter. The average response time, in microseconds, for write operations since the last sampling time.

`Average I/O Size`
Shown by the `all` parameter. The average data size of read and write operations since the last sampling time.

`Average Read I/O Size`
Shown by the `all` parameter. The average data size of read operations since the last sampling time.

`Average Write I/O Size`
Shown by the `all` parameter. The average data size of write operations since the last sampling time.

`Number of Disk Errors`
Shown by the `all` parameter. The total number of disk errors detected since the last sampling time. Error types include: number of SMART events; number of timeouts accessing the disk; number of times the disk did not respond; number of attempts by the storage system to spin-up the disk; media

errors generated by the disk as specified by its manufacturer; non-media errors (generated by the storage system, or by the disk and not categorized as media errors); number of bad-block reassignments.

`Sample Time`
Date and time, in the format *`year-month-day hour:minutes:seconds`*, when the data sample was taken.

Examples

Show live statistics for disks 1.1 and 2.1.

```
# show disk-statistics 1.1,2.1
```

Show live error statistics for all disks.

```
# show disk-statistics error-stats
```

Show historical statistics from a specified date and time range for disk 1.5.

```
# show disk-statistics 1.5 historical time-range "start 2011-12-05 4:40
PM end 2011-12-05 5:00 PM"
```

Show all samples of historical statistics for disk 1.5.

```
# show disk-statistics 1.5 historical all
```

Basetypes

disk-statistics (live)

drive-summary (historical)

status

See also

reset all-statistics

reset disk-error-statistics

reset disk-statistics

show disk-group-statistics

show disks

show email-parameters

Description

Shows email (SMTP) notification parameters for events and managed logs.

Minimum role

`monitor`

Syntax

```
show email-parameters
```

Output

`Email Notification`

- `Disabled`: Email notification is disabled.
- `Enabled`: Email notification is enabled.

`Email Notify Filter`

Shows the minimum severity for which the system should send event notifications:

- `crit`: Sends notifications for Critical events only.
- `error`: Sends notifications for Error and Critical events.
- `warn`: Sends notifications for Warning, Error, and Critical events.
- `resolved`: Sends notifications for Resolved, Warning, Error, and Critical events.
- `info`: Sends notifications for all events.
- `none`: Disables email notification and clears the settings.

This parameter does not apply to managed-logs notifications.

`Email Address (1-3)`
Shows up to three email addresses for recipients of event notifications.

`Log Destination`
Shows the email address for the log collection system used by the managed logs feature.

`Security Protocol`

- `TLS`: Transport Layer Security (TLS) authentication is enabled.
- `SSL`: Secure Sockets Layer (SSL) authentication is enabled.
- `None`: No authentication is enabled.

`Server Port`
The port on which the configured SMTP server is listening. This is either automatically configured to a default setting by the system, or has been overridden by the user.

`Email Server`
The IP address of the SMTP mail server to use for the email messages.

`Email Domain`
The domain name that, with the sender name, forms the “from” address for remote notification.

`Email Sender`
The sender name that, with the domain name, forms the “from” address for remote notification.

`Email Sender Password`
The sender password. For a configured sender, the password is represented by eight asterisks.

`Include Logs`
Shows whether system log files will automatically be attached to email notification messages generated by the managed logs feature. This is the “push” mode for managed logs.

Examples

Show settings for email notification.

```
# show email-parameters
```

Basetypes

email-parameters

status

See also

set email-parameters

show enclosures

Description

Shows information about the chassis in the storage system. Full detail available in API output only.

Minimum role

`monitor`

Syntax

```
show enclosures
```

Output

`Encl`
The enclosure ID.

`Encl WWN`
The chassis WWN.

`Name`
The chassis name.

`Location`
The chassis location, or blank if not set.

`Rack`
The number of the rack that contains the chassis.

`Pos`
The position of the chassis in the rack

`Vendor`
The chassis vendor.

`Model`
The chassis model.

`EMP` *`controller-ID`* `BUS:ID Rev`
The channel ID and firmware revision of the Enclosure Management Processor in each controller's Expander Controller.

`Midplane Type`
An abbreviation that describes the chassis midplane's rack-unit height, maximum number of disks, maximum data rate to disks (Gbit/s), and hardware version.

`Health`

- `OK`

- Degraded
- Fault
- N/A
- Unknown

Reason
If Health is not OK, this field shows the reason for the health state.

Action
If Health is not OK, this field shows recommended actions to take to resolve the health issue.

Drawer information:

Drawer
The number of the drawer.

Name
The name of the drawer.

Status
Status of the drawer.

- Up
- Warning
- Error
- Unknown
- Unavailable
- Not Present

Health

- OK
- Degraded
- Fault
- N/A
- Unknown

Reason
If Health is not OK, this field shows the reason for the health state.

Action
If Health is not OK, this field shows recommended actions to take to resolve the health issue.

Examples

Show information about all chassis in the system.

```
# show enclosures
```

Basetypes

enclosures

status

See also

set enclosure

show sensor-status

show events

Description

Shows events logged by each controller in the storage system. A separate set of event numbers is maintained for each controller. Each event number is prefixed with a letter identifying the controller that logged the event.

Events are listed from newest to oldest, based on a timestamp with one-second granularity. Therefore the event log sequence matches the actual event sequence within about one second.

For more information, see "Resources for diagnosing and resolving problems" in the Event Descriptions Reference Guide.

Minimum role

monitor

Syntax

```
show events
   [a|b|both|error]
   [detail]
   [from timestamp]
   [from-event event-ID]
   [last #]
   [logs yes|no]
   [to timestamp]
   [to-event event-ID]
```

Parameters

a|b|both|error
Optional. Specifies to filter the event listing:

- a: Shows events from controller A only. Do not use this parameter with the from-event parameter or the to-event parameter.
- b: Shows events from controller B only. Do not use this parameter with the from-event parameter or the to-event parameter.
- both: Shows events from both controllers. Do not use this parameter with the from-event parameter or the to-event parameter.
- error: Shows Warning, Error, and Critical events, but not Informational or Resolved events.

detail
Optional. Shows additional information and recommended actions for displayed events. This information is also in the Event Descriptions Reference Guide.

`from` *`timestamp`*
Optional. Shows events that occurred on or after a timestamp specified with the format *`MMDDYYhhmmss`*. For example, 043011235900 represents April 30 2011 at 11:59:00 p.m. This parameter can be used with the `to` parameter or the `to-event` parameter.

`from-event` *`event-ID`*
Optional. Shows events including and after the specified event ID. If this number is smaller than the ID of the oldest event, events are shown from the oldest available event. Events are shown only for the controller that the event ID specifies (A or B). This parameter can be used with the `to` parameter or the `to-event` parameter.

`last #`
Optional. Shows the latest specified number of events. If this parameter is omitted, all events are shown.

`logs yes|no`
Optional.

- `no`: Lists events as described in the Output section, below. This is the default.
- `yes`: Shows events in tabular format, with columns for event ID, date and time, event code, severity, and message.

`to` *`timestamp`*
Optional. Shows events that occurred on or before a timestamp specified with the format MMDDYYhhmmss. For example, 043011235900 represents April 30 2011 at 11:59:00 p.m. This parameter can be used with the from parameter or the from-event parameter.

`to-event` *`event-ID`*
Optional. Shows events before and including the specified event ID. If this number is larger than the ID of the oldest event, events are shown up to the latest event. Events are shown only for the controller that the event ID specifies (A or B). This parameter can be used with the `from` parameter or the `from-event` parameter.

Output

- Date and time when the event was logged
- Event code identifying the type of event to help diagnose problems. For example: [181]
- Event ID prefixed by A or B, indicating which controller logged the event. For example: #A123
- Model, serial number, and ID of the controller module that logged the event
- Severity:
  - `CRITICAL`: A failure occurred that may cause a controller to shut down. Correct the problem immediately.
  - `ERROR`: A failure occurred that may affect data integrity or system stability. Correct the problem as soon as possible.
  - `WARNING`: A problem occurred that may affect system stability but not data integrity. Evaluate the problem and correct it if necessary.
  - `INFORMATIONAL`: A configuration or state change occurred, or a problem occurred that the system corrected. No action is required.
  - `RESOLVED`: A condition that caused an event to be logged has been resolved.
- Event-specific message giving details about the event

Examples

Show the last two events.

```
# show events last 2
```

Show the last three non-Informational events.

```
# show events last 3 error
```

Show all events from April 30 2014 at 11:59:00 p.m. through May 2 2014 at 11:59:00 a.m.

```
# show events from 043014235900 to 050214115900
```

Show a range of events logged by controller A.

```
# show events from-event a100 to-event a123
```

Show detailed output for a specific event.

```
# show events from-event A2264 to-event A2264 detail
```

Basetypes

events

eventsLogs

status

See also

clear events

set snmp-parameters

show snmp-parameters

show expander-status

Description

Shows diagnostic information relating to SAS Expander Controller physical channels, known as PHY lanes.

NOTE: This command is for use by or with direction from technical support.

For each chassis, this command shows status information for PHYs in I/O module A and then I/O module B.

Minimum role

monitor

Syntax

```
show expander-status
```

Output

`Encl`
The chassis that contains the SAS expander.

`Drawer`
Shown in drawer output. The number of the drawer.

`Expander`
Shown in drawer output. The number of the expander.

`Ctlr`
The I/O module that contains the SAS expander.

`Phy`
Identifies a PHY's logical location within a group based on the PHY type. If the PHY's controller module or expansion module is not installed, this field shows "--".

`Type`

- `Drawer0-Egress`: Drawer 0 egress PHY.
- `Drawer0-Ingress`: Drawer 0 ingress PHY.
- `Drawer1-Egress`: Drawer 1 egress PHY.
- `Drawer1-Ingress`: Drawer 1 drawer ingress PHY.
- `Drawer2-Egress`: Drawer 2 egress PHY.
- `Drawer2-Ingress`: Drawer 2 ingress PHY.
- `Drive`: Drive slot PHY.
- `Egress`: Expansion port egress PHY.
- `Expander-Egress-0`: Expansion port 0 egress PHY.
- `Expander-Egress-1`: Expansion port 1 egress PHY.
- `Expander-Ingress-0`: Expansion port 0 ingress PHY.
- `Expander-Ingress-1`: Expansion port 1 ingress PHY.
- `Expander-Universal-0`: Expansion port 0 universal PHY.
- `Expander-Universal-1`: Expansion port 1 universal PHY.
- `Expander-Universal-2`: Expansion port 2 universal PHY.
- `Ingress`: Expansion port ingress PHY.
- `Inter-Exp`: Inter-expander PHY.
- `SC`: Storage Controller PHY.
- `SC-0`: Storage Controller primary PHY.
- `SC-1`: Storage Controller alternate PHY.
- `SC-A`: Storage Controller alternate PHY.
- `SC-P`: Storage Controller primary PHY.
- `SCA-A`: Storage Controller A alternate PHY.
- `SCA-P`: Storage Controller A primary PHY.
- `SCB-A`: Storage Controller B alternate PHY.
- `SCB-P`: Storage Controller B primary PHY.

`Status`

- `Enabled - Healthy`: The PHY is enabled and healthy.
- `Enabled - Degraded`: The PHY is enabled but degraded.
- `Disabled`: The PHY has been disabled by a user or by the system.

`Elem Status`
A standard SES status for the element:

- `Disabled`: Critical condition is detected.
- `Error`: Unrecoverable condition is detected. Appears only if there is a firmware problem related to PHY definition data.
- `Non-critical`: Non-critical condition is detected.
- `Not Used`: Element is not installed in chassis.
- `OK`: Element is installed and no error conditions are known.
- `Unknown`: Either:
  - Sensor has failed or element status is not available. Appears only if an I/O module indicates it has fewer PHYs than the reporting I/O module, in which case all additional PHYs are reported as unknown.
  - Element is installed with no known errors, but the element has not been turned on or set into operation.

`Disabled`

- `Enabled`: PHY is enabled.
- `Disabled`: PHY is disabled.

`Reason`

- Blank if `Elem Status` is `OK`.
- `Error count interrupts`: PHY disabled because of error-count interrupts.
- `Phy control`: PHY disabled by a SES control page as a result of action by a Storage Controller or user.
- `Not ready`: PHY is enabled but not ready. Appears for SC-1 PHYs when the partner I/O module is not installed. Appears for Drive, SC-1, or Ingress PHYs when a connection problem exists such as a broken connector.
- `Drive removed`: PHY disabled because drive slot is empty.
- `Unused - disabled by default`: PHY is disabled by default because it is not used.
- `Excessive Phy changes`: PHY is disabled because of excessive PHY change counts.

Examples

Show expander status for each chassis.

```
# show expander-status
```

Basetypes

sas-status-controller-a

sas-status-drawer

status

See also

clear expander-status

set expander-fault-isolation

set expander-phy

show fan-modules

Description

Shows information about each fan module in the storage system.

To see information about both fans in each fan module, use the show fans command.

Minimum role

`monitor`

Syntax

```
show fan-modules
```

Output

`Encl`
The ID of the chassis that contains the fan module.

`Id`
The fan module position, shown as an index value that starts at 0 and increments from left to right as viewed from the back of the chassis.

`Name`
The name of the fan module in the format `Fan Module` *`ID`*.

`Health`

- `OK`
- `Degraded`
- `Fault`
- `N/A`
- `Unknown`

`Reason`
If Health is not `OK`, this field shows the reason for the health state.

`Action`
If Health is not `OK`, this field shows recommended actions to take to resolve the health issue.

Examples

Show about all fan modules in the system.

```
# show fan-modules
```

Basetypes

fan-modules

status

See also

show fans

show power-supplies

show fans

Description

Shows information about each fan in the storage system.

To see information about the fan modules that contain each pair of fans, use the show fan-modules command.

Minimum role

`monitor`

Syntax

```
show fans
```

Output

`Name`
The fan name.

`Location`
The fan location in the format `Enclosure enclosure-ID - position`. The position is as viewed from the back of the chassis.

`Status`

- `Up`
- `Error`
- `Off`
- `Missing`

`Speed`
The fan speed (revolutions per minute).

`Position`
The fan position, as viewed from the back of the chassis:

- `Left`
- `Right`
- `N/A`

`Serial Number`

- (blank): Not applicable.

`Part Number`

- (blank): Not applicable.

`Firmware Version`

- (blank): Not applicable.
- The firmware revision of a fan FRU.

`Hardware Version`

- (blank): Not applicable.

`Health`

- `OK`
- `Degraded`
- `Fault`
- `N/A`
- `Unknown`

`Reason`
If Health is not `OK`, this field shows the reason for the health state.

`Action`
If Health is not `OK`, this field shows recommended actions to take to resolve the health issue.

Examples

Show about all fans in the system.

```
# show fans
```

Basetypes

fan

status

See also

show power-supplies

show fde-state

Description

Shows Full Disk Encryption information for the storage system.

NOTE: If you insert an FDE disk into a secured system and the disk does not come up in the expected state, perform a manual rescan by using the rescan command.

Minimum role

`monitor`

Syntax

```
show fde-state
```

Output

`FDE Security Status`

- `Unsecured`. The system has not been secured with a passphrase.
- `Secured`. The system has been secured with a passphrase.
- `Secured, Lock Ready`. The system has been secured and lock keys have been cleared. The system will become locked after the next power cycle.
- `Secured, Locked`. The system is secured and the disks are locked to data access, preventing their use.

`Lock Key ID`
The current lock ID is displayed.

`Import Key ID`
The previous or import lock ID is displayed.

`FDE Configuration Time`
If the system is secured, the time at which the current lock ID was set.

Examples

Show FDE information.

```
# show fde-state
```

Basetypes

fde-state

status

See also

clear fde-keys

set fde-import-key

set fde-lock-key

set fde-state

show fenced-data

Description

Shows information about fenced data blocks in the storage system. The command will show information for all fenced blocks by default, or you can use parameters to filter the output.

Fenced data blocks are blocks of data on disk which, for either of the following reasons, cannot be recovered and have been lost:

- Typically, fenced data occurs when a disk in a non-fault-tolerant disk group detects an unrecoverable media error.

- Fenced data can also occur if multiple unrecoverable blocks are detected which exceed the capacity of the RAID error-recovery algorithms.

Unrecoverable data blocks are "fenced" by marking them unreadable by the storage system. A data block remains fenced until the host writes the block, at which time it is again accessible.

For NRAID and RAID 0, fenced data is not tracked. Errors are returned directly during host reads.

For RAID 1 and 10, fenced blocks correspond with the data blocks where unrecoverable errors are detected, normally when a disk group is not fault tolerant and the remaining good disk has a media error.

For RAID 3, 5, 6, 50, and ADAPT for linear storage or 5, 6, and ADAPT for virtual storage, a single unrecoverable error detected while not fault tolerant can result in two or more blocks being fenced. This is because each parity block protects multiple data blocks. Thus, for RAID 3, 5, and 50, if a block returns an unrecovered error during reconstruction, that block is lost (because it cannot be read). The block being reconstructed is also lost because there is not enough information to reconstruct the data for that block. RAID 6 and ADAPT will similarly mark multiple bad blocks if a combination of failed disks and media errors results in unrecoverable data.

When the controller module fences data, it logs events 542 and 543.

Minimum role

`monitor`

Syntax

```
show fenced-data
   [all]
   [disk-groups disk-groups]
   [vdisks vdisks]
   [volumes volumes]
```

Parameters

`all`
Optional. Shows information about all fenced data blocks.

`disk-groups` *`disk-groups`*
Optional. The names or serial numbers of disk groups for which to show fenced data block information. A name that includes a space must be enclosed in double quotes.

`vdisks` *`vdisks`*
Optional. The names or serial numbers of disk groups for which to show fenced data block information. A name that includes a space must be enclosed in double quotes.

`volumes` *`volumes`*
Not supported for virtual storage.

Optional for linear storage. The names or serial numbers of linear volumes for which to show fenced data block information. A name that includes a space must be enclosed in double quotes.

Output

`Volume Name`
The volume name for which fenced data is reported.

`Volume Serial Number`
The volume serial number for which fenced data is reported.

`Volume LBA`
The LBA in the volume at which fenced data is reported.

`Vdisk Name`
The name of the disk group for which fenced data is reported.

`Vdisk Serial Number`
The serial number of the disk group for which fenced data is reported.

`Vdisk LBA`
The LBA in the disk group at which fenced data is reported.

Examples

Show information about fenced data blocks for all volumes.

```
# show fenced-data all
```

Basetypes

fenced-data

status

See also

show disk-groups

show events

show vdisks

show volumes

show frus

Description

Shows FRU (field-replaceable unit) information for the storage system. Some information is for use by service technicians.

Minimum role

`monitor`

Syntax

```
show frus
```

Output

FRU fields:

`Name`

- `CHASSIS_MIDPLANE`: Chassis and midplane circuit board
- `RAID_IOM`: Controller module
- `BOD_IOM`: Expansion module

- POWER_SUPPLY: Power supply module
- DRAWER: Enclosure disk drawer
- FAN MODULE: Fan module
- SIDEPLANE: Sideplane

Description
The FRU description.

Part Number
The FRU part number.

Serial Number
The FRU serial number.

Revision
The hardware revision level.

Dash Level
The FRU template revision number.

FRU Shortname
A short description of the FRU.

Manufacturing Date
The date and time in the format year-month-day hour:minutes:seconds when a PCBA was programmed or a power supply module was manufactured.

Manufacturing Location
The city, state/province, and country where the FRU was manufactured.

Manufacturing Vendor ID
The JEDEC ID (global manufacturing code) of the manufacturer.

FRU Location
The location of the FRU in the chassis.

Configuration SN
The configuration serial number.

FRU Status

- Absent: The FRU is not present.
- Fault: The FRU's health is Degraded or Fault.
- Invalid Data: The FRU ID data is invalid. The FRU's EEPROM is improperly programmed.
- OK: The FRU is operating normally.
- Power OFF: The FRU is powered off.

Original SN
For a power supply module, the original manufacturer serial number. Otherwise, N/A.

Original PN
For a power supply module, the original manufacturer part number. Otherwise, N/A.

Original Rev
For a power supply module, the original manufacturer hardware revision. Otherwise, N/A.

Enclosure ID
The chassis number.

Examples

Show information about all FRUs in the system.

```
# show frus
```

Basetypes

enclosure-fru

status

show host-groups

Description

Shows information about host groups and hosts. The command will show information for all host groups (and hosts) by default, or you can use parameters to filter the output.

Minimum role

`monitor`

Syntax

```
show host-groups
   [hosts hosts]
   [groups host-groups]
```

Parameters

`hosts` *`hosts`*
Optional. A comma-separated list of the names of hosts for which to show host and initiator information. If this parameter is omitted, information is shown for all hosts. A value that includes a space must be enclosed in double quotes.

`groups` *`host-groups`*
Optional. A comma-separated list of the names of host groups for which to show host-group, host, and initiator information. If this parameter is omitted, information is shown for all host groups. A value that includes a space must be enclosed in double quotes.

Output

Host group information:

`Name`
The name of the host group.

`Number of Members`
The number of hosts in the host group.

Host information:

`Name`
The host name.

`Number of Members`
The number of initiators in the host.

Initiator information:

`Nickname`
The nickname of the initiator.

`Discovered`

- `Yes`: The initiator was discovered and its entry was automatically created.
- `No`: The initiator was manually created.

`Mapped`
Shows whether the initiator is explicitly mapped to any volumes:

- `Yes`: At least one volume is explicitly mapped to the initiator.
- `No`: No volumes are explicitly mapped to the initiator.

`Profile`

- `Standard`: Default profile.
- `HP-UX`: The host uses Flat Space Addressing.
- `OpenVMS`: The initiator does not allow LUN 0 to be assigned to a mapping.

`ID`
For an FC initiator, its WWPN. For a SAS initiator, its WWPN. For an iSCSI initiator, its node name (typically the IQN).

Examples

Show information about all host groups.

```
# show host-groups
```

Show information about host groups HGroup1 and HGroup3.

```
# show host-groups groups HGroup1,HGroup3
```

Basetypes

host-group

status

See also

create host-group

delete host-groups

set host-group

show host-phy-statistics

Description

Shows diagnostic information relating to SAS controller physical channels, known as PHY lanes, for each host port.

This command shows PHY status information for each host port found in an chassis. Each controller in an chassis may have multiple host ports. A host port may have multiply PHYs. For each PHY, this command shows statistical information in the form of numerical values.

There is no mechanism to reset the statistics. All counts start from the time the controller started up. The counts stop at the maximum value for each statistic.

This command is only applicable to systems that have controllers with SAS host ports.

Minimum role

`monitor`

Syntax

```
show host-phy-statistics
```

Output

`Ports`
The controller ID and port number of the SAS host ports for which PHY statistics are displayed.

`Phy`
Identifies a PHY's logical location within a group based on the PHY type. Logical IDs are 0–3 for host port PHYs. Each SAS host will have multiple PHYs.

`Disparity`
The number of doublewords containing running disparity errors that have been received by the PHY, not including those received during Link Reset sequences. A running disparity error occurs when positive and negative values in a signal do not alternate.

`Lost DWORD`
The number of times the PHY has lost doubleword synchronization and restarted the Link Reset sequence.

`Invld DWORD`
The number of invalid doublewords that have been received by the PHY, not including those received during Link Reset sequences.

`ResErrCnt`
The number of times the PHY Reset sequence has failed.

Examples

Show PHY statistics for controller host ports.

```
# show host-phy-statistics
```

Basetypes

sas-host-phy-statistics

status

See also

show host-port-statistics

show host-port-statistics

Description

Shows live performance statistics for each controller host port. For each host port these statistics quantify I/O operations through the port between a host and a volume. For example, each time a host writes to a volume's cache, the host port's statistics are adjusted. For host-port performance statistics, the system samples live data every 15 seconds.

Statistics shown only in API output are described in API Basetype Properties on page 351.

Minimum role

`monitor`

Syntax

```
show host-port-statistics
   [ports ports]
```

Parameters

`ports` *ports*
Optional. Specifies a comma-separated list of port IDs for which to show information. For port syntax, see Command Syntax on page 10. If this parameter is omitted, information is shown for all host ports.

Output

`Durable ID`
The host port ID in the format `hostport_`*`controller-ID-and-port-number`*.

`Bps`
The data transfer rate, in bytes per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.

`IOPS`
The input/output operations per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.

`Reads`
The number of read operations since these statistics were last reset or since the controller was restarted.

`Writes`
The number of write operations since these statistics were last reset or since the controller was restarted.

`Data Read`
The amount of data read since these statistics were last reset or since the controller was restarted.

`Data Written`
The amount of data written since these statistics were last reset or since the controller was restarted.

`Queue Depth`
The number of pending I/O operations being serviced.

`I/O Resp Time`
The average response time in microseconds for read and write operations, calculated over the interval since these statistics were last requested or reset.

`Read Resp Time`
The average response time in microseconds for all read operations, calculated over the interval since these statistics were last requested or reset.

`Write Resp Time`
The average response time in microseconds for all write operations, calculated over the interval since these statistics were last requested or reset.

`Reset Time`
The date and time, in the format *`year-month-day hour:minutes:seconds`*, when these statistics were last reset, either by a user or by a controller restart.

Examples

Show live performance statistics for all host ports.

```
# show host-port-statistics
```

Show live performance statistics for host port `A1`.

```
# show host-port-statistics ports a1
```

Basetypes

host-port-statistics

status

See also

reset all-statistics

reset host-port-statistics

show host-phy-statistics

show ports

show initiators

Description

Shows information about initiators. The command will show information about all initiators by default, or you can use parameters to filter the output.

Initiator entries are automatically created for host initiators that have sent an `inquiry` command or a `report luns` command to the system. This typically happens when the physical host containing an initiator boots up or scans for devices. When the command is received, the system saves the host port information. However, the information is retained after a restart only if you have set a name for the initiator.

Minimum role

`monitor`

Syntax

```
show initiators
   [hosts hosts]
   [initiators]
```

Parameters

`hosts` *hosts*

Optional. A comma-separated list of the names of hosts containing initiators for which to show information. If this parameter is omitted, information is shown for all initiators.

initiators

Optional. A comma-separated list of the names of initiators for which to show information. If this parameter is omitted, information is shown for all initiators.

Output

`Nickname`
The name of the initiator.

`Discovered`

- `Yes`: The initiator was discovered and its entry was automatically created.
- `No`: The initiator was manually created.

`Mapped`
Shows whether the initiator is explicitly mapped to any volumes:

- `Yes`: At least one volume is explicitly mapped to the initiator.
- `No`: No volumes are explicitly mapped to the initiator.

`Profile`

- `Standard`: Default profile.
- `HP-UX`: The host uses Flat Space Addressing.
- `OpenVMS`: The initiator does not allow LUN 0 to be assigned to a mapping.

`Host Type`
The host-interface type: `FC`; `iSCSI`; `SAS`.

`ID`
For an FC initiator, its WWPN. For a SAS initiator, its WWPN. For an iSCSI initiator, its node name (typically the IQN).

Examples

Show information about all initiators.

```
# show initiators
```

Show information about initiators in host Host1 only.

```
# show initiators hosts Host1
```

Basetypes

initiator

status

See also

delete initiator-nickname

set initiator

show host-groups (with the `hosts` parameter)

show inquiry

Description

Shows inquiry data for each controller module.

Minimum role

`monitor`

Syntax

```
show inquiry
```

Output

- Product vendor name, product ID, vendor ID, and SCSI product ID
- Management Controller firmware version and loader version
- Storage Controller firmware version and loader version
- Controller module serial number
- Media Access Control (MAC) address
- Network port IP address

Examples

Show inquiry data for controller modules in the system.

```
# show inquiry
```

Basetypes

inquiry

status

See also

show versions

show iscsi-parameters

Description

Shows system-wide parameters for iSCSI ports.

Minimum role

`monitor`

Syntax

```
show iscsi-parameters
```

Output

`CHAP`
Shows whether Challenge-Handshake Authentication Protocol (CHAP) is enabled or disabled.

- `Enabled`: CHAP is enabled.
- `Disabled`: CHAP is disabled.

`Jumbo Frames`
Shows whether support for jumbo frames is enabled or disabled.

- `Enabled`: Jumbo-frame support is enabled.
- `Disabled`: Jumbo-frame support is disabled.

`iSNS`
Shows whether support for Internet Storage Name Service (iSNS) is enabled or disabled.

- `Enabled`: iSNS support is enabled.
- `Disabled`: iSNS support is disabled.

`iSNS IP`
The address of the iSNS server. The default address is all zeroes.

`iSNS Alt IP`
The address of the alternate iSNS server. The default address is all zeroes.

`iSCSI Speed`
The iSCSI host port link speed.

- `auto`: The proper speed is auto-negotiated.
- `1Gbps`: The speed is forced to 1 Gbit/s, overriding a downshift that can occur during auto-negotiation with 1-Gbit/s HBAs. This setting does not apply to 10-Gbit/s HBAs.

`iSCSI IP Version`

- `4`: iSCSI host port addresses use IPv4 format.
- `6`: iSCSI host port addresses use IPv6 format.

Examples

Show system-wide parameters for iSCSI ports.

```
# show iscsi-parameters
```

Basetypes

iscsi-parameters

status

See also

set iscsi-parameters

show license

Description

Shows the status of licensed features in the storage system.

Minimum role

`monitor`

Syntax

```
show license
```

Output

`License Key`

- The license key, if a license is installed and valid.
- Blank if a license is not installed.

`Licensing Serial Number`
The serial number to use when requesting a license.

`Maximum Licensable Snapshots`
Number of snapshots that the highest-level license allows.

`Base Maximum Snapshots`
Number of snapshots allowed without an installed license.

`Licensed Snapshots`
Number of snapshots allowed by the installed license.

`In-Use Snapshots`
Number of existing licensed snapshots.

`Snapshots Expire`

- `Never`. License doesn't expire.
- Number of days remaining for a temporary license.
- `Expired`. Temporary license has expired and cannot be renewed.

`Virtualization`
Shows whether the capability to create and manage virtual pools is enabled or disabled.

`Virtualization Expires`

- `Never`. License is purchasable and doesn't expire.

`Performance Tier`
Shows whether the capability to create a Performance tier comprised of SSDs is enabled or disabled.

`Performance Tier Expires`

- `Never`. License is purchasable and doesn't expire.
- Number of days remaining for a temporary license.
- `Expired`. Temporary license has expired and cannot be renewed.

`Volume Copy`
Shows whether the capability to copy volumes is enabled or disabled.

`Volume Copy Expires`

- `Never`. Always enabled and doesn't expire.

`Replication`
Shows whether the capability to replicate volumes to a remote system is enabled or disabled.

`Replication Expires`

- Never. License is purchasable and doesn't expire.
- Number of days remaining for a temporary license.
- Expired. Temporary license has expired and cannot be renewed.

`VDS`
Shows whether the VDS (Virtual Disk Service) Hardware Provider is enabled or disabled.

NOTE: VDS is not supported in this release.

`VDS Expires`

- `Never`. License and doesn't expire.
- Number of days remaining for a temporary license.
- `Expired`. Temporary license has expired and cannot be renewed.

`VSS`
Shows whether the VSS (Volume Shadow Copy Service) Hardware Provider is enabled or disabled.

`VSS Expires`

- `Never`. License and doesn't expire.
- Number of days remaining for a temporary license.
- `Expired`. Temporary license has expired and cannot be renewed.

SRA
Shows whether Storage Replication Adapter (SRA) support is enabled or disabled.

NOTE: SRA is not supported in this release.

SRA Expires

- Never. License and doesn't expire.
- Number of days remaining for a temporary license.
- Expired. Temporary license has expired and cannot be renewed.

Examples

Show information about the installed license.

```
# show license
```

Basetypes

license

status

See also

create temp-license

show maps

Description

Shows information about mappings between volumes and initiators. If no parameter is specified, this command shows explicit mappings (but not default mappings) for all volumes.

In a dual-controller system, if a mapping uses corresponding ports on both controllers, such as A1 and B1, the Ports field will simply show 1.

Minimum role

monitor

Syntax

```
show maps
   [all]
   [initiator]
   [IDs]
```

Parameters

all
Optional. Shows mappings of all access types: read-write, read-only, no-access, and

`not-mapped` (default mappings). If this parameter is omitted, mappings of type `not-mapped` are not shown.

`initiator`
Optional. Shows mapping information by initiator. If this parameter is omitted, mapping information is shown by volume.

`IDs`
Optional. A comma-separated list of the names or serial numbers of host-type items (initiators, hosts, and host groups) or volume-type items (volumes and volume groups) for which to show mappings. If a volume is mapped to a host group, to see mappings you must specify the host group, not a host or initiator in the group. If a volume is mapped to a host, to see mappings you must specify the host, not an initiator in the group.

You can specify:

- A host by name in the format *`host-name.*`*, where `*` represents all initiators in the host. Example: `FC-Server.*`
- A host group by name in the format *`host-group.*.*`*, where the first `*` represents all hosts in the group and the second `*` represents all initiators in those hosts. Example: `TestLab.*.*`
- A volume group by name in the format *`volume-group.*`*, where `*` represents all volumes in the group. Example: `TestVolumes.*`

Do not include both host-type and volume-type items in a list. A name that includes a space must be enclosed in double quotes.

Output

Properties are described in alphabetical order.

`Access`
Type of host access to the volume:

- `read-write`: Read and write.
- `read-only`: Read only.
- `no-access`: No access (masked).
- `not-mapped`: Not mapped.

`Group Name`
For a volume group, its name in the format *`volume-group.*`*, where the * represents all volumes in the group.

`ID`
Shown by the `initiator` parameter. For an FC initiator, its WWPN. For a SAS initiator, its WWPN. For an iSCSI initiator, its node name (typically the IQN).

`Host-Port-Identifier` (v2)

- For an FC initiator, its WWPN. For a SAS initiator, its WWPN. For an iSCSI initiator, its node name (typically the IQN).
- `all other initiators`: The volume's default mapping.

`Identifier` (v3)
See `Host-Port-Identifier`, above.

`Initiator-Identifier`
Shown for a volume group mapping.

- For an FC initiator, its WWPN. For a SAS initiator, its WWPN. For an iSCSI initiator, its node name (typically the IQN).
- `all other initiators`: The volume's default mapping.

`LUN`

- The LUN that identifies the volume to a host.
- For a volume group, * means multiple LUNs are represented in the group.
- Blank if not mapped or mapped as no-access.

`Name`
The name of a volume or initiator.

`Nickname`

- For a host, its name in the format *`host-name.*`*, where the `*` represents all initiators in the host.
- For a host group, its name in the format *`host-group.*.*`*, where the first `*` represents all hosts in the host group and the second `*` represents all initiators in those hosts.
- Blank if not set or for `all other initiators`.

`Ports`

- The controller host ports to which the mapping applies.
- Blank if not mapped or mapped as `no-access`.

`Profile`

- `Standard`: Default profile.
- `HP-UX`: The host uses Flat Space Addressing.
- `OpenVMS`: The initiator does not allow LUN 0 to be assigned to a mapping.

`Serial Number`
The serial number of the volume group or volume.

`Volume`

- For a volume, its name.
- For a volume group, its name in the format *`volume-group.*`*, where the `*` represents all volumes in the group.

Examples

Show mappings for all volumes.

```
# show maps
```

Show mapping information for all initiators.

```
# show maps initiator
```

Show mappings for volume group `VGroup1` and ungrouped volume `v1`.

```
# show maps VGroup1.*,v1
```

Basetypes

initiator-view

host-group-view

host-view-mappings

volume-group-view

volume-group-view-mappings

volume-view

volume-view-mappings

status

See also

show host-groups

show initiators

show volume-groups

show volumes

show network-parameters

Description

Shows the settings and health of each controller module's network port.

Minimum role

`monitor`

Syntax

```
show network-parameters
```

Output

`IP Address`
The network port IP address.

`Gateway`
The network port gateway IP address.

`Subnet Mask`
The network port IP subnet mask.

`MAC Address`
The controller's unique Media Access Control address.

`Addressing Mode`

- `Manual`: Network settings are set manually (statically).
- `DHCP`: DHCP is used to set network parameters.

`Link Speed`

- `Unknown`: For a system operating in Single Controller mode, this controller module is not present.
- `10mbps`: The network port link speed is set to 10 Mb/s.
- `100mbps`: The network port link speed is set to 100 Mb/s.
- `1000mbps`: The network port link speed is set to 1000 Mb/s.

`Duplex Mode`

- `Undefined`: For a system operating in Single Controller mode, this controller module is not present.

- `half`: The network port duplex mode is set to half duplex.
- `full`: The network port duplex mode is set to full duplex.

`Health`
The health of the network connection.

- `OK`
- `Degraded`
- `Fault`
- `N/A`
- `Unknown`

`Health Reason`
If Health is not `OK`, this field shows the reason for the health state.

`Health Recommendation`
If Health is not `OK`, this field shows recommended actions to take to resolve the health issue.

Examples

Show network parameters for each controller module.

```
# show network-parameters
```

Basetypes

network-parameters

status

See also

set network-parameters

show ntp-status

Description

Shows the status of the use of Network Time Protocol (NTP) in the system.

Minimum role

`monitor`

Syntax

```
show ntp-status
```

Output

`NTP Status`

- `activated`: NTP is enabled.
- `deactivated`: NTP is disabled.

`NTP Server Address`

- The current NTP server IP address if NTP is enabled.
- The last-set NTP server IP address if NTP was enabled and has been disabled.
- `0.0.0.0` if the NTP server IP address has not been set.

`Last Server Contact`
The date and time in the format *`year-month-day hour:minutes:seconds`* of the last message received from the NTP server, or `none`.

Examples

Show NTP status for the system.

```
# show ntp-status
```

Basetypes

ntp-status

status

See also

set controller-date

show peer-connections

Description

Shows information about a peer connection between two systems.

You can run this command on either the local or remote system.

Minimum role

`monitor`

Syntax

`show peer-connections`

`[verify-links]`

`[`*`peer-connection-ID`*`]`

Parameters

`verify-links`
Optional. If a peer connection ID is specified, this parameter displays the ports that can be seen by each port on each peer system.

`peer-connection-ID`
Optional. Specifies the name or serial number of the peer connection for which to show information. If this parameter is not specified the command shows information for all peer connections.

Output

`Peer Connection Name`
The name of the peer connection.

`Peer Connection Type`
The type of ports being used for the peer connection:

- `FC`: FC ports.
- `iSCSI`: iSCSI ports.

`Connection Status`

- `Online`: The systems have a valid connection.
- `Offline`: No connection is available to the remote system.

`Health`

- `OK`
- `Fault`
- `Unknown`

`Health Reason`
If `Health` is not `OK`, this field shows the reason for the health state.

`Health Recommendation`
If `Health` is not `OK`, this field shows recommended actions to take to resolve the health issue.

`Local Port`
The IDs of ports in the local system.

`Port Address`
The assigned port address.

`Remote Port`
The IDs of ports in the remote system.

`Reachable Remote Links`
Shown by the `verify-links` parameter. The IDs of linked ports in the remote system.

`Reachable Local Links`
Shown by the `verify-links` parameter. The IDs of linked ports in the local system.

Examples

Show information for all peer connections.

```
# show peer-connections
```

Show information for peer connection Peer1.

```
# show peer-connections Peer1
```

Show information for peer connection Peer1 and the ports that can be seen from each port.

```
# show peer-connections Peer1 verify-links
```

Basetypes

peer-connections

status

See also

create peer-connection

delete peer-connection

query peer-connection

set peer-connection

show pools

Description

Shows information about linear and virtual pools. The command will show information for all pools by default, or you can use parameters to filter the output. The system can have a maximum of two virtual pools. The system can have a maximum of two virtual pools.

NOTE: For a virtual pool, new data will not be written to, or existing data migrated to, a degraded disk group unless it is the only disk group having sufficient available space for the data.

Minimum role

`monitor`

Syntax

```
show pools
   [type linear|virtual]
   [pool]
```

`type linear|virtual`
Optional. Specifies whether to show information for linear pools or for virtual pools. If this parameter is omitted, information will be shown for both types.

`pool`
Optional. The name or serial number of the pool for which to show information. If this parameter is omitted, information is shown for all pools.

Output

`Name`
The name of the pool.

`Serial Number`
The serial number of the pool.

`Class`

- `Linear`: Linear pool.
- `Virtual`: Virtual pool.

`Total Size`
The total capacity of the pool.

`Avail`
The available capacity in the pool.

`OverCommit`

- `Enabled`: The pool uses thin provisioning, which means that more capacity can be allocated to volumes than physically exists in the pool.
- `Disabled`: The capacity allocated to volumes when they are created cannot exceed the physical capacity of the pool.

`Disk Groups`
The number of disk groups in the pool.

`Volumes`
The number of volumes in the pool.

`Low Thresh`
The low threshold for page allocation as a percentage of pool capacity. When this threshold is exceeded, event 462 will be logged with Informational severity.

`Mid Thresh`
The middle threshold for page allocation as a percentage of pool capacity. When this threshold is exceeded, event 462 will be logged. If the pool is not overcommitted, the event will have Informational severity. If the pool is overcommitted, the event will have Warning severity.

`High Thresh`
The high threshold for page allocation as a percentage of pool capacity. The threshold value is automatically calculated based on the available capacity of the pool minus 200 GB of reserved space. When this threshold is exceeded, event 462 will be logged. If the pool is not overcommitted, the event will have Informational severity. If the pool is overcommitted, the event will have Warning severity and the system will use write-through cache mode until page allocation drops back below this threshold.

`Sec Fmt`
The sector format of disks in the pool.

- `512n`: All disks use 512-byte native sector size. Each logical block and physical block is 512 bytes.
- `512e`: All disks use 512-byte emulated sector size. Each logical block is 512 bytes and each physical block is 4096 bytes. Eight logical blocks will be stored sequentially in each physical block. Logical blocks may or may not be aligned with physical block boundaries.
- `Mixed`: The pool contains a mix of 512n and 512e disks. This is supported, but for consistent and predictable performance, do not mix disks of different sector size types (512n, 512e).

`Health`

- `OK`
- `Degraded`
- `Fault`
- `N/A`
- `Unknown`

`Reason`
If Health is not `OK`, this field shows the reason for the health state.

`Action`
If Health is not `OK`, this field shows recommended actions to take to resolve the health issue.

Examples

Show information about all pools.

```
# show pools
```

Show information about virtual pools.

```
# show pools type virtual
```

Basetypes

pools

disk-groups

tiers

status

See also

delete pools

set pool

show pool-statistics

show pool-statistics

Description

Shows live or historical performance statistics for virtual pools. For pool performance statistics, the system samples live data every 30 seconds and historical data every 5 minutes, and retains historical data for 6 months.

The historical option allows you to specify a time range or a number (count) of data samples to include. It is not recommended to specify both the `time-range` and `count` parameters. If both parameters are specified, and more samples exist for the specified time range, the samples' values will be aggregated to show the required number of samples.

Statistics shown only in API output are described in API Basetype Properties on page 351.

Minimum role

`monitor`

Syntax

To show live statistics:

```
show pool-statistics
   [pools pool]
   [tier performance|standard|archive|readcache]
```

To show historical statistics:

```
show pool-statistics
   [all]
```

```
[count number-of-data-samples]
[filename filename.csv]
historical
[pools pool]
[tier performance|standard|archive|readcache]
[time-range "date/time-range"]
```

Parameters

`all`
Optional. Specifies to show the full set of performance metrics. If this parameter is omitted, the default set of performance metrics will be shown.

`count` *`number-of-data-samples`*
Optional. Specifies the number of data samples to display, from 1 to 100. Each sample will be shown as a separate row in the command output. If this parameter is omitted, 100 samples will be shown. If you specify this parameter, do not specify the `time-range` parameter.

`filename` *`filename`*`.csv`
Optional. Specifies to save historical statistics, in CSV format, to a file on the controller. To access the file, use SFTP or FTP.

`historical`
Optional. Specifies to show historical statistics. If this parameter is omitted, live statistics will be shown.

`pools` *`pool`*
Optional. Specifies the name or serial number of the virtual pool for which to show information. If this parameter is omitted, information will be shown for both pools A and B. A name that includes a space must be enclosed in double quotes.

`tier performance|standard|archive|readcache`
Optional. Specifies the tier for which to show statistics.

`time-range "`*`date/time-range`*`"`
Optional. Specifies the date/time range of historical statistics to show, in the format `"start` *`yyyy-mm-dd hh:mm`* `[AM|PM] end` *`yyyy-mm-dd hh:mm`* `[AM|PM]"`. If the start date/time is specified but no end date/time is specified, the current date/time will be used as the end date/time. The system will return the oldest sample taken after the start time and the latest sample taken before the end time. If the specified start date/time is earlier than the oldest sample, that sample will be used as the start date/time. If you specify this parameter, do not specify the `count` parameter. If this parameter is omitted, the most recent 100 data samples will be displayed.

`disks`
Optional. Specifies a comma-separated list of disks for which to show information. If this parameter is omitted, information will be shown for all disks. For disk syntax, see Command Syntax on page 10.

Output

Live

`Pool`
The name of the pool.

`Pages Allocated per Min`
The rate, in pages per minute, at which pages are allocated to volumes in the pool because they need more space to store data.

`Pages Deallocated per Min`
The rate, in pages per minute, at which pages are deallocated from volumes in the pool because they no longer need the space to store data.

`Pages Unmapped per Minute`
The number of 4-MB pages that host systems have unmapped per minute, through use of the SCSI UNMAP command, to free storage space as a result of deleting files or formatting volumes on the host.

`Time Since Reset`
The amount of time, in seconds, since these statistics were last reset, either by a user or by a controller restart.

`Reads`
The number of read operations since these statistics were last reset or since the controller was restarted.

`Writes`
The number of write operations since these statistics were last reset or since the controller was restarted.

`Data Read`
The amount of data read since these statistics were last reset or since the controller was restarted.

`Data Written`
The amount of data written since these statistics were last reset or since the controller was restarted.

`Bps`
The data transfer rate, in bytes per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.

`IOPS`
The number of input/output operations per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.

`I/O Resp Time`
The average response time, in microseconds, for read and write operations since the last sampling time.

`Read Resp Time`
Shown by the all parameter. The average response time, in microseconds, for read operations since the last sampling time.

`Write Resp Time`
Shown by the all parameter. The average response time, in microseconds, for write operations since the last sampling time.

Historical
`For a pool:`

`Pool`
The name of the pool.

`Total I/Os`
The total number of read and write operations since the last sampling time.

`Reads`
Shown by the `all` parameter. The number of read operations since the last sampling time.

`Writes`
Shown by the `all` parameter. The number of write operations since the last sampling time.

`Data Transferred`
The total amount of data read and written since the last sampling time.

`Data Read`
Shown by the `all` parameter. The amount of data read since the last sampling time.

`Data Written`
Shown by the `all` parameter. The amount of data written since the last sampling time.

`Total IOPS`
The total number of read and write operations per second since the last sampling time.

`Read IOPS`
Shown by the `all` parameter. The number of read operations per second since the last sampling time.

`Write IOPS`
Shown by the `all` parameter. The number of write operations per second since the last sampling time.

`Total B/s`
The total data transfer rate, in bytes per second, since the last sampling time.

`Read B/s`
Shown by the `all` parameter. The data transfer rate, in bytes per second, for read operations since the last sampling time.

`Write B/s`
Shown by the `all` parameter. The data transfer rate, in bytes per second, for write operations since the last sampling time.

`Allocated Pages`
The number of 4-MB pages allocated to volumes in the pool.

`Sample Time`
Date and time, in the format *`year-month-day hour:minutes:seconds`*, when the data sample was taken.

For each tier in the pool:

`Pool`
The name of the pool.

`Tier`
The name of the tier.

`Total I/Os, Reads, Writes, Data Transferred, Data Read, Data Written, Total IOPS, Read IOPS, Write IOPS, Total B/s, Read B/s, Write B/s`
As described for a pool, above.

`Allocated Pages`
The number of 4-MB pages allocated to volumes in the tier.

`Page Moves In`
The number of pages moved into this tier from a different tier.

`Page Moves Out`
The number of pages moved out of this tier to other tiers.

`Page Rebalances`
The number of pages moved between disks in this tier to automatically load balance.

`Initial Allocations`
The number of 4-MB pages that are allocated as a result of host writes. This number does not include pages allocated as a result of background tiering page movement. (Tiering moves pages from one tier to another, so one tier will see a page deallocated, while another tier will show pages allocated. These background moves are not considered initial allocations.)

`Unmaps`
The number of 4-MB pages that are automatically reclaimed and deallocated because they are empty (they contain only zeroes for data).

`RC Copies`
The number of 4-MB pages copied from spinning disks to SSD read cache (read flash cache).

`Zero-Pages Reclaimed`
The number of empty (zero-filled) pages that were reclaimed during this sample period.

`Sample Time`
Date and time, in the format year-month-day hour:minutes:seconds, when the data sample was taken.

Examples

Show live statistics for both pools.

```
# show pool-statistics
```

Show historical statistics from a specified date and time range for pool A.

```
# show pool-statistics pools A historical time-range "start 2014-06-01
4:40 PM end 2014-06-01 5:00 PM"
```

Show all samples of historical statistics for the Standard tier in pool A.

```
# show pool-statistics historical all pools A tier standard
```

Basetypes

pool-statistics (live)

resettable-statistics (live)

tier-statistics (live)

pool-summary (historical)

pool-hist-statistics (historical)

tier-summary (historical)

tier-hist-statistics (historical)

readcache-hist-statistics (historical)

status

See also

reset all-statistics

reset pool-statistics

show pools

show ports

Description

Shows information about host ports in both controllers.

Minimum role

`monitor`

Syntax

```
show ports
   [detail]
```

Parameters

`detail`

Optional. This parameter shows additional detail about the port status, including SFP information.

Output

`Ports`
Controller ID and port number

`Media`

- `FC(P)`: Fibre Channel Point-to-Point
- `FC(L)`: Fibre Channel-Arbitrated Loop (public or private)
- `FC(-)`: Not applicable, as when the port is disconnected
- `SAS`: Serial Attached SCSI
- `iSCSI`: Internet SCSI

`Target ID`
For an FC port, its WWPN. For a SAS port, its WWPN. For an iSCSI port, its node name (typically the IQN).

`Status`

- `Up`: The port is cabled and has an I/O link.
- `Warning`: Not all of the port's PHYs are up.
- `Error`: The port is reporting an error condition.
- `Not Present`: The controller module is not installed or is down.
- `Disconnected`: Either no I/O link is detected or the port is not cabled.

`Speed(A)`

- Actual link speed in Gbit/s.
- Blank if not applicable.

`Speed(C)`
Configured host-port link speed in Gbit/s. Not shown for SAS.

- `FC`: Auto, 16Gb, 8Gb, or 4Gb
- `iSCSI`: Auto
- Blank if not applicable

`Health`

- `OK`
- `Degraded`
- `Fault`
- `N/A`
- `Unknown`

`Reason`
If Health is not `OK`, this field shows the reason for the health state.

`Action`
If Health is not `OK`, this field shows recommended actions to take to resolve the health issue.

`Topo (C)`
FC and SAS only. Configured topology.

`Lanes Expected`
SAS only. If the `detail` parameter is specified, this field shows the expected number of PHY lanes in the SAS port.

`Active Lanes`
SAS only. If the `detail` parameter is specified, this field shows the number of active lanes in the SAS port. If the port is connected and fewer lanes are active than are expected, the port status will change to `Warning`, the health will change to `Degraded`, and event 354 will be logged.

`Disabled Lanes`
SAS only. If the `detail` parameter is specified, this field shows the number of disabled lanes in the SAS port.

`PID`
FC only. If the `detail` parameter is specified, this field is shown. If the port is using loop topology and the port status is `Up`, this field shows the primary loop ID. If the port is not using loop topology or the port status is not `Up`, this field shows `N/A`.

`IP Version`
iSCSI only. IPv4 or IPv6.

`IP Address`
iSCSI only. Assigned port IP address.

`Gateway`
iSCSI only. For IPv4, gateway IP address for assigned IP address.

`Netmask`
iSCSI only. For IPv4, subnet mask for assigned IP address.

`Default Router`
iSCSI only. For IPv6, default router for assigned IP address.

`Link-Local Address`
iSCSI only. For IPv6, the link-local address that is automatically generated from the MAC address and assigned to the port.

`MAC`
iSCSI only. Unique Media Access Control (MAC) hardware address, also called the physical address.

`SFP Status`
If the detail parameter is specified, this field shows the SFP status:

- `OK`
- `Not present`: No SFP is inserted in this port.
- `Not compatible`: The SFP in this port is not qualified for use in this system. When this condition is detected, event 464 is logged.
- `Incorrect protocol`: The SFP protocol does not match the port protocol. When this condition is detected, event 464 is logged.

`Part Number`
If the `detail` parameter is specified, this field shows the SFP part number.

`Supported Speeds`
FC only. If the `detail` parameter is specified, this field shows the link speeds that the SFP supports.

`10G Compliance`
iSCSI only. If the `detail` parameter is specified, this field shows the SFP's 10G compliance code. If the SFP returns an unsupported code, this field will show the equivalent hex value.

`Ethernet Compliance`
iSCSI only. If the `detail` parameter is specified, this field shows the SFP's Ethernet compliance code. If the SFP returns an unsupported code, this field will show the equivalent hex value.

`Cable Technology`
iSCSI only. If the `detail` parameter is specified, this field shows whether the SFP supports active or passive cable technology.

`Cable Length`
iSCSI only. If the `detail` parameter is specified, this field shows the link length (in meters) that is supported by the SFP while operating in compliance with applicable standards for the cable type.

Examples

Show information about host ports in each controller module.

```
# show ports
```

Show detailed information about host ports in each controller module.

```
# show ports detail
```

Basetypes

port

status

See also

set host-parameters

show power-supplies

Description

Shows information about each power supply in the storage system.

Minimum role

monitor

Syntax

```
show power-supplies
```

Output

Encl
The ID of the chassis that contains the power supply.

Id
The power supply position, shown as an index value that starts at 0 and increments from left to right as viewed from the back of the chassis

Serial Number
The serial number of the power supply.

Part Number

- (blank): Not applicable.

Name
The power supply identifier and location.

Firmware Version

- (blank): Not applicable.
- The firmware revision of the power supply.

Health

- OK
- Degraded
- Fault
- N/A
- Unknown

Reason
If Health is not OK, this field shows the reason for the health state.

Action
If Health is not OK, this field shows recommended actions to take to resolve the health issue.

Examples

Show information about each power supply in each chassis.

```
# show power-supplies
```

Basetypes

power-supplies

fan

status

See also

show fans

show frus

show protocols

Description

Shows which management services and protocols are enabled or disabled.

Minimum role

`monitor`

Syntax

```
show protocols
```

Output

`Web Browser Interface (HTTP)`
Shows whether the standard Disk Management Utility web server is enabled or disabled.

`Secure Web Browser Interface (HTTPS)`
Shows whether the secure Disk Management Utility web server is enabled or disabled.

`Command Line Interface (Telnet)`
Shows whether the standard CLI is enabled or disabled.

`Secure Command Line Interface (SSH)`
Shows whether the secure shell CLI is enabled or disabled.

`Storage Management Initiative Specification (SMI-S)`
Shows whether the secure SMI-S interface is enabled or disabled. When enabled, this option allows SMI-S clients to communicate with each controller's embedded SMI-S provider via HTTP port 5989.

`Unsecure Storage Management Initiative Specification (SMI-S 5988)`
Shows whether the unsecure SMI-S interface is enabled or disabled. When enabled, this option allows SMI-S clients to communicate with each controller's embedded SMI-S provider via HTTP port 5988.

`Service Location Protocol (SLP)`
Shows whether the SLP interface is enabled or disabled.

`File Transfer Protocol (FTP)`
Shows whether the unsecure secondary interface for installing firmware updates, installing security certificates and keys, installing a license, and downloading logs is enabled or disabled.

`SSH File Transfer Protocol (SFTP)`
Shows whether the secure secondary interface for installing firmware updates, installing security certificates and keys, installing a license, and downloading logs is enabled or disabled.

`Simple Network Management Protocol (SNMP)`
Shows whether the SNMP interface is enabled or disabled. When this is disabled, all SNMP requests to the MIB are disabled and SNMP traps are disabled.

`Service Debug`
Shows whether the Telnet debug port is enabled or disabled.

`In-band SES Management (SES)`
Shows whether the in-band SES interface is enabled or disabled.

`Activity Progress Reporting (activity)`
Shows whether access to the activity progress interface via HTTP port 8081 is enabled or disabled. This mechanism reports whether a firmware update or partner firmware update operation is active and shows the progress through each step of the operation. In addition, when the update operation completes, status is presented indicating either the successful completion, or an error indication if the operation failed.

`Management Mode`
Shows the default management mode.

- `Linear`: Uses linear-storage terminology in command output and system messages. For example, vdisk for disk groups and pools.
- `Virtual`: Uses terminology in command output and system messages that is generalized for managing virtual and linear storage. For example, disk group for disk groups and pool for pools.

To see the management mode for the current CLI session, which can be set differently than the default, use the show cli-parameters command.

`SSH Port`
Shows the port number used for SSH.

`SFTP Port`
Shows the port number used for SFTP.

Examples

Show the status of service and security protocols.

```
# show protocols
```

Basetypes

security-communications-protocols

communication-ports

status

See also

set protocols

show cli-parameters

show provisioning

Description

Shows information about how the system is provisioned. This command shows the associations between controllers, disks, disk groups or pools, volumes, and mappings. The command will show information for all associations by default, or you can use parameters to filter the output.

This command is useful for the following purposes:

- You want a quick overview of how the system is provisioned.
- You know of a disk-related issue (perhaps from the event log) and want to understand what components it may be impacting. You can use this command to see which volume WWNs are affected, which you can use on the host to determine which device node might be seeing errors.
- You know of a volume-level issue and want to determine which associated components to investigate. You can use this command to quickly see which controller owns the volume and which disks are associated with the volume. For example, perhaps at the OS level, a certain device node (target) looks "slow" relative to the rest of the targets. You can correlate the OS device node to the volume WWN (or LUN), and then use the command output to find the associated controller and disks.

Minimum role

monitor

Syntax

show provisioning

[disks *disks*|luns *LUNs*|pool *pools*|ports *ports*|vdisks *vdisks*|volumes *volumes*]

[no-mapping]

[unhealthy]

Parameters

disks *disks*
Optional. Shows provisioning information for the specified list of disks. For disk syntax, see Command Syntax on page 10. This command does not support the use of hyphens to indicate a range of disks.

luns *LUNs*
Optional. Shows provisioning information for the specified list of LUNs.

no-mapping
Optional. Shows the Mapped field but no other mapping information. If this parameter is omitted, all mapping information is shown.

pool *pools*
Optional. Shows provisioning information for the specified list of pools. A name that includes a space must be enclosed in double quotes.

ports *ports*
Optional. Shows provisioning information for the specified list of ports. For port syntax, see Command Syntax on page 10. This command does not support the use of hyphens to indicate a range of ports.

`vdisks` *vdisks*
Optional. For linear storage, this shows provisioning information for the specified list of disk groups. A name that includes a space must be enclosed in double quotes.

`volumes` *volumes*
Optional. Shows provisioning information for the specified list of volumes. A name that includes a space must be enclosed in double quotes.

`unhealthy`
Optional. Shows provisioning information for disk groups or pools whose health is not OK. If this parameter is omitted, provisioning information is shown for all disk groups or pools.

Output

Volume information:

`Volume`

- Volume name.
- Blank if the disk group or pool does not have a volume.

`WWN`

- Volume World Wide Name.
- Blank if the disk group or pool does not have a volume.

`Ctlr`
Owning controller of the disk group or pool.

`Disks`
Shorthand list of the disks within a disk group or pool.

`Pool` (v3)
Pool name.

`Vdisk` (v2)
Disk group name.

`Health`
Health of the associated disk group or pool:

- `OK`
- `Degraded`
- `Fault`
- `N/A`
- `Unknown`

`Mapped`
Indicates whether the volume is mapped. This is useful when the no-mapping parameter is specified to hide detailed mapping information.

- `Yes`: The volume is mapped.
- `No`: The volume is not mapped.

Mapping information:

`Ports`

- Controller host ports that the mapping applies to.
- Blank if not mapped or mapped as no-access.

`LUN`

- LUN that identifies the volume to a host.
- Blank if not mapped or mapped as no-access.

`Access`
Type of host access to the volume:

- `read-write`: The host has read and write access to the volume.
- `read-only`: The host has read access to the volume.
- `no-access`: The host is denied access to the volume.
- `not-mapped`: The host is not mapped to the volume.

`Host-Port-Identifier` (v2) or `Identifier` (v3)

- For an FC initiator, its WWPN. For a SAS initiator, its WWPN. For an iSCSI initiator, its node name (typically the IQN).
- `all other initiators`: The volume's default mapping.

`Nickname`
Host nickname, or blank if not set or for `all other hosts`.

`Profile`

- `Standard`: Default profile.
- `HP-UX`: The host uses Flat Space Addressing.
- `OpenVMS`: The initiator does not allow LUN 0 to be assigned to a mapping.

Examples

Show provisioning for the system.

```
# show provisioning
```

Show provisioning for disk group `myR1`.

```
# show provisioning vdisks myR1
```

Show provisioning for all unhealthy disk groups.

```
# show provisioning unhealthy
```

Basetypes

provisioning

status

See also

show disk-groups

show disks

show maps

show pools

show vdisks

show redundancy-mode

Description

Shows the redundancy status of the system.

Minimum role

`monitor`

Syntax

```
show redundancy-mode
```

Output

`Controller Redundancy Mode`
Shows the system's operating mode, also called the cache redundancy mode:

- `Independent Cache Performance Mode`: For a dual-controller system, controller failover is disabled and data in a controller's write-back cache is not mirrored to the partner controller. This improves write performance at the risk of losing unwritten data if a controller failure occurs while there is data in controller cache.
- `Active-Active ULP`: Both controllers are active using ULP (Unified LUN Presentation). Data for volumes configured to use write-back cache is automatically mirrored between the two controllers to provide fault tolerance.
- `Single Controller`: The chassis contains a single controller.
- `Failed Over`: Operation has failed over to one controller because its partner is not operational. The system has lost redundancy.
- `Down`: Both controllers are not operational.

`Controller Redundancy Status`

- `Redundant with independent cache`: Both controllers are operational but are not mirroring their cache metadata to each other.
- `Redundant`: Both controllers are operational.
- `Operational but not redundant`: In active-active mode, one controller is operational and the other is offline. In single-controller mode, the controller is operational.
- `Down`: This controller is not operational.
- `Unknown`: Status information is not available.

`Controller` *`ID`* `Status`

- `Operational`: The controller is operational.
- `Down`: The controller is installed but not operational.
- `Not Installed`: The controller is not installed.

`Controller` *`ID`* `Serial Number`

- Controller module serial number
- `Not Available`: The controller is down or not installed.

`Other MC Status`
The operational status of the Management Controller in the partner controller. This is not factored into system health.

- `Operational`
- `Not Operational`
- `Not Communicating`
- `Unknown`

Examples

Show the redundancy status of the system.

```
# show redundancy-mode
```

Basetypes

redundancy

status

show refresh-counters

Description

In XML API format only, shows when the data represented by the basetype was last updated.

The value 0 means the data has never been updated and is not cached. A value other than 0 is a timestamp indicating that the data has been updated. If the value has changed since the last time you called this command then the data has changed.

Minimum role

`monitor`

Syntax

```
show refresh-counters
```

Basetypes

refresh-counters

status

See also

set cli-parameters

show remote-systems

Description

Shows information about remote systems associated with the local system. This command applies to linear storage only.

Minimum role

`monitor`

Syntax

```
show remote-systems
   [system]
```

Parameters

system
Optional. The name or network-port IP address of the remote system about which to show information.

Output

`System Name`
The name of the remote system.

`System Contact`
The name of the person who administers the remote system.

`System Location`
The location of the remote system.

`System Information`
A brief description of the remote system.

`Vendor Name`
The vendor name of the remote system.

`Product ID`
The product model identifier of the remote system.

`Product Brand`
The brand name of the remote system.

`IP Address Controller A`
The IP address of the network port in controller A in the remote system.

IP Address Controller B
The IP address of the network port in controller B in the remote system.

`Username`
The name of a user with the manage role in the remote system.

`Status`

- `Uninitialized`: This system hasn't communicated with the remote system.
- `Ready`: This system has contacted the remote system and it is ready to use.
- `Connected`: This system is transferring data to the remote system.
- `Not Connected`: The system is not connected to the remote system.

`Last Connected`
Date and time, in the format *`year-month-day hour:minutes:seconds`* (UTC), when successful communication was last established between the Management Controller in the local system and the Management Controller in the remote system. This value does not indicate when connection status was last determined, and will not be updated if the remote Management Controller is not accessible or if the connection status is `Not Connected`.

Examples

Show information about remote system `System2`.

```
# show remote-systems System2
```

Basetypes

remote-system

status

See also

delete remote-system

show replication-sets

Description

Shows information about replication sets in the peer connection.

You can view information about all replication sets or a specific replication set.

For virtual storage, you can run this command on either the primary or secondary system. In console mode, this command does not show the serial numbers of items such as replication volumes. To see serial numbers, run this command in API mode.

Timestamps use the local time zone of the system on which this command is run.

NOTE: If you change the time zone of the secondary system in a replication set whose primary and secondary systems are in different time zones, you must restart the system to enable management interfaces to show proper time values for replication operations.

Properties shown only in API output are described in the CLI Reference Guide.

Minimum role

`monitor`

Syntax

```
show replication-sets
   [replication-set-ID]
```

Parameters

replication-set-ID

Optional. The name or serial number of a replication set for which to display information at the replication set level. A name that includes a space must be enclosed in double quotes. If this parameter is omitted, information is shown for all replication sets.

Output

Overview information:

`Name`
The replication set name.

`Group`

- `Yes`: The replication set is part of a group.
- `No`: The replication set is not part of a group.

`Primary Location`
The location of the primary volume in the replication set: Local or Remote.

`Peer`
The name of the peer connection.

`Primary Volume`
The primary volume name. If it is a volume group, it uses the .* notation.

`Secondary Volume`
The secondary volume name. If it is a volume group, it uses the .* notation.

`Policy`
The action to take when a replication is running and a new replication is requested.

- `discard`: Discard the new replication request.
- `queue-latest`: Take a snapshot of the primary volume and queue the new replication request. If the queue contained an older replication request, discard that older request. A maximum of one replication can be queued.

`Queue Count`
The number of queued replications for the replication set: either 0 or 1.

`Status`

- `Not Ready`: The replication set is not ready for replications because the system is still preparing the replication set.
- `Unsynchronized`: The primary and secondary volumes are unsynchronized because the system has prepared the replication set, but the initial replication has not run.
- `Running`: A replication is in progress.
- `Ready`: The replication set is ready for a replication.
- `Suspended`: Replications have been suspended.
- `Unknown`: This system cannot communicate with the primary system and thus cannot be sure of the current state of the replication set. Check the state of the primary system.

`Last Successful Run`
The date and time when the system took a snapshot of the primary volume in preparation for starting the last successful replication run. The value shows when the primary and secondary volumes were last known to be in sync.

`Last Status`
The status of the last attempted replication.

Last run or current run information:

`Replication`
`Last Run` or `Current Run`.

`Progress`
The percentage complete for an active replication. Otherwise, N/A.

`Data Transferred`
The total number of bytes transferred.

`Start Time`
The date and time when the replication started.

`End Time`
For the last run, the date and time when the replication ended.

`Estimated Completion Time`
For the current run, the date and time when the replication is estimated to end.

`Run Error`
A message that says whether the replication succeeded or an error occurred.

Examples

Show information about all replication sets.

```
# show replication-sets
```

Show information about replication set `RS1`.

```
# show replication-sets RS1
```

Basetypes

cs-replication-set

status

See also

create replication-set

delete replication-set

resume replication-set

set replication-set

suspend replication-set

show replication-snapshot-history

Description

Shows information about the snapshot history for all replication sets or a specific replication set.

You can run this command on either the primary or secondary system to see snapshot-history settings for a replication set and details about local replication snapshots.

In console mode, this command does not show the serial numbers of items such as replication volumes. To see serial numbers, run this command in API mode.

Minimum role

monitor

Syntax

```
show replication-snapshot-history
   [replication-set-ID]
```

Parameters

replication-set-ID
Optional. The name or serial number of a replication set for which to display information. A name that includes a space must be enclosed in double quotes. If this parameter is omitted, information is shown for all replication sets.

Output

Snapshot settings:

Replication Set
The replication set name.

Snapshot History

- disabled or off: A snapshot history will not be kept.
- secondary: A snapshot history set will be kept on the secondary system for the secondary volume, using snapshot-count and snapshot-basename settings.
- both: A snapshot history will be kept for the primary volume on the primary system and for the secondary volume on the secondary system. Both snapshot histories will use the same snapshot-count and snapshot-basename settings.

Count
The number of snapshots to retain in snapshot history. When a new snapshot exceeds this limit, the oldest snapshot in the snapshot history is deleted.

Basename
The user-defined prefix for the snapshots.

Retention Priority
The retention priority for snapshots, which is used when automatic deletion of snapshots is enabled by using the set snapshot-space command. In a snapshot tree, only leaf snapshots can be deleted automatically. Deletion based on retention priority is unrelated to deleting the oldest snapshots to maintain a snapshot count.

- `never-delete`: Snapshots will never be deleted automatically to make space. The oldest snapshot in snapshot history will be deleted once the snapshot-count has been exceeded.
- `high`: Snapshots can be deleted after all eligible medium-priority snapshots have been deleted.
- `medium`: Snapshots can be deleted after all eligible low-priority snapshots have been deleted.
- `low`: Snapshots can be deleted.

Snapshot information:

`Local Snapshot`
The snapshot name.

`Creation Date/Time`
The date and time when the snapshot was prepared or committed.

`Snap Data`
The total amount of write data associated with the snapshot.

`Unique Data`
The amount of write data that is unique to the snapshot.

Examples

Show snapshot-history information for all replication sets.

```
# show replication-snapshot-history
```

Show snapshot-history information for replication set `RS1`.

```
# show replication-snapshot-history RS1
```

Basetypes

replication-snapshot-history

current-replication-snapshots

status

See also

show replication-sets

show snapshots

show sas-link-health

Description

Shows the condition of SAS expansion-port connections.

Minimum role

`monitor`

Syntax

```
show sas-link-health
```

Output

`Encl`
The enclosure ID.

`Ctlr`
The ID of the controller module or expansion module.

`Name`

- `Out Port`: Egress (expansion) port in a controller module or an expansion module. Can be connected to an ingress port in an expansion module.
- `In Port`: Ingress port in an expansion module. Can be connected to an egress (expansion) port in a controller module or an expansion module.
- `Universal Port`: Port that can function as either an egress or ingress port in a controller module or an expansion module.

`Status`

- `Up`: The port is cabled and has an I/O link.
- `Warning`: Not all of the port's PHYs are up.
- `Error`: The port is reporting an error condition.
- `Not Present`: The controller module is not installed or is down.
- `Disconnected`: Either no I/O link is detected or the port is not cabled.

`Health`

- `OK`
- `Degraded`
- `Fault`
- `N/A`
- `Unknown`

`Reason`
If Health is not `OK`, this field shows the reason for the health state.

`Action`
If Health is not `OK`, this field shows recommended actions to take to resolve the health issue.

Examples

Show the condition of SAS expansion-port connections in each chassis.

```
# show sas-link-health
```

Basetypes

expander-ports

status

show schedules

Description

Shows information about all task schedules.

Minimum role

`monitor`

Syntax

`show schedules`

`[detail]`

`[`*`schedule-name`*`]`

`detail`
Optional. Shows additional detail about each schedule, with some longer field names, in a vertical format. If this parameter is omitted, output is shown with some shorter field names in a horizontal format.

`schedule-name`
Optional. Shows information about the specified schedule only. A name that includes a space must be enclosed in double quotes. If this parameter is omitted, information is shown for all schedules.

Output

`Name`
Shown by default. The schedule name.

`Schedule Name`
Shown by the `detail` parameter. The schedule name.

`Specification`
Shown by default. The schedule settings for running the associated task.

`Schedule Specification`
Shown by the `detail` parameter. The schedule settings for running the associated task.

`Status`

- `Uninitialized`: The task is not yet ready to run.
- `Ready`: The task is ready to run at the next scheduled time.
- `Suspended`: The task had an error and is holding in its current state.
- `Expired`: The task exceeded a constraint and will not run again.
- `Invalid`: The task is invalid.
- `Deleted`: The task has been deleted.

`Next Time`
The date and time, in the format *`year-month-day hour:minutes:seconds`* (UTC), when the schedule will next run.

`Task To Run`
The name of the task that the schedule runs.

`Error Message`

- If an error occurred while processing the task, the error message.
- Blank if no error occurred.

Task-specific information, as shown by the show tasks command.

Shown by the `detail` parameter.

Examples

Show information about all task schedules.

```
# show schedules
```

Show information about schedule `Sched2`.

```
# show schedules Sched2
```

Basetypes

schedules

status

See also

create schedule

delete schedule

set schedule

show tasks

show sensor-status

Description

Shows information about each environmental sensor in each chassis.

Information shown includes overall unit (chassis) status, and temperature, voltage, charge, and current as applicable for chassis components.

For temperature and voltage ranges (both normal and error), see your product's installation documentation.

Minimum role

`monitor`

Syntax

```
show sensor-status
```

Output

`Encl`
The enclosure ID.

`Drawer`
The drawer ID.

`Sensor Name`
The sensor name and location.

`Value`

- For a sensor, its value.
- For Overall Unit Status, one of the status values below.

`Status`

- `OK`: The sensor is present and detects no error condition.
- `Warning`: The sensor detected a non-critical error condition. Temperature, voltage, or current is between the warning and critical thresholds.
- `Critical`: The sensor detected a critical error condition. Temperature, voltage, or current exceeds the critical threshold.
- `Unavailable`: The sensor is present with no known errors, but has not been turned on or set into operation because it is initializing. This typically occurs during controller startup.
- `Unrecoverable`: The enclosure management processor (EMP) cannot communicate with the sensor.
- `Unknown`: The sensor is present but status is not available.
- `Not Installed`: The sensor is not present.
- `Unsupported`: Status detection is not implemented.

Examples

Show the status of each environmental sensor in each chassis.

```
# show sensor-status
```

Basetypes

sensors

status

show sessions

Description

Shows information about user sessions on the storage system.

When an active session reaches its timeout (1800 seconds by default), the session will be marked as expired, and will be removed 30 seconds later. If you reset the system, all sessions will be removed.

This information is for reference as a security measure.

Minimum role

`manage`

Syntax

```
show sessions
   [detail]
```

`detail`
Optional. Shows additional information about user sessions.

Output

`Username`
The name of the user for which session information is shown.

`Interface`
Shows whether the session is using the CLI or the Disk Management Utility.

`Locale`
The display language.

`Host`
For a CLI session, the connected system's IP address and port number.

`State`
Shown by the `detail` parameter. Shows whether the session is active or expired.

`Timeout`
Shown by the `detail` parameter. The time in seconds that the session can be idle before it automatically ends.

`Idle Time`
The time in seconds that the session has been idle.

`First Access`
Shown by the `detail` parameter. The date and time when the session started.

Last Access
Shown by the `detail` parameter. The date and time when the session was last accessed. It updates to the current time when a command is issued.

Examples

Show active sessions on the storage system.

```
# show sessions
```

Basetypes

sessions

status

show shutdown-status

Description

Shows whether each Storage Controller is active or shut down.

Minimum role

`monitor`

Syntax

```
show shutdown-status
```

Output

`Controller A`

- `up`: The controller is operational.
- `down`: The controller is shut down.
- `not installed`: The controller is not installed.

`Controller B`

- `up`
- `down`
- `not installed`

`Other MC Status`
The operational status of the Management Controller in the partner controller. This is not factored into system health.

- `Operational`
- `Not Operational`
- `Not Communicating`
- `Unknown`

Examples

Show the shutdown status of each controller.

```
# show shutdown-status
```

Basetypes

show-other-MC-status

shutdown-status

status

See also

restart mc

restart sc

shutdown

show snapshot-space

Description

Shows snapshot-space settings for each virtual pool. This includes space used by replication snapshots.

Minimum role

`monitor`

Syntax

`show snapshot-space`

Output

`Pool`
The pool for which information is displayed (A or B).

`Limit (%Pool)`
The percentage of the pool that can be used for snapshots (the snapshot space).

`Limit Size`
The actual size of the snapshot space.

`Allocated (%Pool)`
The percentage of the pool currently used by snapshots.

`Allocated (%Snapshot Space)`
The percentage of the snapshot space currently used by snapshots.

`Allocated Size`
The actual amount of space currently used by snapshots.

`Low Threshold (%Snapshot Space)`
A percentage of the snapshot space designated as the low threshold.

`Middle Threshold (%Snapshot Space)`
A percentage of the snapshot space designated as the middle threshold.

`High Threshold (%Snapshot Space)`
A percentage of the snapshot space designated as the high threshold.

`Limit Policy`
The limit policy for when the percentage of the pool designated for snapshots is reached.

- `notify-only`: When the snapshot space is reached an event is generated and logged.
- `delete`: When the snapshot space is reached an event is generated and logged and automatic deletion of snapshots occurs.

Examples

Show snapshot-space settings for each virtual pool.

```
# show snapshot-space
```

Basetypes

snap-space

status

See also

set snapshot-space

show pools

show snapshots

Description

Shows information about snapshots. The command will show information for all snapshots by default, or you can use parameters to filter the output.

Minimum role

monitor

Syntax

```
show snapshots
   [pattern string]
   [pool pool]
   [volume volume]
```

Parameters

`pattern` *`string`*
Optional. Shows snapshots whose names contain the specified string. The string can include the following wildcards, singly or in combination.

`*` — Matches zero or more characters.

`?` — Matches any one character. Use multiple '?' wildcards to find names of a specific length. For example, `Vol??` will find names starting with `Vol` that are five characters long.

`[]` — Matches any character within the brackets, except a hyphen. Alphabetic characters are case sensitive. For example, `[123]` matches 1, 2, or 3. Use a hyphen between two characters to specify a range. For example, `[0-9]` matches any one digit. You can combine the list and range forms. For example, `[xy1-3]` matches x or y (but not X or Y), or 1, 2, or 3.

`pool` *`pool`*
Optional. Specifies the name or serial number of the pool that contains the snapshots for which to show information. A name that includes a space must be enclosed in double quotes. If this parameter is omitted, information is shown for snapshots in all pools.

`volume` *volume*
Optional. Shows snapshots associated with the specified volume name or serial number. A name that includes a space must be enclosed in double quotes.

Output

`Pool`
The name of the pool that contains the snapshot.

`Serial Number`
Snapshot serial number

`Name`
The name of the snapshot.

`Creation Date/Time`
The date and time when the snapshot was prepared or committed.

`Status`

- `Available`
- `Unavailable`: See the `Status-Reason` value.

`Status-Reason`
Shows `N/A` for `Available` status, or one of the following reasons for `Unavailable` status:

- `snapshot not found`
- `master volume not found`
- `snapshot pending` (not yet committed)
- `master volume not accessible`
- `Volume copy with modified data is in progress`
- `Unknown reason`

`Parent Volume`
The name of the volume of which the snapshot was taken.

`Base Vol`
The root of the snapshot tree, if any. A snapshot tree is a series of inter-related snapshots of a volume and can be 254 levels deep.

`Snaps`
The number of child snapshots (snapshots taken of this snapshot).

`TreeSnaps`
The number of snapshots taken of the base volume and its children. This count includes the base volume and all snapshots that share the base volume as their root.

`Snap-Pool`

- The name of the snap pool for linear snapshots.
- Blank for virtual snapshots.

`Snap Data`
The total amount of write data associated with the snapshot.

`Unique Data`
The amount of write data that is unique to the snapshot.

`Shared Data`
The amount of write data that is shared between this snapshot and other snapshots.

`Retention Priority`
The retention priority for the snapshot.

- `never-delete`: Snapshots will never be deleted.
- `high`: Snapshots may be deleted after all eligible medium-priority snapshots have been deleted.
- `medium`: Snapshots may be deleted after all eligible low-priority snapshots have been deleted.
- `low`: Snapshots may be deleted.

Snapshots that are mapped or are not leaves of a volume's snapshot tree are not eligible for automatic deletion.

Examples

Show information about all snapshots.

```
# show snapshots
```

Show information about snapshots of volume `vol2`.

```
# show snapshots volume vol2
```

Show snapshots whose names include snap followed by an underscore and a two-digit number — such as `VolAsnap_01` or `snap_10`, but not `snapVolA_01` or `Snap_1`.

```
# show snapshots pattern *snap_[0-9][0-9]
```

Basetypes

snapshots

status

See also

show pools

show volumes

show snmp-parameters

Description

Shows SNMP settings for event notification.

Minimum role

`monitor`

Syntax

```
show snmp-parameters
```

Output

`SNMP Trap Notification Level`

- `crit`: Sends notifications for Critical events only.

- `error`: Sends notifications for Error and Critical events.
- `warn`: Sends notifications for Warning, Error, and Critical events.
- `resolved`: Sends notifications for Resolved, Warning, Error, and Critical events.
- `info`: Sends notifications for all events.
- `none`: No events are sent as traps and traps are disabled.

`SNMP Trap Host IP#`
The IP address of each trap host.

`SNMP read community`
The community string for read-only access. The value is obscured for users having only the `monitor` role and is shown in clear text for users having the `manage` role.

`SNMP write community`
The community string for write access. The value is obscured for users having only the `monitor` role and is shown in clear text for users having the `manage` role.

Examples

Show SNMP notification settings.

```
# show snmp-parameters
```

Basetypes

snmp-parameters

status

See also

set snmp-parameters

set protocols

show protocols

show syslog-parameters

Description

Shows syslog notification parameters for events and managed logs.

Minimum role

`monitor`

Syntax

```
show syslog-parameters
```

Output

`Syslog Host IP`
The IP address of the remote syslog server to use for the notifications.

`Syslog Notification Level`
Shows the minimum severity for which the system sends notifications:

- `crit`: Sends notifications for Critical events only.
- `error`: Sends notifications for Error and Critical events.
- `warn`: Sends notifications for Warning, Error, and Critical events.
- `resolved`: Sends notifications for Resolved, Warning, Error, and Critical events.
- `info`: Sends notifications for all events.
- `none`: Disables syslog notification and clears the settings.

`Syslog Host Port`
The port on which the remote syslog facility is expected to listen for notifications.

Examples

Show settings for remote syslog notification.

```
# show syslog-parameters
```

Basetypes

syslog-parameters

status

See also

set syslog-parameters

show system

Description

Shows information about the storage system. If the system's health is not OK, each unhealthy component is listed with information to help you resolve the health problem.

Minimum role

`monitor`

Syntax

```
show system
   [detail]
```

Parameters

`detail`
Optional. Shows the SCSI Vendor ID and SCSI Product ID fields on a system where they are hidden by default.

Output

`System Name`
The name of the system.

`System Contact`
The name of the person who administers the system.

`System Location`
The location of the system.

`System Information`
A brief description of what the system is used for or how it is configured.

`Midplane Serial Number`
The serial number of the controller chassis midplane.

`Vendor Name`
The vendor name.

`Product ID`
The product model identifier.

`Product Brand`
The product brand name.

`SCSI Vendor ID`
The vendor name returned by the SCSI INQUIRY command.

`SCSI Product ID`
The product identifier returned by the SCSI INQUIRY command.

`Enclosure Count`
The number of chassis in the system.

`Health`

- `OK`
- `Degraded`
- `Fault`
- `N/A`
- `Unknown`

`Health Reason`
If Health is not `OK`, this field shows the reason for the health state.

`Other MC Status`
The operational status of the Management Controller in the partner controller. This is not factored into system health.

- `Operational`
- `Not Operational`
- `Not Communicating`
- `Unknown`

`PFU Status`
Shows whether partner firmware update is running on the system, or is idle.

`Supported Locales`
Supported display languages.

Examples

Show information about the system.

```
# show system
```

Basetypes

system

status

See also

set system

show system-parameters

show system-parameters

Description

Shows certain storage-system settings and configuration limits. For a summary of the physical and logical limits of the storage system, see the system configuration limits topic in the Disk Management Utility help.

Minimum role

`monitor`

Syntax

```
show system-parameters
```

Output

`ULP Enabled`
Shows that the system is using Unified LUN Presentation, which can expose all LUNs through all host ports on both controllers. The interconnect information is managed in the controller firmware. ULP appears to the host as an active-active storage system where the host can choose any available path to access a LUN regardless of disk group ownership. When ULP is in use, the system's operating/cache-redundancy mode is shown as Active-Active ULP. ULP uses the T10 Technical Committee of INCITS Asymmetric Logical Unit Access (ALUA) extensions, in SPC-3, to negotiate paths with aware host systems. Unaware host systems see all paths as being equal.

`Host Profiles Enabled`
Shows whether host profiles are enabled.

`Number of Host Ports`
The number of host-interface ports in the controller chassis.

`Maximum Disks`
The number of disks that the system supports.

`Maximum Volumes`
The number of volumes that the system supports.

`Maximum Linear Disk Groups` (v3)
The number of linear disk groups that the system supports.

`Maximum Linear Vdisks` (v2)
The number of disk groups that the system supports.

`Maximum LUNs`
The number of LUNs that the system supports.

`Maximum Linear Disk Groups per Controller` (v3)
The number of linear disk groups that each controller supports.

`Maximum Linear Vdisks per Controller` (v2)
The number of disk groups that each controller supports.

`Maximum Virtual Pools per Controller`
The number of virtual pools that each controller supports.

`Maximum Virtual Disk Groups per Pool`
The number of virtual pools that each pool can contain.

`Maximum Virtual Pool Size`
The maximum capacity of a virtual pool, formatted to use the current base, precision, and units.

`Maximum Host Groups`
The number of host groups that the system supports.

`Maximum Hosts per Host Group`
The maximum number of hosts that a host group can contain.

`Maximum Initiators per Host`
The maximum number of initiators that a host can contain.

`Maximum Volume Groups per Controller`
The maximum number of volume groups that each controller supports.

`Maximum Volumes per Volume Group`
The maximum number of volumes that a volume group can contain.

`Local Controller`
The ID of the controller you are accessing.

`Serial Number`
The last six digits of the midplane serial number.

Examples

Show settings and configuration limits for the storage system.

```
# show system-parameters
```

Basetypes

system-parameters-table

status

See also

show system

show tasks

Description

Shows information about tasks.

Minimum role

`monitor`

Syntax

```
show tasks
   [detail]
   [task-name]
```

`detail`
Optional. Shows additional detail about each task.

`task-name`
Optional. Shows information about the specified task only. If this parameter is omitted, information is shown for all tasks.

Output: Any task type, no detail

`Name`
The name of the task.

`Type`
The task type.

`Status`
The task status. Status values for each task type are listed in the following sections.

`State`
The current step of the task. State values for each task type are listed in the following sections.

`Error Message`

- If an error occurred while processing the task, the error message.
- Blank if no error has occurred.

Output: TakeSnapshot task, detail

`Task Name`
The name of the task.

`Task Type`
`TakeSnapshot`

`Status`

- `Uninitialized`: The task is not yet ready to run.
- `Ready`: The task is ready to run.
- `Active`: The task is running.
- `Error`: The task has an error.
- `Complete`: For a `TakeSnapshot` task only, the task is complete but not yet ready to run again.

- `Deleted`: The task is expired but this state is not yet synchronized to the partner controller.

`Task State`
The current step of the task:

- `Start`
- `VerifyVolume`
- `ValidateLicensingLimit`
- `CreateName`
- `CreateSnap`
- `VerifySnap`
- `InspectRetention`
- `FindOldestSnap`
- `UnmapSnap`
- `ResetSnap`
- `RenameSnap`

`Error Message`

- If an error occurred while processing the task, the error message.
- Blank if no error has occurred.

`Source Volume`
The name of the source volume.

`Source Volume Serial`
The serial number of the source volume.

`Prefix`
The label that identifies snapshots created by this task.

`Retention Count`
The number of snapshots to retain with this prefix. When a new snapshot exceeds this limit, the oldest snapshot with the same prefix is deleted.

`Last Created`

- The name of the last snapshot created by the task.
- Blank if the task has not taken a snapshot.

`Snapshot Name`

- The name of each snapshot taken.
- Blank if the task has not taken a snapshot.

`Snapshot Serial`

- The serial number of each snapshot taken.
- Blank if the task has not taken a snapshot.

Output: ResetSnapshot task, detail

`Task Name`
The name of the task.

`Task Type`
`ResetSnapshot`

`Status`

- `Uninitialized`: The task is not yet ready to run.
- `Ready`: The task is ready to run.
- `Active`: The task is running.
- `Error`: The task has an error.
- `Deleted`: The task is expired but this state is not yet synchronized to the partner controller.

`Task State`
The current step of the task:

- `Start`
- `VerifySnap`
- `UnmapSnap`
- `ResetSnap`

`Error Message`

- If an error occurred while processing the task, the error message.
- Blank if no error has occurred.

`Snapshot Name`
The name of the snapshot to reset.

`Snapshot Serial Number`
The serial number of the snapshot to reset.

Output: Replicate task, detail

`Task Name`
The name of the task.

`Task Type`
`Replicate`

`Status`

- `Uninitialized`: The task is not yet ready to run.
- `Ready`: The task is ready to run.
- `Active`: The task is running.
- `Error`: The task has an error.
- `Deleted`: The task is expired but this state is not yet synchronized to the partner controller.

`Task State`
The current step of the task:

- `Idle`
- `Replicate`
- `VerifyRunning`

`Error Message`

- If an error occurred while processing the task, the error message.
- Blank if no error has occurred.

`Task Name`
The name of the task.

Output: EnableDSD task, detail

`Task Name`
The name of the task.

`Task Type`
`EnableDSD`

`Status`

- `Uninitialized`: The task is not yet ready to run.
- `Ready`: The task is ready to run.
- `Active`: The task is running.
- `Error`: The task has an error.
- `Deleted`: The task is expired but this state is not yet synchronized to the partner controller.

`Task State`
The current step of the task, which is always `Start`.

`Error Message`

- If an error occurred while processing the task, the error message.
- Blank if no error has occurred.

Output: DisableDSD task, detail

`Task Name`
The name of the task.

`Task Type`
`DisableDSD`

`Status`

- `Uninitialized`: The task is not yet ready to run.
- `Ready`: The task is ready to run.
- `Active`: The task is running.
- `Error`: The task has an error.
- `Deleted`: The task is expired but this state is not yet synchronized to the partner controller.

`Task State`
The current step of the task, which is always `Start`.

`Error Message`

- If an error occurred while processing the task, the error message.
- Blank if no error has occurred.

Examples

Show information about all tasks.

```
# show tasks
```

Show information about task `Task1`.

```
# show tasks Task1
```

Basetypes

tasks

status

See also

create schedule

create task

delete task

set task

show schedules

show tiers

Description

Shows information about tiers.

Minimum role

`monitor`

Syntax

```
show tiers
  tier performance|standard|archive|readcache|all
```

Parameters

`tier performance|standard|archive|readcache|all`

Specifies the tier for which to show information.

Output

`Pool`
The name of the pool.

`Tier`
The name of the tier.

`% of Pool`
The percentage of pool capacity that the tier occupies.

`Disks`
The number of disks in the tier.

`Total Size`
The total capacity of the tier.

`Alloc Size`
The amount of space currently allocated to volumes in the tier.

`Available Size`
The available capacity in the tier.

`Affinity Size`
The total size of volumes configured to have affinity for that tier.

Examples

Show information about all tiers.

```
# show tiers tier all
```

Show information about the Standard tier.

```
# show tiers tier standard
```

Basetypes

tiers

status

See also

show tier-statistics

show tier-statistics

Description

Shows live performance statistics for tiers. The command will show information for all tiers by default, or you can use parameters to filter the output. For tier performance statistics, the system samples live data every 30 seconds.

Properties shown only in API format are described in API Basetype Properties on page 351.

Minimum role

`monitor`

Syntax

```
show tier-statistics
   [pool pool]
   tier performance|standard|archive|readcache|all
```

Parameters

`pool` *`pool`*

Optional. Specifies the name or serial number of the pool for which to show information. If this parameter is omitted, information is shown for all pools.

`tier performance|standard|archive|readcache|all`

Specifies the tier for which to show statistics.

Output

`Pool`
The name of the pool.

`Tier`
The name of the tier.

`Pages Allocated per Min`
The rate, in pages per minute, at which pages are allocated to volumes in the tier because they need more space to store data.

`Pages Deallocated per Min`
The rate, in pages per minute, at which pages are deallocated from volumes in the tier because they no longer need the space to store data.

`Pages Reclaimed`
The number of 4-MB pages that have been automatically reclaimed and deallocated because they are empty (they contain only zeroes for data).

`Pages Unmapped per Minute`
The number of 4-MB pages that host systems have unmapped per minute, through use of the SCSI UNMAP command, to free storage space as a result of deleting files or formatting volumes on the host.

`Time Since Reset`
The amount of time, in seconds, since these statistics were last reset, either by a user or by a controller restart.

`Reads`
The number of read operations since these statistics were last reset or since the controller was restarted.

`Writes`
The number of write operations since these statistics were last reset or since the controller was restarted.

`Data Read`
The amount of data read since these statistics were last reset or since the controller was restarted.

`Data Written`
The amount of data written since these statistics were last reset or since the controller was restarted.

`Bps`
The data transfer rate, in bytes per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.

`IOPS`
The number of input/output operations per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.

`I/O Resp Time`
The average response time, in microseconds, for read and write operations since the last sampling time.

`Read Resp Time`
Shown by the `all` parameter. The average response time, in microseconds, for read operations since the last sampling time.

`Write Resp Time`
Shown by the `all` parameter. The average response time, in microseconds, for write operations since the last sampling time.

Examples

Show statistics for all tiers.

```
# show tier-statistics tier all
```

Show statistics for the `Standard` tier in pool `A`.

```
# show tier-statistics pool A tier standard
```

Basetypes

tier-statistics

status

See also

reset all-statistics

show pools

show tiers

show unwritable-cache

Description

Shows the percentage of unwritable data in the system. This data has not been written to disk because it is associated with a volume that no longer exists or whose disks are not online. If the data is needed, the volume's disks must be brought online. If the data is not needed it can be cleared, in which case it will be lost and data will differ between the host and disk.

NOTE: If you are uncertain whether to clear unwritable cache data, contact technical support for assistance.

Minimum role

`monitor`

Syntax

```
show unwritable-cache
```

Output

`Percent of unwritable cache in controller ID`
The percentage of cache space occupied by unwritable data in the indicated controller module.

Examples

Show the percentage of unwritable cache data in each controller.

```
# show unwritable-cache
```

Basetypes

unwritable-cache

status

See also

clear cache

show users

Description

Shows configured user accounts.

Minimum role

`monitor`

Syntax

```
show users
   [show-snmp-password]
   [user]
```

Parameters

`show-snmp-password`
Optional. Minimum role: manage. For SNMPv3 users, this parameter shows Password and Privacy Password values in clear text for reference when configuring users in the corresponding management application. If this parameter is omitted, password values are displayed obscured for security reasons.

`user`
Optional. Shows settings for the specified user only. If this parameter is omitted, settings are shown for all users.

Output

`Username`
The user name.

`Roles`

- `monitor`: The user can view but not change system settings.

- `manage`: The user can view and change system settings.
- `diagnostic`: The user can view and change system settings.

`User Type`
The user's experience level: Novice, Standard, Advanced, or Diagnostic. This parameter does not affect access to commands.

`User Locale`
The display language.

`WBI`

- `x`: The user can access the web-browser interface (the Disk Management Utility).
- (blank): The user cannot access this interface.

`CLI`

- `x`: The user can access the command-line interface.
- (blank): The user cannot access this interface.

`FTP`

- `x`: The user can access the FTP or SFTP interface.
- (blank): The user cannot access this interface.

`SMI-S`

- `x`: The user can access the Storage Management Initiative Specification (SMI-S) interface.
- (blank): The user cannot access this interface.

`SNMP`

- `U`: The user can access the SNMPv3 interface and view the MIB.
- `T`: The user can access the SNMPv3 interface and receive trap notifications.
- (blank): The user cannot access this interface.

`Authentication Type`

- `MD5`: MD5 authentication.
- `SHA`: SHA-1 authentication.
- `none`: No authentication.

`Privacy Type`

- `DES`: Data Encryption Standard.
- `AES`: Advanced Encryption Standard.
- `none`: No encryption.

`Password`
The user password. For a standard user the password is represented by eight asterisks. For an SNMPv3 user this is the authentication password.

`Privacy Password`
The encryption password for an SNMPv3 user whose privacy type is set to `DES` or `AES`.

`Trap Host Address`
SNMP trap destination for an SNMPv3 user that can receive trap notifications.

Examples

Show information about all users.

```
# show users
```

Show information about user `JSmith`.

```
# show users JSmith
```

As a user with the manage role, show information—including SNMP passwords—for SNMPv3 user `Traps`.

```
# show users Traps show-snmp-password
```

Basetypes

users

status

See also

create user

delete user

set user

show vdisks

Description

Shows information about all or specified linear disk groups. This command applies to linear storage only.

Minimum role

`monitor`

Syntax

```
show vdisks
   [vdisks]
```

Parameters

vdisks
Optional. A comma-separated list of the names or serial numbers of the linear disk groups to show information about. A name that includes a space must be enclosed in double quotes.

Output

`Name`
The name of the disk group.

`Size`
The size of the disk group.

Free
The amount of free (available) space in the disk group.

Own
Either the preferred owner during normal operation or the partner controller when the preferred owner is offline.

Pref
The controller that owns the disk group and its volumes during normal operation.

RAID
The disk-group RAID level.

Class

- Linear: The disk group acts as a linear pool.
- Virtual: The disk group is in a virtual pool.

Disks
The number of disks in the disk group.

Spr
The number of spares assigned to the disk group.

Chk

- For RAID levels except NRAID, RAID 1, and RAID 50, the configured chunk size for the disk group.
- For NRAID and RAID 1, chunk-size has no meaning and is therefore shown as not applicable (N/A).
- For RAID 50, the disk-group chunk size calculated as: configured-chunk-size x (subgroup-members - 1). For a disk group configured to use 64-KB chunk size and 4-disk subgroups, the value would be 192k (64KB × 3).

Status

- CRIT: Critical. The disk group is online but isn't fault tolerant because some of its disks are down.
- DMGD: Damaged. The disk group is online and fault tolerant, but some of its disks are damaged.
- FTDN: Fault tolerant with a down disk. The vdisk is online and fault tolerant, but some of its disks are down.
- FTOL: Fault tolerant and online.
- MSNG: Missing. The disk group is online and fault tolerant, but some of its disks are missing.
- OFFL: Offline. Either the disk group is using offline initialization, or its disks are down and data may be lost.
- QTCR: Quarantined critical. The vdisk is critical with at least one inaccessible disk. For example, two disks are inaccessible in a RAID-6 disk group or one disk is inaccessible for other fault-tolerant RAID levels. If the inaccessible disks come online or if after 60 seconds from being quarantined the disk group is QTCR or QTDN, the disk group is automatically dequarantined.
- QTDN: Quarantined with a down disk. The RAID-6 disk group has one inaccessible disk. The disk group is fault tolerant but degraded. If the inaccessible disks come online or if after 60 seconds from being quarantined the disk group is QTCR or QTDN, the disk group is automatically dequarantined.
- QTOF: Quarantined offline. The disk group is offline with multiple inaccessible disks causing user data to be incomplete, or is an NRAID or RAID-0 disk group.
- STOP: The disk group is stopped.
- UNKN: Unknown.
- UP: Up. The disk group is online and does not have fault-tolerant attributes.

Jobs
Shows whether a job is running and its percent complete.

- DRSC: A disk is being scrubbed.
- EXPD: The disk group is being expanded.
- INIT: The disk group is initializing.
- RBAL: The ADAPT disk group is being rebalanced.
- RCON: At least one disk in the vdisk is being reconstructed.
- VDRAIN: The virtual disk group is being removed and its data is being drained to another disk group.
- VPREP: The virtual disk group is being prepared for use in a virtual pool.
- VRECV: The virtual disk group is being recovered to restore its membership in the virtual pool.
- VREMV: The disk group and its data are being removed.
- VRFY: The disk group is being verified.
- VRSC: The disk group is being scrubbed.
- Blank if no job is running.

Job%

- 0%-99%: Percent complete of running job
- Blank if no job is running (job has completed)

Serial Number
The serial number of the disk group.

Spin Down

- Disabled: DSD is disabled for the disk group.
- Enabled - all spinning: DSD is enabled for the disk group.
- Partial spin-down: DSD is enabled for the disk group and its disks are partially spun down to conserve power.
- Full spin-down: DSD is enabled for the disk group and its disks are fully spun down to conserve power.

SD Delay
For spinning disks in non-ADAPT disk groups, the period of inactivity after which the disk group's disks and dedicated spares will automatically spin down, from 1 to 360 minutes. The value 0 means spin down is disabled.

Sec Fmt
The sector format of disks in the disk group.

- 512n: All disks use 512-byte native sector size. Each logical block and physical block is 512 bytes.
- 512e: All disks use 512-byte emulated sector size. Each logical block is 512 bytes and each physical block is 4096 bytes. Eight logical blocks will be stored sequentially in each physical block. Logical blocks may or may not be aligned with physical block boundaries.
- Mixed: The disk group contains a mix of 512n and 512e disks. This is supported, but for consistent and predictable performance, do not mix disks of different rotational speed or sector size types (512n, 512e).

Health

- OK

- Degraded
- Fault
- N/A
- Unknown

Reason
If Health is not OK, this field shows the reason for the health state.

Action
If Health is not OK, this field shows recommended actions to take to resolve the health issue.

Examples

Show information about all linear disk groups.

```
# show vdisks
```

Show information about linear disk group vd0002.

```
# show vdisks vd0002
```

Basetypes

virtual-disks

status

See also

create vdisk

delete vdisks

expand vdisk

set vdisk

show vdisk-statistics

Description

Shows live or historical performance statistics for linear disk groups. This command applies to linear storage only.

You can view live statistics for all or specified disk groups, or historical statistics for a specified disk group. For disk-group performance statistics, the system samples live data every 30 seconds and historical data every quarter hour, and retains historical data for 6 months.

The historical option allows you to specify a time range or a number (count) of data samples to include. It is not recommended to specify both the time-range and count parameters. If both parameters are specified, and more samples exist for the specified time range, the samples' values will be aggregated to show the required number of samples.

For each disk group these statistics quantify destages, read-aheads, and host reads that are cache misses. For example, each time data is written from a volume's cache to disks in the disk group that contains the volume, the disk group's statistics are adjusted.

Properties shown only in API format are described in API Basetype Properties on page 351.

NOTE: Values for the amount of data transferred and for data throughput appear to be much higher in historical output than in live output. This is caused by a difference in the way that historical and live values are calculated.

Live values are calculated based on the vdisk as viewed from the controller cache perspective. In the live statistics, performance numbers are obtained by accounting for when data is written from cache to disk or is read from disk to cache.

Historical data is obtained by using the summation of the disk statistics for the disks in the vdisk. The historical vdisk data shows transfers to and from the disks in the vdisk that include the overhead of any RAID transfers as well as any host activity.

Because I/Os from the RAID engine are included, values for the historical data appear higher than the numbers for the live data.

Minimum role

monitor

Syntax

To show live statistics:

```
show vdisk-statistics
   [vdisks]
```

To show historical statistics:

```
show vdisk-statistics
   [all]
   [count number-of-data-samples]
   historical
   [time-range "date/time-range"]
   vdisk
```

Parameters

all
Optional. Specifies to show the full set of performance metrics. If this parameter is omitted, the default set of performance metrics will be shown.

count *number-of-data-samples*
Optional. Specifies the number of data samples to display, from 1 to 100. Each sample will be shown as a separate row in the command output. If this parameter is omitted, 100 samples will be shown. If you specify this parameter, do not specify the time-range parameter.

historical
Optional. Specifies to show historical statistics. If this parameter is omitted, live statistics will be shown.

time-range "*date/time-range*"
Optional. Specifies the date/time range of historical statistics to show, in the format "start *yyyy-mm-dd hh:mm* [AM|PM] end *yyyy-mm-dd hh:mm* [AM|PM]". If the start date/time is specified but no end date/time is specified, the current date/time will be used as the end date/time. The system will return the oldest sample taken after the start time and the latest sample taken before

the end time. If the specified start date/time is earlier than the oldest sample, that sample will be used as the start date/time. If you specify this parameter, do not specify the `count` parameter. If this parameter is omitted, the most recent 100 data samples will be displayed.

vdisk
Specifies the name or serial number of one disk group for which to show historical statistics. A name that includes a space must be enclosed in double quotes.

vdisks
Optional. Specifies a comma-separated list of the names or serial number of disk groups for which to show live statistics. A name that includes a space must be enclosed in double quotes. If this parameter is omitted, statistics will be shown for all disk groups.

Output

Live

`Name`
The name of the disk group.

`Serial Number`
The serial number of the disk group.

`Bps`
The data transfer rate, in bytes per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.

`IOPS`
The input/output operations per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.

`Reads`
The number of read operations since these statistics were last reset or since the controller was restarted.

`Writes`
The number of write operations since these statistics were last reset or since the controller was restarted.

`Data Read`
Amount of data read since these statistics were last reset or since the controller was restarted.

`Data Written`
The amount of data written since these statistics were last reset or since the controller was restarted.

`I/O Resp Time`
The average response time in microseconds for read and write operations, calculated over the interval since these statistics were last requested or reset.

`Read Resp Time`
The average response time in microseconds for all read operations, calculated over the interval since these statistics were last requested or reset.

`Write Resp Time`
The average response time in microseconds for all write operations, calculated over the interval since these statistics were last requested or reset.

`Reset Time`
The date and time, in the format *`year-month-day hour:minutes:seconds`*, when these statistics were last reset, either by a user or by a controller restart.

Output

Historical

`Name`
The name of the disk group.

`Serial Number`
The serial number of the disk group.

`Data Transferred`
The total amount of data read and written since the last sampling time.

`Total B/s`
The data transfer rate, in bytes per second, for read and write operations since the last sampling time.

Sample Time
The date and time, in the format *`year-month-day hour:minutes:seconds`*, when the data sample was taken.

Historical, all

`Name`
The name of the disk group.

`Serial Number`
The serial number of the disk group.

`Data Transferred`
The total amount of data read and written since the last sampling time.

`Data Read`
Shown by the `all` parameter. The amount of data read since the last sampling time.

`Data Written`
Shown by the `all` parameter. The amount of data written since the last sampling time.

`Total B/s`
The data transfer rate, in bytes per second, since the last sampling time. This is the sum of `Read B/s` and `Write B/s`.

`Read B/s`
Shown by the `all` parameter. The data transfer rate, in bytes per second, for read operations since the last sampling time.

`Write B/s`
Shown by the `all` parameter. The data transfer rate, in bytes per second, for write operations since the last sampling time.

`Sample Time`
The date and time, in the format *`year-month-day hour:minutes:seconds`*, when the data sample was taken.

Examples

Show live statistics for linear disk groups `VD1` and `MyVdisk`.

```
# show vdisk-statistics VD1,MyVdisk
```

Show historical statistics from a specified date and time range for linear disk group `VD2`.

```
# show vdisk-statistics VD2 historical time-range "start 2013-01-18 4:40
PM end 2013-01-18 5:00 PM"
```

Show all historical statistics (the latest 100 samples) for linear disk group `VD2`.

```
# show vdisk-statistics VD2 historical all
```

Basetypes

vdisk-statistics (live)

virtual-disk-summary (historical)

vdisk-hist-statistics (historical)

status

See also

reset all-statistics

reset vdisk-statistics

show vdisks

show versions

Description

Shows firmware and hardware version information for the system.

Minimum role

monitor

Syntax

```
show versions
   [detail]
   [frus]
```

Parameters

detail
Optional. Shows information about the versions of firmware and hardware in each controller module. If this parameter is omitted, only firmware-bundle information is shown.

frus
Optional. Shows information about firmware versions for FRUs in each chassis. If this parameter is omitted, only controller-module information is shown.

Examples

Show firmware-bundle version information for the system.

```
# show versions
```

Show detailed version information for each controller module.

```
# show versions detail
```

Show version information for FRUs in each chassis.

```
# show versions frus
```

Basetypes

versions

fru-versions

status

See also

show inquiry

show volume-copies

Description

Shows information about in-progress copy volume operations.

Minimum role

`monitor`

Syntax

`show volume-copies`

Parameters

`Src Volume`
The name of the source volume.

`Src Type`
The type of the source volume: `Virtual` or `Linear`.

`Src Pool`
The name of the source pool: A or B.

`Dest Volume`
The name of the destination volume.

`Dest Type`
The type of the destination volume.

`Dest Pool`
The name of the destination pool: A or B.

`Progress`
The percent complete of the operation.

Examples

Show information about in-progress copy volume operations.

```
# show volume-copies
```

Basetypes

copy-volumes

status

See also

abort copy

copy volume

show volume-groups

Description

Shows information about specified volume groups or all volume groups

Minimum role

`monitor`

Syntax

```
show volume-groups
   [volume-groups]
```

Parameters

volume-groups
Optional. A comma-separated list of the names of volume groups for which to show information. If this parameter is omitted, information is shown for all volume groups.

Output

Volume group information:

`Group Name`
The name of the volume group.

`Serial Number`
The serial number of the volume group.

`Type`
The group type, which is Volume.

`Number of Members`
The number of volumes in the volume group.

Volume information:

`Pool`
The name of the pool that contains the volume.

`Name`
The name of the volume.

`Total Size`
The total size of the volume.

`Alloc Size`
The amount of space currently allocated to a virtual volume, or the total size of a linear volume.

`Class`

- `Virtual`: The volume is in a virtual pool.

`Type`

- `base`: Base volume
- `standard`: Standard volume

`Health`

- `OK`
- `Degraded`
- `Fault`
- `N/A`
- `Unknown`

`Reason`
If `Health` is not `OK`, this field shows the reason for the health state.

`Action`
If `Health` is not `OK`, this field shows recommended actions to take to resolve the health issue.

Examples

Show information about all volume groups.

```
# show volume-groups
```

Show information about volume groups `VGroup1` and `VGroup2`.

```
# show volume-groups VGroup1,VGroup2
```

Basetypes

volume-groups

volumes

status

See also

create volume-group

delete volume-groups

set volume-group

show volume-names

Description

Shows volume names and serial numbers.

Minimum role

`monitor`

Syntax

```
show volume-names
   [volumes]
```

Parameters

volumes
Optional. A comma-separated list of the names or serial numbers of the volumes for which to show information. A name that includes a space must be enclosed in double quotes. If this parameter is omitted, information is shown for all volumes.

Output

`Name`
The name of the volume.

`Serial Number`
The serial number of the volume.

Examples

Show volume names and serial numbers.

```
# show volume-names
```

Basetypes

volume-names

status

See also

show maps

show volumes

show volume-reservations

Description

Shows persistent reservations for all or specified volumes. The persistent group reservations (PGR) mechanism enables application clients on multiple hosts to control access to a storage volume, and limits access by other hosts.

Each host must be registered with the storage system in order to establish a persistent reservation for a volume, thereby becoming a reservation holder.

If the system gets into an abnormal state and you need to remove all registrations and reservations for specified volumes to return them to a "clean" state, you can use the release volume command. This command must be used with care, as described in its help.

For more information about persistent reservations, see the SPC-3 specification at http://www.t10.org.

Minimum role

`monitor`

Syntax

```
show volume-reservations
   [all|volumes]
```

Parameters

`all|volumes`
Optional. Specifies all volumes, or a comma-separated list of the names or serial numbers of specific volumes. A name that includes a space must be enclosed in double quotes. If this parameter is omitted, information is shown for all volumes.

Output

Properties are described in alphabetical order.

`Host ID`
For an FC initiator, its WWPN. For a SAS initiator, its WWPN. For an iSCSI initiator, its node name (typically the IQN).

`Key`
The reservation key, shown as a hexadecimal value.

`Name`
The name of the volume.

`PGR Generation`
The generation of the volume reservation, shown as a hexadecimal value.

`Ports`
The controller host-port identifiers.

`Reservation Type`

- `Write Exclusive`: Write commands are only allowed for a single reservation holder.
- `Exclusive Access`: Certain access (read, write) commands are only allowed for a single reservation holder.
- `Write Exclusive - Registrants Only`: Write commands are only allowed for registered hosts. There is a single reservation holder.
- `Exclusive Access - Registrants Only`: Certain access (read, write) commands are only allowed for registered hosts. There is a single reservation holder.
- `Write Exclusive - All Registrants`: Write commands are only allowed for registered hosts. There is a single reservation holder.
- `Exclusive Access - All Registrants`: Certain access (read, write) commands are only allowed for registered hosts. There is a single reservation holder.
- `Undefined`: The volume has no persistent reservations.

`Scope`
The reservation scope, `Logical Unit`.

`Serial Number`
The serial number of the volume.

`Volume Reserved`

- `Free`: The volume is not reserved.
- `Reserved`: The volume has been reserved by a host.

Examples

Show reservations for all volumes.

```
# show volume-reservations
```

Show reservations for volume `v1`.

```
# show volume-reservations v1
```

Basetypes

volume-reservations

status

See also

release volume

show volumes

show volumes

Description

Shows information about volumes. The command will show information for all volumes by default, or you can use parameters to filter the output.

Minimum role

`monitor`

Syntax

```
show volumes
   [details]
   [pattern string]
   [pool pool]
   [type all|base|standard|snapshot|primary-volume|secondary-volume]
   [vdisk vdisks]
   [volumes]
```

Parameters

`details`
Optional. Shows additional information about the volumes.

`pattern string`
Optional. Shows volumes whose names contain the specified string. The string can include the following wildcards, singly or in combination.

`*` Matches zero or more characters.

`?` Matches any one character. Use multiple '?' wildcards to find names of a specific length. For example, `Vol??` will find names starting with `Vol` that are five characters long.

`[]` Matches any character within the brackets, except a hyphen. Alphabetic characters are case sensitive. For example, `[123]` matches `1`, `2`, or `3`. Use a hyphen between two characters to specify a range. For example, `[0-9]` matches any one digit. You can combine the list and range forms. For example, `[xy1-3]` matches `x` or `y` (but not `X` or `Y`), or `1`, `2`, or `3`.

`pool` *`pool`*
Optional. The name or serial number of the pool that contains the volumes for which to show information.

`type all|base|standard|snapshot|primary-volume|secondary-volume`
Optional.

- `all`: Show all volumes.
- `base`: Show only virtual volumes that are not snapshots of any other volume.
- `snapshot`: Show only snapshots.
- `standard`: Show only standard volumes.
- `primary-volume`: Show only primary volumes.
- `secondary-volume`: Show only secondary volumes.

If this parameter is omitted, all volumes are shown.

`vdisk` *`vdisks`*
Optional. A comma-separated list of the names or serial numbers of the vdisks containing the volumes to show. A name that includes a space must be enclosed in double quotes.

`volumes`
Optional. A comma-separated list of the names or serial numbers of volumes for which to show information. A name that includes a space must be enclosed in double quotes.

Output

Properties are described in alphabetical order.

`Action`
If `Health` is not `OK`, this field shows recommended actions to take to resolve the health issue.

`Alloc Size`
The amount of space currently allocated to a virtual volume, or the total size of a linear volume.

`Cache Opt`
Shown by the `details` parameter. The cache optimization mode:

- `standard`: This controller cache mode of operation is optimized for sequential and random I/O and is the optimization of choice for most workloads. In this mode, the cache is kept coherent with the partner controller.
- `no-mirror`: In this mode of operation, the controller cache performs the same as the standard mode with the exception that the cache metadata is not mirrored to the partner. While this improves the response time of write I/O, it comes at the cost of redundancy. If this option is used, the user can expect higher write performance but is exposed to data loss if a controller fails.

`Class`

- `Linear`: The volume is in a linear pool.
- `Virtual`: The volume is in a virtual pool.

`Desc`
Shown by the `details` parameter.

- For HP-UX, a text value (set in-band by a host application) that identifies the volume.
- For OpenVMS, a numeric value (set with the create volume or set volume command) that identifies the volume to an OpenVMS host.
- Blank if not set.

`Health`

- `OK`
- `Degraded`
- `Fault`
- `N/A`
- `Unknown`

`Large Virtual Extents`
For a virtual volume, this shows whether the system will try to allocate pages in a sequentially optimized way to reduce I/O latency in SSD applications and improve performance.

- `disabled` or `off`: Optimized page allocation is disabled. This is the default.
- `enabled` or `on`: Optimized page allocation is enabled.

`Name`
The name of the volume.

`Pool`
The name of the pool that contains the volume.

`Read Ahead`
Shown by the `details` parameter. The read-ahead cache setting:

- `Disabled`: Read-ahead is disabled.
- `Adaptive`: Adaptive read-ahead is enabled, which allows the controller to dynamically calculate the optimum read-ahead size for the current workload.
- `Stripe`: Read-ahead is set to one stripe. The controllers treat NRAID and RAID-1 disk groups internally as if they have a stripe size of 512 KB, even though they are not striped.
- `512 KB`, `1 MB`, `2 MB`, `4 MB`, `8 MB`, `16 MB`, or `32 MB`: Size selected by a user.

`Reason`
If `Health` is not `OK`, this field shows the reason for the health state.

`Role`
Shown by the `details` parameter.

- `Copy Source`: The volume is the source for a volume copy operation.
- `Copy Destination`: The volume is the destination for a volume copy operation.
- `Primary`: The volume is the primary volume in a replication set.
- `Secondary`: The volume is the secondary volume in a replication set.
- (blank): Not applicable.

`Serial Number`
Shown by the `details` parameter. The serial number of the volume.

`Size`
The total size of the volume.

`Snap-Pool`
Shown by the `details` parameter. Not applicable.

`Snap Retention Priority`
Shown by the `details` parameter. The retention priority for snapshots of the volume.

- `never-delete`: Snapshots will never be deleted.
- `high`: Snapshots may be deleted after all eligible medium-priority snapshots have been deleted.
- `medium`: Snapshots may be deleted after all eligible low-priority snapshots have been deleted.
- `low`: Snapshots may be deleted.

Snapshots that are mapped or are not leaves of a volume's snapshot tree are not eligible for automatic deletion.

`Tier Affinity`
Shown by the `details` parameter.

- `No Affinity`: This setting uses the highest available performing tiers first and only uses the Archive tier when space is exhausted in the other tiers. Volume data will swap into higher performing tiers based on frequency of access and tier space availability.
- `Archive`: This setting prioritizes the volume data to the least performing tier available. Volume data can move to higher performing tiers based on frequency of access and available space in the tiers.
- `Performance`: This setting prioritizes volume data to the higher performing tiers. If no space is available, lower performing tier space is used. Performance affinity volume data will swap into higher tiers based upon frequency of access or when space is made available.

`Total Size`
The total size of the volume.

`Type`

- `base`: Base volume
- `standard`: Standard volume

`Vdisk`
The name of the vdisk that contains the volume.

`WR Policy`
Shown by the `details` parameter. The cache write policy:

- `write-back`: Write-back caching does not wait for data to be completely written to disk before signaling the host that the write is complete. This is the preferred setting for a fault-tolerant environment because it improves the performance of write operations and throughput.
- `write-through`: Write-through caching significantly impacts performance by waiting for data to be completely written to disk before signaling the host that the write is complete. Use this setting only when operating in an environment with low or no fault tolerance.

`WWN`
Shown by the `details` parameter. The World Wide Name of the volume

Examples

Show about all volumes.

```
# show volumes
```

Show detailed information for volume `volA`.

```
# show volumes details volA
```

Show volumes whose names start with `Vol` followed by any single character, an underscore, and a two-digit number — such as `VolA_01` or `Vol3_10`, but not `volA_01` or `Vol3_1`.

```
# show volumes pattern Vol?_[0-9][0-9]
```

Basetypes

volumes

status

See also

create volume

delete volumes

expand volume

set volume

show disk-groups

show maps

show pools

show vdisks

show volume-statistics

Description

Shows live performance statistics for all or specified volumes. For each volume these statistics quantify I/O operations between hosts and the volume. For example, each time a host writes to a volume's cache, the volume's statistics are adjusted. For volume performance statistics, the system samples live data every 15 seconds.

Statistics shown only in API output are described in API Basetype Properties on page 351.

Minimum role

`monitor`

Syntax

```
show volume-statistics
   [volumes]
```

Parameters

volumes
Optional. A comma-separated list of the names or serial numbers of the volumes for which to show information. A name that includes a space must be enclosed in double quotes. If this parameter is omitted, information is shown for all volumes.

Output

Name
The name of the volume.

Serial Number
The serial number of the volume.

Bps
The data transfer rate, in bytes per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.

IOPS
The input/output operations per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.

Reads
The number of read operations since these statistics were last reset or since the controller was restarted.

Writes
The number of write operations since these statistics were last reset or since the controller was restarted.

Data Read
The amount of data read since these statistics were last reset or since the controller was restarted.

Data Written
The amount of data written since these statistics were last reset or since the controller was restarted.

Allocated Pages
The number of pages allocated to the volume.

% Performance
The percentage of volume capacity occupied by data in the Performance tier.

% Standard
The percentage of volume capacity occupied by data in the Standard tier.

% Archive
The percentage of volume capacity occupied by data in the Archive tier.

% RC
The percentage of read-cache capacity that is occupied.

Reset Time
The date and time, in the format *year-month-day hour:minutes:seconds*, when these statistics were last reset, either by a user or by a controller restart.

Examples

Show live performance statistics for all volumes.

```
# show volume-statistics
```

Show live performance statistics for volume `v0001`.

```
# show volume-statistics v0001
```

Basetypes

volume-statistics

status

See also

reset all-statistics

reset volume-statistics

show volumes

shutdown

Description

Shuts down the Storage Controller in a controller module. This ensures that a proper failover sequence is used, which includes stopping all I/O operations and writing any data in write cache to disk.

CAUTION: Performing a shut down will cause data to be unavailable from the Storage Controller that is shut down. If the Storage Controller in each controller module is shut down, hosts cannot access the system's data.

Perform a shut down before removing a controller module or powering down the system.

Minimum role

`manage`

Syntax

```
shutdown
   [a|b|both]
```

Parameters

`a|b|both`

Optional. Specifies to shut down the Storage Controller in controller A, B, or both. If this parameter is omitted, the command affects the controller being accessed.

Examples

Shut down the Storage Controller in controller A.

```
# shutdown a
```

See also

restart mc

restart sc

show shutdown-status

suspend replication-set

Description

Suspends the replication operations for the specified replication set.

You can run this command on the replication set's primary system.

When you run this command, all replications in progress are paused and no new replications are allowed to start. During the suspension period, you can abort paused replications using the abort replication command. After you suspend replication, you must resume it using the resume replication-set command to allow the replication set to resume replications that were in progress and allow new replications to start.

If replications are attempted during the suspended period (including scheduled replications), the replications will fail.

Minimum role

`manage`

Syntax

```
suspend replication-set
   replication-set-ID
```

Parameters

`replication-set-ID`
The name or serial number of the replication set for which to suspend replication.

Examples

Suspend replications in replication set `RS1`.

```
# suspend replication-set RS1
```

See also

abort replication

create replication-set

delete replication-set

resume replication-set

set replication-set

show replication-sets

test

Description

Sends a test message to configured destinations for event notification and managed logs. After issuing this command, verify that the test message reached its destinations.

Minimum role

`manage`

Syntax

```
test
   email|managedlogs|managedlogswarn|managedlogswrap|notification|snmp
   [region crash1|crash2|crash3|crash4|ecdebug|mc|scdebug]
```

Parameters

`email|managedlogs|managedlogswarn|managedlogswrap|notification|snmp`

- `email`: This option behaves the same as the notification option and remains for backward compatibility only.
- `managedlogs`: Specify this option to test receipt of the managed-logs notification that logs need to be transferred. (Event 400)
- `managedlogswarn`: Specify this option to test receipt of the managed-logs notification that logs are nearly full and must be transferred to avoid losing older entries. (Event 401)
- `managedlogswrap`: Specify this option to test receipt of the managed-logs notification that logs have wrapped and older entries may be lost. (Event 402)
- `notification`: Specify this option to test receipt of event-notification messages by every interface that is configured to receive them, such as email, SNMP, and SMI-S. (Event 312)
- `snmp`: This option behaves the same as the notification option.

`region crash1|crash2|crash3|crash4|ecdebug|mc|scdebug`
Optional. For use with the managed logs feature, this parameter specifies the log type (debug-data region) for which to send notifications.

- `crash1`, `crash2`, `crash3`, or `crash4`: Specify one of these options to send notification for one of the Storage Controller's four crash logs.
- `ecdebug`: Specify this option to send notification for the Expander Controller log.
- `mc`: Specify this option to send notification for the Management Controller log.
- `scdebug`: Specify this option to send notification for the Storage Controller log, which includes the event log.

If this parameter is omitted, the command sends four representative log types: `crash1`, `ecdebug`, `scdebug`, and `mc`.

Examples

Test receipt of event notifications by every interface that is configured to receive them.

```
# test notification
```

Test receipt of the managed-logs notification that the Storage Controller log needs to be transferred.

```
# test managedlogs region scdebug
```

See also

set email-parameters

set snmp-parameters

trust

Description

Enables an offline disk group to be brought online for emergency data recovery.

CAUTION: Improper use of trust may cause data corruption or data loss.

NOTE: This command is for use by or with direction from technical support.

This command must be enabled before each use. If used improperly this command can cause unstable operation and data loss. Before use, carefully read the cautions and procedures below.

The `trust` command provides an opportunity to recover data from a disk group that has failed due to disk failure. The command forces a resynchronization of the metadata (as well as time and date stamps) that unifies members of a disk group, and essentially puts the disk group back into an accessible state. As long as the failed disks are operable, data can be read from the disks and restored to another location.

From examining the state of the disks, if the command determines that the trust operation is unsafe—that it may result in an unstable disk group with data corruption—the command will fail. You may then seek assistance from technical support or run the command with a special parameter to acknowledge the risk of proceeding. Otherwise, if the command determines the operation to be safe, the command will proceed.

When the "trusted" disk group is back online, back up its data and audit the data to make sure that it is intact. Then delete that disk group, create a new disk group, and restore data from the backup to the new disk group. Using a trusted disk group is only a disaster-recovery measure. The disk group has no tolerance for any additional failures.

The following procedure outlines the general steps for performing a trust operation, but the best procedure to follow for your situation may vary from this procedure. Before starting this procedure, contact technical support for assistance in determining if the trust operation applies to your situation, and for assistance to perform it.

CAUTION:

1. Do not use the `trust` command when the storage system is unstable. For example, if there are many power or topology-change events.

2. The `trust` command can be run on a quarantined-offline or offline disk group. In many cases the disk group will be automatically dequarantined. If you cannot resolve the issue that caused the disk to become quarantined such that it is automatically dequarantined, and if the trust operation is applicable to your situation, then proceed to `trust`.

NOTE: The best practice is to dequarantine the disk group and then proceed to trust the offline disk group. If the dequarantine command fails then contact technical support for assistance.

CAUTION: Performing trust on a quarantined-offline disk group can cause data corruption because it will bring a disk with stale data back into the disk group.

3. Never update controller-module, expansion-module, or disk firmware when the disk group is offline.

4. Never clear unwritten data cache when a disk group is offline.

5. Do not use the `trust` command on a disk group that failed during disk-group expansion.

6. Do not use the `trust` command on a disk group with status CRIT. Instead, add spares and let the system reconstruct the disk group.

The `trust` command must be used in CLI console mode.

Steps for running the `trust` command

1. Disable background scrub of disks and disk group to avoid running scrubs automatically.

2. Identify the cause for the disk group becoming offline.

3. If an external issue (power, cabling, and so forth) caused the disk group to fail, fix the external issue before continuing to the next step.

4. Disable host access to the failed disk group. In a single-controller configuration, disconnect the host-port cables. In a dual-controller configuration:

a. Determine the owning controller of the failed disk group.

b. As a precautionary measure, remove the host-port cables of the owning controller of the offline disk group.

5. Unseat the spare disks associated with the disk group to prevent reconstruction.

CAUTION: It is recommended to avoid reconstruction after using the trust command. Reconstruction causes heavy usage of disks that were already reporting errors. This usage could cause the disks to fail during reconstruction, which can cause data to be unrecoverable.

---

6. Enable the `trust` command.

7. Run the `trust` command on the disk group.

8. If the `trust` command determines that it would be unsafe to proceed, it will fail. If this happens you can either:

- Contact Support for further assistance. This is recommended.

- Proceed by re-enabling trust and running trust with the unsafe parameter. This is not recommended because in most cases it will result in an unstable disk group with data corruption.

After running the `trust` command

1. Reinsert the host-port cables.
2. Perform a complete backup of the disk group.
3. Delete the disk group.
4. Replace the failed disks with new disks.
5. Re-create the disk group.
6. Restore the data from the backup performed in step 2.
7. Restore original disk-group ownership.
8. Re-enable background scrub operations.

Parameters

`enable|disable`
Optional.

- `enable`: Enables the `trust` command before use.
- `disable`: Disables the `trust` command if it is not used after being enabled. If `trust` is not explicitly disabled, it will be automatically disabled when the user's CLI session ends.

`disk-group` *`disk-group`*
Optional. The name or serial number of the disk group to trust. A name that includes a space must be enclosed in double quotes.

`unsafe`
Optional. Specifies to proceed with a trust operation that is determined to be unsafe because it must use out-of-sync or partially reconstructed disks.

CAUTION: In most cases using this option will result in an unstable disk group with data corruption.

`vdisk` *`vdisk`*
Optional. The name or serial number of the disk group to trust. A name that includes a space must be enclosed in double quotes.

Output

With the `unsafe` parameter

`Location`
The enclosure ID and slot number of the disk.

`Serial Number`
The serial number of the disk.

`Type`

- `SAS`: Enterprise SAS spinning disk.
- `SAS MDL`: Midline SAS spinning disk.
- `sSAS`: Dual-port, SAS solid-state disk (SSD).

`State`

- `AVAIL`: Available

- FAILED: The disk is unusable and must be replaced. Reasons for this status include: excessive media errors, SMART error, disk hardware failure, or unsupported disk.
- GLOBAL SP: Global spare
- LEFTOVR: Leftover
- VDISK: Used in a disk group
- VDISK SP: Spare assigned to a disk group

Partially Recon Target

- True: The disk contains partially reconstructed data.
- False: The disk does not contain partially reconstructed data.

Out Of Sync

- True: The disk data is out of sync with other disks in the disk group.
- False: The disk data is in sync with other disks in the disk group.

Age
The age of the disk in the disk group. The age value starts at 1 and is incremented for all good disks in the disk group each time there is a change in the disk configuration of the disk group, such as when a disk is detected to have failed or be missing. Therefore, if a disk has a lower age than other disks in the disk group, that disk is out-of-sync with the other disk group members. This value can be used as a guide to decide which disks to physically remove before doing the trust operation to minimize the amount of corrupt data in the trusted disk group if you want to use the unsafe parameter.

Examples

Trust a disk group which has enough good disks to complete the trust operation. The disk group may have out-of-sync or partially reconstructed disks but they are not needed to complete the trust operation. The command completes successfully.

```
# trust enable
Success: Command completed successfully. - Trust is enabled. (2013-09-17
04:29:28)
```

```
# trust disk-group data_1
Success: Command completed successfully. (data_1) - Trust operation
completed successfully for this disk group. (2013-09-17 04:29:35)
```

Trust a disk group which does not have enough good disks available to complete the trust operation. The command fails.

```
# trust enable
Success: Command completed successfully. - Trust is enabled. (2013-09-17
04:12:49)
```

```
# trust disk-group data_1
Error: The trust operation failed because the disk group has an
insufficient number of in-sync disks. - Please contact Support for
further assistance. (2013-09-17 04:13:13)
```

Trust a disk group which has out-of-sync or partially reconstructed disks that would be needed to complete the trust operation. The command fails.

```
# trust enable
Success: Command completed successfully. - Trust is enabled. (2013-09-17
09:06:41)
```

```
# trust disk-group data_1
Error: Command failed. - The disk group specified contains out-of-sync or
```

```
partially reconstructed disks that are necessary to restore the disk
group to an accessible state. Continuing with the trust operation may
lead to data corruption. Please contact Support for further assistance.
(2013-09-08 09:06:46)
```

Continuing the previous example, you decide to re-enable trust and proceed by specifying the unsafe parameter.

```
# trust enable
Success: Command completed successfully. - Trust is enabled. (2013-09-17
09:06:48)

# trust disk-group data_1 unsafe
Location Serial Number Type State Partially Reconstructed

Out Of Sync Age

------------------------------------------------------------------------

1.2 SN SAS LEFTOVR False

True 6

1.4 SN SAS VIRTUAL POOL False

False 7

1.5 SN SAS LEFTOVR True

False 4

------------------------------------------------------------------------

WARNING: Found partially reconstructed and out-of-sync disk(s). Using
these disks for trust will in most cases cause data corruption.

Because of the risk of data corruption, it is recommended that you
continue the trust operation only with the supervision of Support
personnel. If you are ready to continue, enter "continue" at the prompt
or enter "abort" to abort the operation and leave the disk group offline.

> continue

If you continue with the trust operation, you risk corrupting data in
this disk group. Enter "accept" at the prompt if you intend to accept
this risk and proceed with the trust operation or enter "abort" to abort
the operation and leave the disk group offline.

> accept

Success: Command completed successfully. (data_1) - Trust operation
completed successfully for this disk group. (2013-09-17 09:07:31)
```

Abort an unsafe trust operation when you decide not to risk using bad disks.

```
# trust enable
Success: Command completed successfully. - Trust is enabled. (2013-09-17
09:05:37)

# trust disk-group data_1 unsafe
Location Serial Number Type State Partially Reconstructed

Out Of Sync Age

------------------------------------------------------------------------

1.2 SN SAS LEFTOVR False

True 6
```

```
1.4 SN SAS VIRTUAL POOL False

False 7

1.5 SN SAS LEFTOVR True

False 4

------------------------------------------------------------------------

WARNING: Found partially reconstructed and out-of-sync disk(s). Using
these disks for trust will in most cases cause data corruption.
Because of the risk of data corruption, it is recommended that you
continue the trust operation only with the supervision of Support
personnel. If you are ready to continue, enter "continue" at the prompt
or enter "abort" to abort the operation and leave the disk group offline.
```

> continue

```
If you continue with the trust operation, you risk corrupting data in
this disk group. Enter "accept" at the prompt if you intend to accept
this risk and proceed with the trust operation or enter "abort" to abort
the operation and leave the disk group offline.
```

> abort

```
Error: Command was aborted by user. (2013-09-17 09:05:49)
```

After enabling trust, disable it if you decide not to run trust disk-group.

```
# trust disable

Success: Command completed successfully. - Trust is disabled. (2013-09-17
17:40:01)
```

See also

show disk-groups

show vdisks

verify disk-groups

verify vdisk

unfail controller

Description

Allows the partner controller module to recover from a simulated failure performed with the fail command (which requires the manage role). If you attempt to unfail a controller that is operating, the command will have no effect.

NOTE: If you are uncertain whether to use this command, contact technical support for assistance.

Minimum role

manage

Syntax

```
unfail controller
```

Examples

From controller A, unfail the partner controller.

```
# unfail controller
```

See also

fail

show controllers

unmap volume

Description

Deletes explicit mappings or the default mapping for specified volumes. When an explicit mapping between an initiator and a volume is deleted, access by that initiator to the volume is controlled by the volume's default mapping (described in help for create volume). When a default mapping is deleted, access by initiators to the volume is controlled by any explicit mappings of those initiators to the volume. If neither mapping exists, the volume is unavailable to initiators.

If you want to mask access for a specific initiator to a specific volume, use the map volume command and set the `access` parameter to `no-access`.

CAUTION: When a volume is unmapped from an initiator, the initiator will no longer be able to access the volume's data.

Minimum role

```
manage
```

Syntax

To delete explicit mappings:

```
unmap volume
   [host hosts]
   initiator initiators|hosts|host-groups
   volumes|volume-groups
```

To delete the default mapping:

```
unmap volume
   volumes|volume-groups
```

Parameters

`host` *`hosts`*
Deprecated—use the initiator parameter instead.

`initiator` *`initiators`*|*`hosts`*|*`host-groups`*
A comma-separated list of initiators, hosts, or host groups for which to delete explicit mappings. For initiator, host, and host-group syntax, see Command Syntax on page 10.

`volumes`|*`volume-groups`*

A comma-separated list of volumes or volume groups to unmap. For a volume, specify its name or serial number. For a volume group, specify the name as *`volume-group`*`.*`. A name that includes a space must be enclosed in double quotes.

Examples

Delete explicit mappings for `Host1` to volumes `vol1` and `vol3` (leaving the default mappings, if any, unchanged).

```
# unmap volume initiator Host1.* vol1,vol3
```

Delete volume `vol2`'s default mapping (leaving explicit mappings, if any, unchanged).

```
# unmap volume vol2
```

Delete explicit mappings for initiator `FC-port1` to volume group `MyVolumes` (leaving the default mappings, if any, unchanged).

```
# unmap volume initiator FC-port1 MyVolumes.*.*
```

See also

map volume

show initiators

show maps

show volumes

verify disk-groups

Description

Analyzes redundant disk groups to find and fix inconsistencies between their redundancy data and their user data.

This command acts on all disks in a disk group but not dedicated spares or leftover disks. This command will find and optionally fix parity mismatches for RAID 3, 5, 6, 50, and ADAPT, and mirror mismatches for RAID 1 and 10. This command can be performed only on a disk group whose status is `FTOL` (fault tolerant and online). This command cannot be performed for NRAID or RAID 0.

Verification can last over an hour, depending on disk-group size, utility priority, and amount of I/O activity. You can use a disk group while it is being verified. To view the progress of a verify (`VRFY`) job, use the `show disk-groups` command.

When verification is complete, event 21 is logged and specifies the number of inconsistencies found. Such inconsistencies can indicate that a disk is going bad.

TIP: The scrub disk-groups command operates similarly to `verify disk-groups` and can find media errors for any RAID level, including NRAID and RAID 0.

Minimum role

`manage`

Syntax

```
verify disk-groups
   [fix yes|no]
   disk-groups
```

Parameters

`fix yes|no`
Optional. Specifies whether or not to automatically fix parity mismatches by making parity match the data in all cases. The default is `no`.

`disk-groups`
A comma-separated list of the names or serial numbers of the disk groups to verify. A name that includes a space must be enclosed in double quotes.

Examples

Start verifying disk group `dg1`.

```
# verify disk-group dg1
```

See also

abort verify

scrub disk-groups

show disk-groups

verify links

Description

Verifies FC or iSCSI host-port link paths between controller A and controller B. This command is not applicable to a system with SAS controller modules.

Minimum role

`manage`

Syntax

```
verify link
   [link-type FC|iSCSI|ALL]
```

Parameters

`link-type FC|iSCSI|ALL`
Optional. Specifies the type of host-port links to verify:

- `FC`: Verify FC-to-FC links only.
- `iSCSI`: Verify iSCSI-to-iSCSI links only.
- `ALL`: Verify all FC-to-FC and iSCSI-to-iSCSI links.

If this parameter is omitted, all links are verified.

Output

`Port`
The port ID.

`Type`

- `FC`: FC port.
- `iSCSI`: iSCSI port.
- `Unknown`: Port type is unknown.

`Links`
The IDs of linked ports.

Examples

Verify all links between controllers A and B.

```
# verify links
```

verify vdisk

Description

Analyzes redundant vdisks to find and fix inconsistencies between their redundancy data and their user data. This command applies to linear storage only.

This command acts on all disks in a vdisk but not dedicated spares or leftover disks. This command will find and optionally fix parity mismatches for RAID 3, 5, 6, and 50, and mirror mismatches for RAID 1 and 10. This command can be performed only on a vdisk whose status is `FTOL` (fault tolerant and online). This command cannot be performed for NRAID or RAID 0.

Verification can last over an hour, depending on vdisk size, utility priority, and amount of I/O activity. You can use a vdisk while it is being verified. To view the progress of a verify (`VRFY`) job, use the show vdisks command.

When verification is complete, event 21 is logged and specifies the number of inconsistencies found. Such inconsistencies can indicate that a disk is going bad.

TIP: The scrub vdisk command operates similarly to `verify vdisk` and can find media errors for any RAID level, including NRAID and RAID 0.

Minimum role

manage

Syntax

```
verify vdisk
   [fix yes|no]
   vdisks
```

Parameters

`fix yes|no`
Optional. Specifies whether or not to automatically fix parity mismatches by making parity match the data in all cases. The default is `no`.

`vdisks`
A comma-separated list of the names or serial numbers of the vdisks to verify. A name that includes a space must be enclosed in double quotes.

Examples

Start verifying vdisk `vd1`.

```
# verify vdisk vd1
```

See also

abort verify

scrub vdisk

show vdisks

verify disk-groups

Chapter 4

API Basetype Properties

Alphabetical List of Commands (Chapter 3) describes command output that is shown in console format. This chapter describes the basetype properties that CLI commands display in API format, and is organized to help you find a basetype by name. This chapter excludes basetypes that are for internal use only.

Each basetype topic includes the following information:

- References to CLI commands that directly use the basetype.
- For each property, the values of its name and type elements, and a description of the values that the property may show. For descriptions of other elements see Table 4 on page 5.
- References to embedded or nested basetypes that the output may show.

adapt-expand-preview

This basetype is used by add storage on page 32 when the `preview` parameter is specified.

Table 9 adapt-expand-preview properties

Name	Type	Description
`name`	string	The name of the disk group.
`serial-number`	string	Disk group serial number.
`pool`	string	The name of the pool that contains the disk group.
`pool-serial-number`	string	The serial number of the pool that contains the disk group.
`type`	string	Disk description. • `SAS`: Enterprise SAS spinning disk. • `SAS MDL`: Midline SAS spinning disk. • `SSD SAS`: SAS solid-state disk.
`type-numeric`	uint32	Numeric equivalents for type values. • `4: SAS` • `8: SSD SAS` • `11: SAS MDL`

Table 9 adapt-expand-preview properties

Name	Type	Description
size	string	Disk group capacity, formatted to use the current base, precision, and units.
size-numeric	uint64	Unformatted size value in blocks.
raidtype	string	The RAID level of the disk group. • NRAID • RAID0 • RAID1 • RAID3 • RAID5 • RAID6 • RAID10 • RAID50 • ADAPT
raidtype-numeric	uint32	Numeric equivalents for raidtype values. • 0: RAID0 • 1: RAID1 • 2: ADAPT • 3: RAID3 • 5: RAID5 • 6: NRAID • 8: RAID50 • 10: RAID10 • 11: RAID6
tier	string	• Archive: The disk group is in the lowest storage tier, which uses midline spinning SAS disks (<10k RPM, high capacity). • Performance: The disk group is in the highest storage tier, which uses SSDs (high speed). • Read Cache: The disk is an SSD providing high-speed read cache for a storage pool. • Standard: The disk group is in the storage tier that uses enterprise-class spinning SAS disks (10k/15k RPM, higher capacity).
tier-numeric	uint32	Numeric equivalents for storage-tier values. • 0: N/A • 1: Performance • 2: Standard • 4: Archive • 8: Read Cache

Table 9 adapt-expand-preview properties

Name	Type	Description
enclosure-id	string	Enclosure ID.
disk-count	uint32	Number of disks in the disk group.
disk-display	string	The disks that would be used, listed as hyphenated disk ranges where possible to aid readability (e.g., 1.1-12,...). If the list exceeds 60 characters, see the full list shown by disk-display-full.
disk-display-full	string	The disks that would be used, listed individually (e.g., 1.1,1.2,...).

advanced-settings-table

This basetype is used by show advanced-settings.

Table 10 advanced-settings-table properties

Name	Type	Description
background-scrub	string	Shows whether disks in disk groups are automatically checked for disk defects to ensure system health. The interval between a scrub finishing and starting again is specified by the background-scrub-interval parameter. • Disabled: Background disk-group scrub is disabled. • Enabled: Background disk-group scrub is enabled.
background-scrub-numeric	uint32	Numeric equivalents for background-scrub values. • 0: Disabled • 1: Enabled
background-scrub-interval	uint16	Shows the interval between background disk-group scrub finishing and starting again, from 0 to 360 hours.
partner-firmware-upgrade	string	Shows whether component firmware versions are monitored and will be automatically updated on the partner controller. • Disabled: Partner firmware upgrade is disabled. • Enabled: Partner firmware upgrade is enabled.
partner-firmware-upgrade-numeric	uint32	Numeric equivalents for partner-firmware-upgrade values. • 0: Disabled • 1: Enabled
utility-priority	string	Priority at which data-redundancy utilities, such as disk group verify and reconstruct, run with respect to I/O operations competing for the system's processors. (This does not affect disk group background scrub, which always runs at “background” priority.) • High: Utilities have higher priority than host I/O. This can cause heavy I/O to be slower than normal. • Medium: Utility performance is balanced with host I/O performance. • Low: Utilities run at a slower rate with minimal effect on host I/O.

Table 10 advanced-settings-table properties

Name	Type	Description
utility-priority-numeric	uint32	Numeric equivalents for utility-priority values. • 0: High • 1: Medium • 2: Low
smart	string	Shows whether SMART (Self-Monitoring Analysis and Reporting Technology) is enabled or disabled for disks. • Detect-Only: Each disk in the system retains its individual SMART setting, as will new disks added to the system. • Enabled: SMART is enabled for all disks in the system and will be enabled for new disks added to the system. • Disabled: SMART is disabled for all disks in the system and will be disabled for new disks added to the system.
smart-numeric	uint32	Numeric equivalents for smart values. • 0: Detect-Only • 1: Enabled • 2: Disabled
dynamic-spares	string	Shows whether the storage system will automatically use a compatible disk as a spare to replace a failed disk in a disk group if no compatible spare is available. • Disabled: The dynamic spares feature is disabled. • Enabled: The dynamic spares feature is enabled.
emp-poll-rate	string	Shows the interval in seconds at which the storage system will poll each chassis's Enclosure Management Processor (EMP) for status changes, from 5 to 3600 seconds.
host-cache-control	string	Shows whether hosts are allowed to use the SCSI MODE SELECT command to change the storage system's write-back cache setting. • Disabled: Host control of caching is disabled. • Enabled: Host control of caching is enabled.
host-cache-control-numeric	uint32	Numeric equivalents for host-cache-control values. • 0: Disabled • 1: Enabled
sync-cache-mode	string	Shows how the SCSI SYNCHRONIZE CACHE command is handled. • Immediate: Good status is returned immediately and cache content is unchanged. • Flush To Disk: Good status is returned only after all write-back data for the specified volume is flushed to disk.
sync-cache-mode-numeric	uint32	Numeric equivalents for sync-cache-mode values. • 0: Immediate • 1: Flush to Disk

Table 10 advanced-settings-table properties

Name	Type	Description
`independent-cache`	string	Shows the cache redundancy mode for a dual-controller storage system. • `Disabled`: Controller failover is enabled and data in a controller's write-back cache is mirrored to the partner controller. • `Enabled`: The controllers use Independent Cache Performance Mode, in which controller failover is disabled and data in a controller's write-back cache is not mirrored to the partner controller. This improves write performance at the risk of losing unwritten data if a controller failure occurs while there is data in controller cache.
`independent-cache-numeric`	uint32	Numeric equivalents for `independent-cache` values. • `0: Disabled` • `1: Enabled`
`missing-lun-response`	string	Shows whether host drivers may probe for LUNs until the host drivers reach the LUN to which they have access. • `Not Ready`: Sends a reply that there is a LUN where a gap has been created but that it's "not ready." Sense data returned is sensekey = 2, code = 4, qualifier = 3. • `Illegal Request`: Sends a reply that there is a LUN but that the request is "illegal." Sense data returned is sensekey = 5, code = 25h, qualifier = 0.
`missing-lun-response-numeric`	uint32	Numeric equivalents for `missing-lun-response` values. • `0: Not Ready` • `1: Illegal Request`
`controller-failure`	string	Shows whether the cache policy will change from write-back to write-through when a controller fails. • `Disabled`: The controller failure trigger is disabled. • `Enabled`: The controller failure trigger is enabled.
`controller-failure-numeric`	uint32	Numeric equivalents for `controller-failure` values. • `0: Disabled` • `1: Enabled`
`super-cap-failure`	string	Shows whether the cache policy will change from write-back to write-through when the supercapacitor that provides backup power for cache is not fully charged or fails. • `Disabled`: The supercapacitor failure trigger is disabled. • `Enabled`: The supercapacitor failure trigger is enabled.
`super-cap-failure-numeric`	uint32	Numeric equivalents for `super-cap-failure` values. • `0: Disabled` • `1: Enabled`

Table 10 advanced-settings-table properties

Name	Type	Description
compact-flash-failure	string	Shows whether the cache policy will change from write-back to write-through when CompactFlash memory is not detected during POST (Power-On Self-Test), fails during POST, or fails during controller operation. • Disabled: The CompactFlash failure trigger is disabled. • Enabled: The CompactFlash failure trigger is enabled.
compact-flash-failure-numeric	uint32	Numeric equivalents for compact-flash-failure values. • 0: Disabled • 1: Enabled
power-supply-failure	string	Shows whether the cache policy will change from write-back to write-through when a power supply fails. • Disabled: The power-supply failure trigger is disabled. • Enabled: The power-supply failure trigger is enabled.
power-supply-failure-numeric	uint32	Numeric equivalents for power-supply-failure values. • 0: Disabled • 1: Enabled
fan-failure	string	Shows whether the cache policy will change from write-back to write-through when a fan fails. • Disabled: The fan failure trigger is disabled. • Enabled: The fan failure trigger is enabled.
fan-failure-numeric	uint32	Numeric equivalents for fan-failure values. • 0: Disabled • 1: Enabled
temperature-exceeded	string	Shows whether the system will shut down a controller when its temperature exceeds the critical operating range. • Disabled: The over-temperature trigger is disabled. • Enabled: The over-temperature trigger is enabled.
temperature-exceeded-numeric	uint32	Numeric equivalents for temperature-exceeded values. • 0: Disabled • 1: Enabled
partner-notify	string	Shows whether the partner controller will be notified when a trigger condition occurs. • Disabled: Notification is disabled. The partner controller will continue using its current caching mode. • Enabled: Notification is enabled. The partner controller will change to writethrough mode for better data protection.
partner-notify-numeric	uint32	Numeric equivalents for partner-notify values. • 0: Disabled • 1: Enabled

Table 10 advanced-settings-table properties

Name	Type	Description
auto-write-back	string	Shows whether the cache policy will change from write-through to write-back when the trigger condition is cleared. • Disabled: Auto-write-back is disabled. • Enabled: Auto-write-back is enabled.
auto-write-back-numeric	uint32	Numeric equivalents for auto-write-back values. • 0: Disabled • 1: Enabled
disk-dsd-enable	string	Shows whether spinning disks that are available or are global spares will spin down after a period of inactivity shown by the disk-dsd-delay property. • Disabled: Drive spin down for available disks and global spares is disabled. • Enabled: Drive spin down for available disks and global spares is enabled.
disk-dsd-enable-numeric	uint32	Numeric equivalents for disk-dsd-enable values. • 0: Disabled • 1: Enabled
disk-dsd-delay	uint16	Specifies the period of inactivity in minutes after which spinning disks that are available or are global spares will spin down, from 1 to 360 minutes. The value 0 means spin down is disabled.
background-disk-scrub	string	Shows whether disks that are not in disk groups are automatically checked for disk defects to ensure system health. The interval between background disk scrub finishing and starting again is 72 hours. • Disabled: Background disk scrub is disabled. • Enabled: Background disk scrub is enabled.
background-disk-scrub-numeric	uint32	Numeric equivalents for background-disk-scrub values. • 0: Disabled • 1: Enabled
managed-logs	string	Shows whether the managed logs feature is enabled, which allows log files to be transferred from the storage system to a log-collection system to avoid losing diagnostic data as logs fill. • Disabled: The managed logs feature is disabled. • Enabled: The managed logs feature is enabled.
managed-logs-numeric	uint32	Numeric equivalents for managed-logs values. • 0: Disabled • 1: Enabled

Table 10 advanced-settings-table properties

Name	Type	Description
single-controller	string	For a system that had two controller modules but now has only one and is intended to be used as a single-controller system, this property shows whether the operating/redundancy mode is set to Single Controller. This prevents the system from reporting the absent partner controller as an error condition. This parameter does not affect any other system settings. Installing a second, functional controller module will change the mode to Active-Active ULP. • Enabled: Single Controller mode is enabled. • Disabled: Single Controller mode is disabled.
single-controller-numeric	string	Numeric equivalents for single-controller values. • 0: Disabled • 1: Enabled
disk-protection-info	string	Not supported.
disk-protection-info-numeric	uint32	Not supported.
auto-stall-recovery	string	Shows whether the auto stall recovery feature is enabled, which detects situations where a controller stall is preventing I/O operations from completing, and recovers the system so that at least one controller is operational, thus avoiding data-unavailability situations. • Disabled: Auto stall recovery is disabled. • Enabled: Auto stall recovery is enabled.
auto-stall-recovery-numeric	uint32	Numeric equivalents for auto-stall-recovery values. • 0: Disabled • 1: Enabled
restart-on-capi-fail	string	Shows whether a Storage Controller that experiences a CAPI hang will be forced to restart. A CAPI hang is perceived as a management-interface hang. As part of the restart process, a dump file is created and event 107 is logged. To provide the dump file to technical support for debugging, use the Save Logs action in the Disk Management Utility.
restart-on-capi-fail-numeric	uint32	Numeric equivalents for restart-on-capi-fail values. • 0: Disabled • 1: Enabled
large-pools	string	Shows whether the large-pools feature is enabled. This option provides the capability to create a virtual pool larger than 300 TiB on each controller by limiting the number of user-defined snapshots that can be created in snapshot trees. • enabled or on: The maximum size for a virtual pool will increase to 512 TiB. The maximum number of volumes per snapshot tree will decrease to 9 (base volume plus 8 snapshots). • disabled or off: The maximum size for a virtual pool will increase to 300 TiB. The maximum number of volumes per snapshot tree will decrease to 255 (base volume plus 254 snapshots).

Table 10 advanced-settings-table properties

Name	Type	Description
large-pools-numeric	uint32	Numeric equivalents for large-pools values. • 0: Disabled • 1: Enabled
random-io-performance-optimization	string	Shows whether random I/O performance optimization is enabled or disabled.
random-io-performance-optimization-numeric	uint32	• 0: Disabled • 1: Enabled
cache-flush-timeout	string	Shows whether the cache flush timeout is enabled or disabled.
cache-flush-timeout-numeric	uint32	• 0: Disabled • 1: Enabled

cache-parameter

This basetype is used by show cache-parameters, when a volume is specified, to show volume cache properties.

Table 11 cache-parameter properties

Name	Type	Description
serial-number	string	If a volume is specified, its serial number.
volume-name	string	If a volume is specified, its name.
write-policy	string	If a volume is specified, its cache write policy. • write-back: Write-back caching does not wait for data to be completely written to disk before signaling the host that the write is complete. This is the preferred setting for a fault-tolerant environment because it improves the performance of write operations and throughput. • write-through: Write-through caching significantly impacts performance by waiting for data to be completely written to disk before signaling the host that the write is complete. Use this setting only when operating in an environment with low or no fault tolerance.
write-policy-numeric	uint32	Numeric equivalents for write-policy values. • 0: write-through • 1: write-back

Table 11 cache-parameter properties

Name	Type	Description
cache-optimization	string	If a volume is specified, its cache optimization mode. • standard: This controller cache mode of operation is optimized for sequential and random I/O and is the optimization of choice for most workloads. In this mode, the cache is kept coherent with the partner controller. This mode gives you high performance and high redundancy. • no-mirror: In this mode of operation, the controller cache performs the same as the standard mode with the exception that the cache metadata is not mirrored to the partner. While this improves the response time of write I/O, it comes at the cost of redundancy. If this option is used, the user can expect higher write performance but is exposed to data loss if a controller fails.
cache-optimization-numeric	uint32	Numeric equivalents for cache-optimization values. • 0: standard • 2: no-mirror
read-ahead-size	string	The volume's read-ahead cache setting. • Disabled: Read-ahead is disabled. • Adaptive: Adaptive read-ahead is enabled, which allows the controller to dynamically calculate the optimum read-ahead size for the current workload. • Stripe: Read-ahead is set to one stripe. The controllers treat NRAID and RAID-1 disk groups internally as if they have a stripe size of 512 KB, even though they are not striped. • 512 KB, 1 MB, 2 MB, 4 MB, 8 MB, 16 MB, or 32 MB: Size selected by a user.
read-ahead-size-numeric	uint32	Numeric equivalents for read-ahead-size values. • -2: Stripe • -1: Adaptive • 0: Disabled • 524288: 512 KB • 1048576: 1 MB • 2097152: 2 MB • 4194304: 4 MB • 8388608: 8 MB • 16777216: 16 MB • 33554432: 32 MB

cache-settings

This basetype is used by show cache-parameters to show system cache properties.

Table 12 cache-settings properties

Name	Type	Description
`operation-mode`	string	The system's operating mode, also called the cache redundancy mode. • `Independent Cache Performance Mode`: For a dual-controller system, controller failover is disabled and data in a controller's write-back cache is not mirrored to the partner controller. This improves write performance at the risk of losing unwritten data if a controller failure occurs while there is data in controller cache. • `Active-Active ULP`: Both controllers are active using ULP (Unified LUN Presentation). Data for volumes configured to use write-back cache is automatically mirrored between the two controllers to provide fault tolerance. • `Single Controller`: The chassis contains a single controller. • `Failed Over`: Operation has failed over to one controller because its partner is not operational. The system has lost redundancy. • `Down`: Both controllers are not operational.
`operation-mode-numeric`	uint32	Numeric equivalents for `operation-mode` values. • `1: Independent Cache Performance Mode` • `2: Active-Active ULP` • `3: Single Controller` • `4: Failed Over` • `5: Down`
`pi-format`	string	Not applicable.
`pi-format-numeric`	uint32	Not applicable.
`cache-block-size`	uint16	• `512 Bytes`: The system is using 512-byte block size.
`controller-cache-parameters`	Embedded; see controller-cache-parameters.	

certificate-status

This basetype is used by show certificate.

Table 13 certificate-status properties

Name	Type	Description
`controller`	string	• `A`: Controller A. • `B`: Controller B.
`controller-numeric`	uint32	Numeric equivalents for `controller` values. • `0: A` • `1: B`
`certificate-status`	string	• `Customer-supplied`: The controller is using a certificate that you have uploaded. • `System-generated`: The controller is using system-generated certificates. • `Unknown status`: The controller's certificate cannot be read. This most often occurs when a controller is restarting or the certificate replacement process is still in process.
`certificate-status-numeric`	uint32	Numeric equivalents for `certificate-status` values. • `0: Default` • `1: Customer-supplied`
`certificate-time`	string	The date and time, in the format *`year-month-day hour:minutes:seconds`*, when the certificate was created.
`certificate-signature`	string	The first few characters of the certificate file. This property is for diagnostic purposes, and can be used to verify that the proper certificate is in use.
`certificate-text`	string	The full text of the certificate.

chap-records

This basetype is used by show chap-records.

Table 14 chap-records properties

Name	Type	Description
`initiator-name`	string	The originator name.
`initiator-secret`	string	The secret that the recipient uses to authenticate the originator.
`oname`	string	For mutual CHAP, the recipient name.
`osecret`	string	For mutual CHAP, the secret that the originator uses to authenticate the recipient.

cli-parameters

This basetype is used by show cli-parameters.

Table 15 cli-parameters properties

Name	Type	Description
`timeout`	uint32	Time in seconds that the session can be idle before it automatically ends. Valid values are 120–43200 seconds (2–720 minutes).
`output-format`	string	• `console`: Supports interactive use of the CLI by displaying command output in easily readable format. This format automatically sizes fields according to content and adjusts content to window resizes. • `api`: Supports scripting by displaying command output in XML. All objects are displayed at the same level, related by COMP elements. • `api-embed`: Alternate form of XML output which displays "child" objects embedded (indented) under "parent" objects. • `ipa`: Alternate form of XML output which displays like api-embed format with brief mode enabled. • `json`: Standard JavaScript Object Notation (JSON) output. • `wbi`: A JSON-like format used internally by the Disk Management Utility.
`output-format-api`	string	• `console` • `api` • `api-brief` • `api-embed` • `api-embed-brief` • `json` • `json-full`
`output-format-api-numeric`	uint32	Numeric equivalents for `output-format-api` values. • `1: console` • `2: api` • `3: api-brief` • `4: api-embed` • `5: api-embed-brief` • `6: json` • `7: json-full`
`brief-mode`	string	• `Enabled`: In XML output, this setting shows a subset of attributes of object properties. The name and type attributes are always shown. • `Disabled`: In XML output, this setting shows all attributes of object properties.

Table 15 cli-parameters properties

Name	Type	Description
brief-mode-numeric	uint32	Numeric equivalents for brief-mode values. • 0: Disabled • 1: Enabled
base	uint8	Alias for storage-size-base.
pager	string	• Enabled: Halts output after each full screen to wait for keyboard input. • Disabled: Output is not halted. When displaying output in API format, which is intended for scripting, disable paging.
pager-numeric	uint32	Numeric equivalents for pager values. • 0: Disabled • 1: Enabled
locale	string	The display language.
locale-numeric	uint32	Numeric equivalents for locale values. • 0: English • 3: Spanish • 4: French • 5: German • 6: Italian • 7: Japanese • 8: Korean • 9: Dutch • 11: Chinese-simplified • 12: Chinese-traditional
storage-size-base	uint8	Base for entry and display of storage-space sizes. • 2: Sizes are shown as powers of 2, using 1024 as a divisor for each magnitude. • 10: Sizes are shown as powers of 10, using 1000 as a divisor for each magnitude. Operating systems usually show volume size in base 2. Disk drives usually show size in base 10. Memory (RAM and ROM) size is always shown in base 2.
storage-size-precision	uint8	Number of decimal places (1–10) for display of storage-space sizes.

Table 15 cli-parameters properties

Name	Type	Description
storage-size-units	string	Unit for display of storage-space sizes. • Auto: Lets the system determine the proper unit for a size. • MB: Sizes are shown in megabytes. • GB: Sizes are shown in gigabytes. • TB: Sizes are shown in terabytes. Based on the precision setting, if a size is too small to meaningfully display in the selected unit, the system uses a smaller unit for that size. For example, if storage-size-units is set to TB, storage-size-precision is set to 1, and storage-size-base is set to 10, the size 0.11709 TB is instead shown as 117.1 GB.
storage-size-units-numeric	uint32	Numeric equivalents for storage-size-units values. • 0: Auto • 1: MB • 2: GB • 3: TB
temperature-scale	string	• Fahrenheit: Temperatures are shown in degrees Fahrenheit. • Celsius: Temperatures are shown in degrees Celsius.
temperature-scale-numeric	uint32	Numeric equivalents for temperature-scale values. • 0: Fahrenheit • 1: Celsius
user-type	string	The logged-in user's experience level. • Novice • Standard • Advanced • Diagnostic
user-type-numeric	uint32	Numeric equivalents for user-type values. • 1: Novice • 2: Standard • 3: Advanced • 4: Diagnostic
username	string	The logged-in user name.

Table 15 cli-parameters properties

Name	Type	Description
management-mode	string	The management mode used in the current CLI session. • Linear: Uses linear-storage terminology in command output and system messages. For example, *vdisk* for disk groups and pools. • Virtual: Uses terminology in command output and system messages that is generalized for managing virtual and linear storage. For example, *disk group* for disk groups and *pool* for pools.
management-mode-numeric	uint32	Numeric equivalents for management-mode values. • 2: Linear • 3: Virtual

code-load-readiness

This basetype is used by check firmware-upgrade-health.

Table 16 code-load-readiness properties

Name	Type	Description
overall-health	string	• Pass: There are no risks to performing firmware upgrade. • Fail: At least one condition exists that presents a risk of upgrade failure or loss of availability.
overall-health-numeric	uint32	Numeric equivalents for overall-health values. • 0: Pass • 1: Fail
code-load-readiness-reasons	Embedded; see code-load-readiness-reasons.	

code-load-readiness-reasons

This basetype is used by check firmware-upgrade-health.

Table 17 code-load-readiness-reasons properties

Name	Type	Description
readiness-reason	string	The condition that was detected.
failure-risks	string	The problems that are likely to result if you do not resolve the conditions before performing a firmware upgrade.
failure-risks-numeric	uint32	Numeric equivalents for failure-risks values.

communication-ports

This basetype is used by show protocols.

Table 18 communication-ports properties

Name	Type	Description
ssh-port	uint16	The port number used for SSH.
sftp-port	uint16	The port number used for SFTP.

compact-flash

This basetype is used by show controllers.

Table 19 compact-flash properties

Name	Type	Description
durable-id	string	• Ctlr A CF: CompactFlash card in controller A. • Ctlr B CF: CompactFlash card in controller B.
controller-id	string	• A: Controller A. • B: Controller B.
controller-id-numeric	uint32	Numeric equivalents for controller-id values. • 0: B • 1: A
name	string	• Controller A CompactFlash • Controller B CompactFlash
status	string	• Not Installed • Installed
status-numeric	uint32	Numeric equivalents for status values. • 0: Not Installed • 1: Installed
cache-flush	string	• Enabled: If the controller loses power, it will automatically write cache data to the CompactFlash card. Cache flush is normally enabled, but is temporarily disabled during controller shut down. • Disabled: Cache flush is disabled.
cache-flush-numeric	uint32	Numeric equivalents for cache-flush values. • 0: Disabled • 1: Enabled
health	string	• OK • Fault • N/A

Table 19 compact-flash properties

Name	Type	Description
health-numeric	uint32	Numeric equivalents for health values. • 0: OK • 2: Fault • 4: N/A
health-reason	string	If Health is not OK, the reason for the health state.
health-recommendation	string	If Health is not OK, the recommended action to take to resolve the health issue.

controller-cache-parameters

This basetype is used by show cache-parameters to show controller cache properties.

Table 20 controller-cache-parameters properties

Name	Type	Description
durable-id	string	• cache-params-a: Cache parameters for controller A. • cache-params-b: Cache parameters for controller B.
controller-id	string	• A: Controller A. • B: Controller B.
controller-id-numeric	uint32	Numeric equivalents for controller-id values. • 0: B • 1: A
name	string	• Controller A Cache Parameters • Controller B Cache Parameters
write-back-status	string	Shows the current, system-wide cache policy as determined by auto-write-through logic. This value is not settable by users. If an auto-write-through trigger condition (such as a CompactFlash failure) is met, the cache policy for all volumes changes to write-through, overriding the volume-specific settings. When the problem is corrected, the cache policy reverts to the value configured for each individual volume. • Enabled: Write-back. This is the normal state. • Disabled: Write-through. • Not up: The controller is not up.
write-back-status-numeric	uint32	Numeric equivalents for write-back-status values. • 0: Enabled (write-back) • 1: Disabled (write-through) • 2: Not up
compact-flash-status	string	• Not Installed: The CompactFlash card is not installed. • Installed: The CompactFlash card is installed.

Table 20 controller-cache-parameters properties

Name	Type	Description
compact-flash-status-numeric	uint32	Numeric equivalents for compact-flash-status values. • 0: Not Installed • 1: Installed
compact-flash-health	string	• OK • Degraded • Fault • N/A • Unknown
compact-flash-health-numeric	uint32	Numeric equivalents for compact-flash-health values. • 0: OK • 1: Degraded • 2: Fault • 3: Unknown • 4: N/A
cache-flush	string	• Enabled: If the controller loses power, it will automatically write cache data to the CompactFlash card. Cache flush is normally enabled, but is temporarily disabled during controller shut down. • Disabled: Cache flush is disabled.
cache-flush-numeric	uint32	Numeric equivalents for cache-flush values. • 0: Disabled • 1: Enabled

controllers

This basetype is used by show configuration and show controllers.

Table 21 controllers properties

Name	Type	Description
durable-id	string	• controller a • controller b
controller-id	string	• A: Controller A. • B: Controller B.
controller-id-numeric	uint32	• 0: B • 1: A
serial-number	string	• Serial number of the controller module. • Not Available: The controller module is down or not installed.

Table 21 controllers properties

Name	Type	Description
hardware-version	string	Controller module hardware version.
cpld-version	string	Complex Programmable Logic Device (CPLD) firmware version.
mac-address	string	Controller network port MAC address.
node-wwn	string	Storage system World Wide Node Name (WWNN).
active-version	uint32	The configured network port IP version. • 4: IPv4
ip-address	string	Controller network port IP address.
ip-subnet-mask	string	Controller network port IP subnet mask.
ip-gateway	string	Controller network port gateway IP address.
disks	uint32	Number of disks in the storage system.
number-of-storage-pools	uint32	Number of virtual pools in the storage system.
virtual-disks	uint32	Number of disk groups in the storage system.
cache-memory-size	uint32	Controller cache memory size (MB).
system-memory-size	uint32	Controller module cache memory size, in MB, including CPU memory available to I/O.
host-ports	uint32	Number of host ports in the controller module.
drive-channels	uint32	Number of expansion ports in the controller chassis.
drive-bus-type	string	Controller interface to disks. • SAS
drive-bus-type-numeric	uint32	Numeric equivalent for drive-bus-type value. • 8: SAS
status	string	• Operational • Down • Not installed
status-numeric	uint32	Numeric equivalents for status values. • 0: Operational • 1: Down • 2: Not installed

Table 21 controllers properties

Name	Type	Description
failed-over	string	Indicates whether the partner controller has failed over to this controller. • No: The partner controller has not failed over to this controller. • Yes: The partner controller has either failed or been shut down, and its responsibilities have been taken over by this controller. There will be a delay between the time that the value of the status property becomes Down for one controller and the time that the value of the failed-over property becomes Yes for the other controller. This time period is the time that it takes for a controller to take over the responsibilities of its partner.
failed-over-numeric	uint32	Numeric equivalents for failed-over values. • 0: No • 1: Yes
fail-over-reason	string	If failed-over is Yes, a reason for the failover appears; otherwise, Not applicable appears.
fail-over-reason-numeric	uint32	Numeric equivalents for fail-over-reason values.
sc-fw	string	Storage Controller firmware version.
vendor	string	Controller manufacturer.
model	string	Controller model.
platform-type	string	Chassis platform type.
platform-type-numeric	uint32	Numeric equivalents for platform-type values.
multicore	string	Shows whether the controller module is using multiple application processing cores. • Enabled: Multiple cores are active. • Disabled: A single core is active.
multicore-numeric	uint32	Numeric equivalents for multicore values. • 0: Enabled • 1: Disabled
sc-cpu-type	string	Storage Controller processor type.
sc-cpu-speed	sint32	Storage Controller processor speed.
internal-serial-number	string	Internal serial number of the controller.
cache-lock	string	Shows whether hosts are prevented from using the SCSI MODE SELECT command to change the storage system's write-back cache setting. • No: Hosts are permitted to disable write-back cache. • Yes: Hosts are prevented from disabling write-back cache.

Table 21 controllers properties

Name	Type	Description
cache-lock-numeric	uint32	Numeric equivalents for cache-lock values. • 0: No • 1: Yes
write-policy	string	The current, system-wide cache policy as determined by auto-write-through (AWT) logic. This value is not settable by users. If an AWT trigger condition (such as a CompactFlash failure) is met, the cache policy for all volumes changes to writethrough, overriding the volume-specific settings. When the problem is corrected, the cache policy reverts to the value configured for each individual volume. • write-back: This is the normal state. • write-through • Not up: The controller is not up.
write-policy-numeric	uint32	Numeric equivalents for write-policy values. • 0: write-back • 1: write-through • 2: Not up
description	string	FRU long description.
part-number	string	Part number for the FRU.
revision	string	Hardware revision level for the FRU.
dash-level	string	FRU template revision number.
fru-shortname	string	FRU short description.
mfg-date	string	Date and time, in the format *year-month-day hour:minutes:seconds* (UTC), when the controller's PCBA was programmed.
mfg-date-numeric	uint32	Unformatted mfg-date value.
mfg-location	string	City, state/province, and country where the FRU was manufactured.
mfg-vendor-id	string	JEDEC ID of the FRU manufacturer.
locator-led	string	Shows the state of the locator LED on a controller module. • Off • On
locator-led-numeric	uint32	Numeric equivalents for locator-led values. • 0: Off • 1: On
ssd-alt-path-io-count	uint8	The ratio of I/Os that alternate between the primary path and the alternate path to the SSDs. Thus, 2 means every second I/O will go to the alternate path, or 3 means every third I/O will go to the alternate path.

Table 21 controllers properties

Name	Type	Description
health	string	• OK • Degraded • Fault • Unknown • N/A
health-numeric	uint32	Numeric equivalents for health values. • 0: OK • 1: Degraded • 2: Fault • 3: Unknown • 4: N/A
health-reason	string	If Health is not OK, the reason for the health state.
health-recommendation	string	If Health is not OK, the recommended actions to take to resolve the health issue.
position	string	Position of the controller module, as viewed from the back of the chassis. • Left • Right • Top • Bottom
position-numeric	uint32	Numeric equivalents for position values. • 0: Left • 1: Right • 2: Top • 3: Bottom
rotation	string	Rotation of the controller module in the chassis. • 0 Degrees • 90 Degrees • 180 Degrees • 270 Degrees
rotation-numeric	string	Numeric equivalents for position values. • 0: 0 Degrees • 1: 90 Degrees • 2: 180 Degrees • 3: 270 Degrees

Table 21 controllers properties

Name	Type	Description
phy-isolation	string	Shows whether the automatic disabling of SAS expander PHYs having high error counts is enabled or disabled for this controller. • Enabled: PHY fault isolation is enabled. • Disabled: PHY fault isolation is disabled.
phy-isolation-numeric	uint32	Numeric equivalents for phy-isolation values. • 0: Enabled • 1: Disabled
redundancy-mode	string	The system's operating mode, also called the cache redundancy mode. • Independent Cache Performance Mode: For a dual-controller system, controller failover is disabled and data in a controller's write-back cache is not mirrored to the partner controller. This improves write performance at the risk of losing unwritten data if a controller failure occurs while there is data in controller cache. • Active-Active ULP: Both controllers are active using ULP (Unified LUN Presentation). Data for volumes configured to use write-back cache is automatically mirrored between the two controllers to provide fault tolerance. • Single Controller: The chassis contains a single controller. • Failed Over: Operation has failed over to one controller because its partner is not operational. The system has lost redundancy. • Down: Both controllers are not operational.
redundancy-mode-numeric	uint32	Numeric equivalents for redundancy-mode values. • 1: Independent Cache Performance Mode • 2: Active-Active ULP • 3: Single Controller • 4: Failed Over • 5: Down
redundancy-status	string	• Redundant with independent cache: Both controllers are operational but are not mirroring their cache metadata to each other. • Redundant: Both controllers are operational. • Operational but not redundant: In active-active mode, one controller is operational and the other is offline. In single-controller mode, the controller is operational. • Down: This controller is not operational. • Unknown: Status information is not available.

Table 21 controllers properties

Name	Type	Description
redundancy-status-numeric	uint32	Numeric equivalents for redundancy-status values. • 0: Operational but not redundant • 1: Redundant with independent cache • 3: Redundant • 4: Down • 5: Unknown
unhealthy-component	Embedded; see unhealthy-component.	
ip-address	Embedded; see network-parameters.	
port-details	Embedded; see port.	
enclosure-id	Embedded; see expander-ports.	
compact-flash	Embedded; see compact-flash.	
expander-details	Embedded; see expanders.	

controller-statistics

This basetype is used by show controller-statistics.

Table 22 controller-statistics properties

Name	Type	Description
durable-id	string	• controller a • controller b
cpu-load	uint32	Percentage of time the CPU is busy, from 0 to 100.
power-on-time	uint32	Number of seconds since the controller was restarted.
write-cache-used	uint32	Percentage of write cache in use, from 0 to 100.
bytes-per-second	string	The data transfer rate, in bytes per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.
bytes-per-second-numeric	uint64	Unformatted bytes-per-second value.
iops	uint32	Input/output operations per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.
number-of-reads	uint64	For the controller whose host ports had I/O activity, the number of read operations since these statistics were last reset or since the controller was restarted.
read-cache-hits	uint64	For the controller that owns the volume, the number of times the block to be read is found in cache.

Table 22 controller-statistics properties

Name	Type	Description
read-cache-misses	uint64	For the controller that owns the volume, the number of times the block to be read is not found in cache.
number-of-writes	uint64	For the controller whose host ports had I/O activity, the number of write operations since these statistics were last reset or since the controller was restarted.
write-cache-hits	uint64	For the controller that owns the volume, the number of times the block written to is found in cache.
write-cache-misses	uint64	For the controller that owns the volume, the number of times the block written to is not found in cache.
data-read	string	Amount of data read since these statistics were last reset or since the controller was restarted.
data-read-numeric	uint64	Unformatted data-read value.
data-written	string	Amount of data written since these statistics were last reset or since the controller was restarted.
data-written-numeric	uint64	Unformatted data-written value.
num-forwarded-cmds	uint32	The current count of commands that are being forwarded or are queued to be forwarded to the partner controller for processing. This value will be zero if no commands are being forwarded or are queued to be forwarded.
reset-time	string	Date and time, in the format *year-month-day hour:minutes:seconds*, when these statistics were last reset, either by a user or by a controller restart.
reset-time-numeric	uint32	Unformatted reset-time value.
start-sample-time	string	Date and time, in the format *year-month-day hour:minutes:seconds*, when sampling started for the iops and bytes-per-second values.
start-sample-time-numeric	uint32	Unformatted start-sample-time value.
stop-sample-time	string	Date and time, in the format *year-month-day hour:minutes:seconds*, when sampling stopped for the iops and bytes-per-second values.
stop-sample-time-numeric	uint32	Unformatted stop-sample-time value.
total-power-on-hours	string	The total amount of hours the controller has been powered on in its life time.

copy-volumes

This basetype is used by show volume-copies.

Table 23 copy-volumes properties

Name	Type	Description
source-volume	string	The name of the source volume.
source-volume-serial	string	The serial number of the source volume.
source-type	string	The type of the source volume: Virtual or Linear.
source-type-numeric	uint32	Numeric equivalents for source-type values. • 0: Linear • 1: Virtual
source-pool-name	string	The name of the source pool: A or B.
destination-volume	string	The name of the destination volume.
destination-volume-serial	string	The serial number of the destination volume.
destination-type	string	The type of the destination volume.
destination-type-numeric	uint32	Numeric equivalents for destination-type values. • 0: Linear • 1: Virtual
destination-pool-name	string	The name of the destination pool: A or B.
progress	string	The percent complete of the operation.

cs-replicate-tasks

This basetype is used by show schedules.

Table 24 cs-replicate-tasks properties

Name	Type	Description
replication-set-name	string	The name of the replication set.
replication-set-serialnum	string	The serial number of the replication set.

Table 24 cs-replicate-tasks properties

Name	Type	Description
replicate-last-snapshot	string	• False: The primary volume will be replicated. • True: The most recent snapshot of the primary volume will be replicated.
replicate-last-snapshot-numeric	uint32	Numeric equivalents for replicate-last-snapshot values. • 0: False • 1: True

cs-replication

This basetype is used by show replication-sets.

Table 25 cs-replication properties

Name	Type	Description
replication-state	string	• Last Run • Current Run
replication-state-numeric	uint32	Numeric equivalents for replication-state values. • 0: Last Run • 1: Current Run
image-generation	sint32	The generation number of the replication. If the replication set is unsynchronized, which means the replication set is ready for replication but no replications have been performed, the value will be 0.
progress	string	The percentage complete of the active replication. Otherwise, N/A.
total-data-transferred	string	The total number of bytes transferred.
total-data-transferred-numeric	uint64	Unformatted total-data-transferred value.
collection-time	uint32	The date and time when the replication data shown by this command was collected.
collection-time-numeric	uint32	Unformatted collection-time value.
time-start	string	The date and time when the replication started.
time-start-numeric	uint32	Unformatted time-start value.
time-end	string	The date and time when the replication ended.
time-end-numeric	uint32	Unformatted time-end value.
estimated-time-completion	string	The date and time when the replication is estimated to end.
estimated-time-completion-numeric	uint32	Unformatted estimated-time-completion value.

Table 25 cs-replication properties

Name	Type	Description
most-recent-suspend-time	string	The most recent time that the replication was suspended.
most-recent-suspend-time-numeric	uint32	Unformatted most-recent-suspend-time value.
num-seconds-suspended	uint32	The amount of time, in seconds, that the replication was suspended.
suspend-count	uint32	The number of times the replication was suspended.
error-count	uint32	The number of times the replication experienced an error.
run-error	string	A message that says whether the replication succeeded or an error occurred.

cs-replication-set

This basetype is used by show replication-sets for a virtual replication set.

Table 26 cs-replication-set properties

Name	Type	Description
name	string	The replication set name.
serial-number	string	The replication set serial number.
group	string	• Yes: The replication set is part of a group. • No: The replication set is not part of a group.
group-numeric	uint32	Numeric equivalents for group values. • 0: No • 1: Yes
primary-location	string	The location of the primary volume in the replication set: Local or Remote.
primary-location-numeric	uint32	Numeric equivalents for primary-location values. • 0: Remote • 1: Local
peer-connection-name	string	The name of the peer connection.
peer-connection-serial	string	The serial number of the peer connection.
primary-volume-name	string	The primary volume name. If it is a volume group, it uses the .* notation.
primary-volume-serial	string	The serial number of the primary volume.

Table 26 cs-replication-set properties

Name	Type	Description
secondary-volume-name	string	The secondary volume name. If it is a volume group, it uses the .* notation.
secondary-volume-serial	string	The serial number of the secondary volume.
sync-job-active	string	• False: No replication is in progress on the replication set. • True: A replication is currently in progress on the replication set.
sync-job-active-numeric	uint32	Numeric equivalents for sync-job-active values. • 0: False • 1: True
queue-policy	string	The action to take when a replication is running and a new replication is requested. • discard: Discard the new replication request. • queue-latest: Take a snapshot of the primary volume and queue the new replication request. If the queue contained an older replication request, discard that older request. A maximum of one replication can be queued.
queue-policy-numeric	uint32	Numeric equivalents for queue-policy values. • 0: none • 1: discard • 2: queue-latest
queue-count	uint8	The number of queued replications for the replication set: either 0 or 1.
snapshot-history	string	Specifies whether to maintain a replication snapshot history for the replication set. • disabled or off: A snapshot history will not be kept. • secondary: A snapshot history set will be kept on the secondary system for the secondary volume. • both: A snapshot history will be kept for the primary volume on the primary system and for the secondary volume on the secondary system.
snapshot-history-numeric	uint32	Numeric equivalents for snapshot-history values. • 0: disabled • 1: secondary • 2: both
snapshot-count	uint32	The number of snapshots to retain in snapshot history. When a new snapshot exceeds this limit, the oldest snapshot in the snapshot history is deleted.
snapshot-basename	string	The user-defined prefix for the snapshots.

Table 26 cs-replication-set properties

Name	Type	Description
`retention-priority`	string	The retention priority for snapshots, which is used when automatic deletion of snapshots is enabled by using the set snapshot-space command. In a snapshot tree, only leaf snapshots can be deleted automatically. Deletion based on retention priority is unrelated to deleting the oldest snapshots to maintain a snapshot count. • `never-delete`: Snapshots will never be deleted automatically to make space. The oldest snapshot in the snapshot history will be deleted once the `snapshot-count` value has been exceeded. • `high`: Snapshots can be deleted after all eligible medium-priority snapshots have been deleted. • `medium`: Snapshots can be deleted after all eligible low-priority snapshots have been deleted. • `low`: Snapshots can be deleted.
`retention-priority-numeric`	uint32	Numeric equivalents for `retention-priority-numeric` values. • `0: never-delete` • `1: low` • `2: medium` • `3: high`
`status`	string	• `Not Ready`: The replication set is not ready for replications because the system is still preparing the replication set. • `Unsynchronized`: The primary and secondary volumes are unsynchronized because the system has prepared the replication set, but the initial replication has not run. • `Running`: A replication is in progress. • `Ready`: The replication set is ready for a replication. • `Suspended`: Replications have been suspended. • `Unknown`: This system cannot communicate with the primary system and thus cannot be sure of the current state of the replication set. Check the state of the primary system.
`status-numeric`	uint32	Numeric equivalents for `status` values.
`failback-in-progress`	string	Not supported.
`failback-in-progress-numeric`	uint32	Not supported.
`failback-sync-complete`	string	Not supported.
`failback-sync-complete-numeric`	uint32	Not supported.
`last-success-time`	string	The date and time when the system took a snapshot of the primary volume in preparation for starting the last successful replication run. The value shows when the primary and secondary volumes were last known to be in sync.

Table 26 cs-replication-set properties

Name	Type	Description
last-success-time-numeric	uint32	Unformatted last-success-time value.
last-success-generation	sint32	The number of times a replication has successfully completed.
last-run-status	string	The status of the last attempted replication. • N/A: The replication has not yet completed. • Success: The replication completed successfully. • Fail: The replication failed.
last-run-status-numeric	uint32	Numeric equivalents for last-run-status values. • 0: N/A • 1: Success • 2: Fail
estimated-time-completion	string	For the current run, the date and time when the replication is estimated to end. If no replication is in progress, N/A.
estimated-time-completion-numeric	uint32	Unformatted estimated-time-completion value.
previous-replication-run	Embedded; see cs-replication.	
current-replication-run	Embedded; see cs-replication.	
current-replication-snapshots	Embedded; see current-replication-snapshots.	

current-replication-snapshots

This basetype is used by show replication-snapshot-history.

Table 27 current-replication-snapshots properties

Name	Type	Description
serial-number	string	The snapshot serial number.
name	string	The snapshot name.
creation-date-time	string	The date and time when the snapshot was prepared or committed.
snap-data	blocks	The total amount of write data associated with the snapshot.
unique-data	blocks	The amount of write data that is unique to the snapshot.
base-volume	string	The base volume name.
base-serial-number	string	The base volume serial number.

debug-log-parameters

This basetype is used by show debug-log-parameters.

Table 28 debug-log-parameters properties

Name	Type	Description
host-dbg	string	Shows whether host interface debug messages are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.
host-dbg-numeric	uint32	Numeric equivalents for host values. • 0: Off • 1: On
disk	string	Shows whether disk interface debug messages are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.
disk-numeric	uint32	Numeric equivalents for disk values. 0: Off 1: On
mem	string	Shows whether internal memory debug messages are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.
mem-numeric	uint32	Numeric equivalents for mem values. • 0: Off • 1: On
fo	string	Shows whether failover and recovery debug messages are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.
fo-numeric	uint32	Numeric equivalents for fo values. • 0: Off • 1: On
msg	string	Shows whether inter-controller message debug messages are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.

Table 28 debug-log-parameters properties

Name	Type	Description
msg-numeric	uint32	Numeric equivalents for msg values. • 0: Off • 1: On
ioa	string	Shows whether standard debug messages for an I/O interface driver are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.
ioa-numeric	uint32	Numeric equivalents for ioa values. • 0: Off • 1: On
iob	string	Shows whether resource-count debug messages for an I/O interface driver are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.
iob-numeric	uint32	Numeric equivalents for iob values. • 0: Off • 1: On
ioc	string	Shows whether upper-layer, verbose debug messages for an I/O interface driver are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.
ioc-numeric	uint32	Numeric equivalents for ioc values. • 0: Off • 1: On
iod	string	Shows whether lower-layer, verbose debug messages for an I/O interface driver are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.
iod-numeric	uint32	Numeric equivalents for iod values. • 0: Off • 1: On
misc	string	Shows whether internal debug messages are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.

Table 28 debug-log-parameters properties

Name	Type	Description
misc-numeric	uint32	Numeric equivalents for misc values. • 0: Off • 1: On
host2	string	Shows whether host/SCSI debug messages are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.
host2-numeric	uint32	Numeric equivalents for host2 values. • 0: Off • 1: On
raid	string	Shows whether RAID debug messages are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.
raid-numeric	uint32	Numeric equivalents for raid values. • 0: Off • 1: On
cache	string	Shows whether cache debug messages are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.
cache-numeric	uint32	Numeric equivalents for cache values. • 0: Off • 1: On
emp	string	Shows whether Enclosure Management Processor debug messages are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.
emp-numeric	uint32	Numeric equivalents for emp values. • 0: Off • 1: On
capi	string	Shows whether Internal Configuration API debug messages are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.

Table 28 debug-log-parameters properties

Name	Type	Description
capi-numeric	uint32	Numeric equivalents for capi values. • 0: Off • 1: On
mui	string	Shows whether internal service interface debug messages are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.
mui-numeric	uint32	Numeric equivalents for mui values. • 0: Off • 1: On
bkcfg	string	Shows whether internal configuration debug messages are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.
bkcfg-numeric	uint32	Numeric equivalents for bkcfg values. • 0: Off • 1: On
awt	string	Shows whether debug messages for auto-write-through cache triggers are enabled for inclusion in the Storage Controller debug log. • Off: Disabled • On: Enabled.
awt-numeric	uint32	Numeric equivalents for awt values. • 0: Off • 1: On
res2	string	Shows whether internal debug messages are enabled for inclusion in the Storage Controller debug log. • Off: Disabled • On: Enabled.
res2-numeric	uint32	Numeric equivalents for res2 values. • 0: Off • 1: On
capi2	string	Shows whether Internal Configuration API tracing messages are enabled for inclusion in the Storage Controller debug log. • Off: Disabled • On: Enabled.

Table 28 debug-log-parameters properties

Name	Type	Description
capi2-numeric	uint32	Numeric equivalents for capi2 values. • 0: Off • 1: On
dms	string	Not used.
dms-numeric	uint32	Not used.
fruid	string	Shows whether FRU ID debug messages are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.
fruid-numeric	uint32	Numeric equivalents for fruid values. • 0: Off • 1: On
resmgr	string	Shows whether Reservation Manager debug messages are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.
resmgr-numeric	uint32	Numeric equivalents for resmgr values. • 0: Off • 1: On
init	string	Shows whether host-port initiator mode debug messages are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.
init-numeric	uint32	Numeric equivalents for init values. • 0: Off • 1: On
ps	string	Shows whether paged storage debug messages are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.
ps-numeric	uint32	Numeric equivalents for ps values. • 0: Off • 1: On

Table 28 debug-log-parameters properties

Name	Type	Description
cache2	string	Shows whether extra cache debugging messages that may occur frequently enough to fill logs are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.
cache2-numeric	uint32	Numeric equivalents for cache2 values. • 0: Off • 1: On
rtm	string	Shows whether Remote Target Manager debug messages are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.
rtm-numeric	uint32	Numeric equivalents for rtm values. • 0: Off • 1: On
hb	string	Shows whether inter-controller heartbeat debug messages are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.
hb-numeric	uint32	Numeric equivalents for hb values. • 0: Off • 1: On
autotest	string	Shows whether auto-test debug messages are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.
autotest-numeric	uint32	Numeric equivalents for autotest values. • 0: Off • 1: On
cs	string	Shows whether Copy Services feature debug messages are enabled for inclusion in the Storage Controller debug log. • Off: Disabled. • On: Enabled.
cs-numeric	uint32	Numeric equivalents for cs values. • 0: Off • 1: On

disk-groups

This basetype is used by show configuration, show disk-groups, and show pools.

Table 29 disk-groups properties

Name	Type	Description
name	string	The name of the disk group.
blocksize	uint32	The size of a block, in bytes.
size	string	Disk group capacity, formatted to use the current base, precision, and units.
size-numeric	uint64	Unformatted size value in blocks.
freespace	string	The amount of free space in the disk group, formatted to use the current base, precision, and units.
freespace-numeric	uint64	Unformatted freespace value in blocks.
raw-size	string	The raw capacity of the disks in the disk group, irrespective of space reserved for RAID overhead and so forth, formatted to use the current base, precision, and units.
raw-size-numeric	uint64	Unformatted raw-size value in blocks.
storage-type	string	• Linear: The disk group acts as a linear pool. • Virtual: The disk group is in a virtual pool.
storage-type-numeric	uint32	Numeric equivalents for storage-type values. • 0: Linear • 1: Virtual
pool	string	The name of the pool that contains the disk group.
pool-serial-number	string	The serial number of the pool that contains the disk group.
storage-tier	string	• Archive: The disk group is in the lowest storage tier, which uses midline spinning SAS disks (<10k RPM, high capacity). • Performance: The disk group is in the highest storage tier, which uses SSDs (high speed). • Read Cache: The disk is an SSD providing high-speed read cache for a storage pool. • Standard: The disk group is in the storage tier that uses enterprise-class spinning SAS disks (10k/15k RPM, higher capacity).
storage-tier-numeric	uint32	Numeric equivalents for storage-tier values. • 0: N/A • 1: Performance • 2: Standard • 4: Archive • 8: Read Cache
total-pages	uint32	For a virtual disk group, the total number of 4-MB pages it contains. For a linear disk group, 0.

Table 29 disk-groups properties

Name	Type	Description
allocated-pages	uint32	For a virtual pool, the number of 4-MB pages that are currently in use. For a linear pool, 0.
available-pages	uint32	For a virtual pool, the number of 4-MB pages that are still available to be allocated. For a linear pool, 0.
pool-percentage	uint8	The percentage of pool capacity that the disk group occupies.
performance-rank	uint8	Disk group performance rank within the virtual pool.
owner	string	Either the preferred owner during normal operation or the partner controller when the preferred owner is offline. • A: Controller A. • B: Controller B.
owner-numeric	uint32	Numeric equivalents for owner values. • 0: B • 1: A
preferred-owner	string	Controller that owns the disk group and its volumes during normal operation. • A: Controller A. • B: Controller B.
preferred-owner-numeric	uint32	Numeric equivalents for preferred-owner values. • 0: B • 1: A
raidtype	string	The RAID level of the disk group. • NRAID • RAID0 • RAID1 • RAID3 • RAID5 • RAID6 • RAID10 • RAID50 • ADAPT

Table 29 disk-groups properties

Name	Type	Description
raidtype-numeric	uint32	Numeric equivalents for raidtype values. • 0: RAID0 • 1: RAID1 • 2: ADAPT • 3: RAID3 • 5: RAID5 • 6: NRAID • 8: RAID50 • 10: RAID10 • 11: RAID6
diskcount	uint16	Number of disks in the disk group.
sparecount	uint16	For a linear disk group, the number of spares assigned to the disk group. For a virtual disk group, 0.
chunksize	string	• For RAID levels except NRAID, RAID 1, and RAID 50, the chunk size for the disk group. • For NRAID and RAID 1, chunk-size has no meaning and is therefore shown as not applicable (N/A). • For RAID 50, the disk-group chunk size calculated as: *configured-chunk-size* × (*subgroup-members* - 1). For a disk group configured to use 64-KB chunk size and 4-disk subgroups, the value would be 192k (64KB x 3).

Table 29 disk-groups properties

Name	Type	Description
status	string	• CRIT: Critical. The disk group is online but isn't fault tolerant because some of its disks are down. • DMGD: Damaged. The disk group is online and fault tolerant, but some of its disks are damaged. • FTDN: Fault tolerant with a down disk. The disk group is online and fault tolerant, but some of its disks are down. • FTOL: Fault tolerant and online. • MSNG: Missing. The disk group is online and fault tolerant, but some of its disks are missing. • OFFL: Offline. Either the disk group is using offline initialization, or its disks are down and data may be lost. • QTCR: Quarantined critical. The disk group is critical with at least one inaccessible disk. For example, two disks are inaccessible in a RAID-6 disk group or one disk is inaccessible for other fault-tolerant RAID levels. If the inaccessible disks come online or if after 60 seconds from being quarantined the disk group is QTCR or QTDN, the disk group is automatically dequarantined. • QTDN: Quarantined with a down disk. The RAID-6 disk group has one inaccessible disk. The disk group is fault tolerant but degraded. If the inaccessible disks come online or if after 60 seconds from being quarantined the disk group is QTCR or QTDN, the disk group is automatically dequarantined. • QTOF: Quarantined offline. The disk group is offline with multiple inaccessible disks causing user data to be incomplete, or is an NRAID or RAID-0 disk group. • STOP: The disk group is stopped. • UNKN: Unknown. • UP: Up. The disk group is online and does not have fault-tolerant attributes.

Table 29 disk-groups properties

Name	Type	Description
status-numeric	uint32	Numeric equivalents for status values. • 0: FTOL • 1: FTDN • 2: CRIT • 3: OFFL • 4: QTCR • 5: QTOF • 6: QTDN • 7: STOP • 8: MSNG • 9: DMGD • 250: UP • *other: UNKN*
lun	uint32	Deprecated.
min-drive-size	string	Minimum disk size that can this disk group can use, formatted to use the current base, precision, and units.
min-drive-size-numeric	uint64	Numeric equivalents for min-drive-size values.
create-date	string	Date and time, in the format *year-month-day hour:minutes:seconds* (UTC), when the disk group was created.
create-date-numeric	uint32	Unformatted create-date value.
cache-read-ahead	string	Deprecated.
cache-read-ahead-numeric	uint64	Deprecated.
cache-flush-period	uint32	Deprecated.
read-ahead-enabled	string	Deprecated.
read-ahead-enabled-numeric	uint32	Deprecated.
write-back-enabled	string	Deprecated.
write-back-enabled-numeric	uint32	Deprecated.
job-running	string	Same as current-job.

Table 29 disk-groups properties

Name	Type	Description
current-job	string	Job running on the disk group, if any. • DRSC: A disk is being scrubbed. • EXPD: The disk group is being expanded. • INIT: The disk group is initializing. • RBAL: The ADAPT disk group is being rebalanced. • RCON: At least one disk in the disk group is being reconstructed. • VDRAIN: The virtual disk group is being removed and its data is being drained to another disk group. • VPREP: The virtual disk group is being prepared for use in a virtual pool. • VRECV: The virtual disk group is being recovered to restore its membership in the virtual pool. • VREMV: The disk group and its data are being removed. • VRFY: The disk group is being verified. • VRSC: The disk group is being scrubbed. • Blank if no job is running.
current-job-numeric	uint32	Numeric equivalents for current-job values. • 0: (blank) • 2: INIT • 3: RCON • 4: VRFY • 5: EXPD • 6: VRSC • 7: DRSC • 9: VREMV • 12: VPREP • 13: VDRAIN • 14: VRECV • 16: RBAL
current-job-completion	string	• 0%–99%: Percent complete of running job. • (blank): No job is running (job has completed).
num-array-partitions	uint32	Number of volumes in the disk group.
largest-free-partition-space	string	The largest contiguous space in which a volume can be created. The value is formatted to use the current base, precision, and units.
largest-free-partition-space-numeric	uint64	Unformatted largest-free-partition-space value in blocks.

Table 29 disk-groups properties

Name	Type	Description
num-drives-per-low-level-array	uint8	• For a RAID-10 or RAID-50 disk group, the number of disks in each subgroup. • For other RAID levels, 1.
num-expansion-partitions	uint8	Not used.
num-partition-segments	uint8	Number of free segments available for expansion of volumes.
new-partition-lba	string	Maximum number of blocks that could be allocated to a newly created volume. The value is formatted to use the current base, precision, and units. Expanding a volume in the same disk group will reduce this amount.
new-partition-lba-numeric	uint64	Unformatted new-partition-lba value in blocks.
array-drive-type	string	Type of disks used in the disk group. • SAS: Enterprise SAS. • SAS MDL: Midline SAS. • sSAS: SAS SSD. • MIXED: Mixture of enterprise SAS and midline SAS disks.
array-drive-type-numeric	uint32	Numeric equivalents for array-drive-type values. • 1: MIXED • 4: SAS • 8: sSAS • 11: SAS MDL
is-job-auto-abortable	string	• false: The current job must be manually aborted before you can delete the disk group. • true: The current job will automatically abort if you delete the disk group.
is-job-auto-abortable-numeric	uint32	Numeric equivalents for is-job-auto-abortable values. • 0: false • 1: true
serial-number	string	Disk group serial number.
blocks	string	The number of blocks, whose size is specified by the blocksize property.
blocks-numeric	uint64	Unformatted blocks value.
disk-dsd-enable-vdisk	string	• Disabled: DSD is disabled for the disk group. • Enabled - all spinning: DSD is enabled for the disk group. • Partial spin-down: DSD is enabled for the disk group and its disks are partially spun down to conserve power. • Full spin-down: DSD is enabled for the disk group and its disks are fully spun down to conserve power.

Table 29 disk-groups properties

Name	Type	Description
disk-dsd-enable-vdisk-numeric	uint32	Numeric equivalents for disk-dsd-enable-vdisk values. • 0: Disabled • 1: Enabled - all spinning • 2: Partial spin-down • 3: Full spin-down
disk-dsd-delay-vdisk	uint32	For spinning disks in a linear disk group, the period of inactivity after which the disks and dedicated spares will automatically spin down, from 1 to 360 minutes. The value 0 means spin down is disabled.
scrub-duration-goal	uint16	Not applicable.
adapt-target-spare-capacity	string	For an ADAPT disk group, the target spare capacity in GiB. Typically twice the capacity of the largest disk in the disk group.
adapt-target-spare-capacity-numeric	uint64	Unformatted adapt-target-spare-capacity value in blocks.
adapt-actual-spare-capacity	string	For an ADAPT disk group, the currently available spare capacity in GiB.
adapt-actual-spare-capacity-numeric	uint64	Unformatted adapt-actual-spare-capacity value in blocks.
adapt-critical-capacity	string	For an ADAPT disk group, the amount of storage space that is not currently protected against disk loss. (Normally all data is protected against loss of two disks.)
adapt-critical-capacity-numeric	uint64	Unformatted adapt-critical-capacity value in blocks.
adapt-degraded-capacity	string	For an ADAPT disk group, the amount of storage space that is protected against loss of a single disk only. (Normally all data is protected against loss of two disks.)
adapt-degraded-capacity-numeric	uint64	Unformatted adapt-degraded-capacity value in blocks.
adapt-linear-volume-boundary	uint32	The block size by which volumes are aligned in a linear ADAPT disk group. Disk group space is allocated in multiples of this size to such volumes.
pool-sector-format	string	The sector format of disks in the disk group. • 512n: All disks use 512-byte native sector size. Each logical block and physical block is 512 bytes. • 512e: All disks use 512-byte emulated sector size. Each logical block is 512 bytes and each physical block is 4096 bytes. Eight logical blocks will be stored sequentially in each physical block. Logical blocks may or may not be aligned with physical block boundaries. • Mixed: The disk group contains a mix of 512n and 512e disks. This is supported, but for consistent and predictable performance, do not mix disks of different sector size types (512n, 512e).

Table 29 disk-groups properties

Name	Type	Description
health	string	• OK • Degraded • Fault • Unknown • N/A
health-numeric	uint32	Numeric equivalents for health values. • 0: OK • 1: Degraded • 2: Fault • 3: Unknown • 4: N/A
health-reason	string	If Health is not OK, the reason for the health state.
health-recommendation	string	If Health is not OK, the recommended actions to take to resolve the health issue.
unhealthy-component	Embedded; see unhealthy-component.	

disk-groups-preview

This basetype is used by add storage when the preview parameter is specified.

Table 30 disk-groups-preview properties

Name	Type	Description
name	string	The name of the disk group.
pool	string	The name of the pool that contains the disk group.
type	string	Disk description. • SAS: Enterprise SAS spinning disk. • SAS MDL: Midline SAS spinning disk. • SSD SAS: SAS solid-state disk.
type-numeric	uint32	Numeric equivalents for type values. • 4: SAS • 8: SSD SAS • 11: SAS MDL
size	string	Disk group capacity, formatted to use the current base, precision, and units.
size-numeric	uint64	Unformatted size value in blocks.

Table 30 disk-groups-preview properties

Name	Type	Description
raidtype	string	The RAID level of the disk group. • NRAID • RAID0 • RAID1 • RAID3 • RAID5 • RAID6 • RAID10 • RAID50 • ADAPT
raidtype-numeric	uint32	Numeric equivalents for raidtype values. • 0: RAID0 • 1: RAID1 • 2: ADAPT • 3: RAID3 • 5: RAID5 • 6: NRAID • 8: RAID50 • 10: RAID10 • 11: RAID6
tier	string	• Archive: The disk group is in the lowest storage tier, which uses midline spinning SAS disks (<10k RPM, high capacity). • Performance: The disk group is in the highest storage tier, which uses SSDs (high speed). • Read Cache: The disk is an SSD providing high-speed read cache for a storage pool. • Standard: The disk group is in the storage tier that uses enterprise-class spinning SAS disks (10k/15k RPM, higher capacity).
tier-numeric	uint32	Numeric equivalents for storage-tier values. • 0: N/A • 1: Performance • 2: Standard • 4: Archive • 8: Read Cache
enclosure-id	string	Enclosure ID.
disk-count	uint32	Number of disks in the disk group.

Table 30 disk-groups-preview properties

Name	Type	Description
disk-display	string	The disks that would be used, listed as hyphenated disk ranges where possible to aid readability (e.g., 1.1-12,...). If the list exceeds 60 characters, see the full list shown by disk-display-full.
disk-display-full	string	The disks that would be used, listed individually (e.g., 1.1,1.2,...).

disk-group-statistics

This basetype is used by show disk-group-statistics.

Table 31 disk-group-statistics properties

Name	Type	Description
serial-number	string	The serial number of the disk group.
name	string	The name of the disk group.
time-since-reset	uint32	The amount of time, in seconds, since these statistics were last reset, either by a user or by a controller restart.
time-since-sample	uint32	The amount of time, in milliseconds, since this set of statistics was last sampled by the Storage Controller.
number-of-reads	uint64	Number of read operations since these statistics were last reset or since the controller was restarted.
number-of-writes	uint64	Number of write operations since these statistics were last reset or since the controller was restarted.
data-read	string	Amount of data read since these statistics were last reset or since the controller was restarted.
data-read-numeric	uint64	Unformatted data-read value.
data-written	string	Amount of data written since these statistics were last reset or since the controller was restarted.
data-written-numeric	uint64	Unformatted data-written value.
bytes-per-second	string	The data transfer rate, in bytes per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.
bytes-per-second-numeric	uint64	Unformatted bytes-per-second value.
iops	uint32	Input/output operations per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.
avg-rsp-time	uint32	Average response time in microseconds for read and write operations, calculated over the interval since these statistics were last requested or reset.
avg-read-rsp-time	uint32	Average response time in microseconds for all read operations, calculated over the interval since these statistics were last requested or reset.

Table 31 disk-group-statistics properties

Name	Type	Description
avg-write-rsp-time	uint32	Average response time in microseconds for all write operations, calculated over the interval since these statistics were last requested or reset.
disk-group-statistics-paged	Embedded; see disk-group-statistics-paged.	

disk-group-statistics-paged

This basetype is used by show disk-group-statistics for a virtual disk group.

Table 32 disk-group-statistics-paged properties

Name	Type	Description
serial-number	string	The serial number of the disk group.
pages-alloc-per-minute	uint32	The rate, in pages per minute, at which pages are allocated to volumes in the disk group because they need more space to store data.
pages-dealloc-per-minute	uint32	The rate, in pages per minute, at which pages are deallocated from volumes in the disk group because they no longer need the space to store data.
pages-reclaimed	uint32	The number of 4-MB pages that have been automatically reclaimed and deallocated because they are empty (they contain only zeroes for data).
num-pages-unmap-per-minute	uint32	The number of 4-MB pages that host systems have unmapped per minute, through use of the SCSI UNMAP command, to free storage space as a result of deleting files or formatting volumes on the host.

disk-hist-statistics

This basetype is used by show disk-statistics when the historical parameter is specified.

Table 33 disk-hist-statistics properties

Name	Type	Description
number-of-ios	uint64	Total number of read and write operations since the last sampling time.
number-of-reads	uint64	Number of read operations since the last sampling time.
number-of-writes	uint64	Number of write operations since the last sampling time.
total-data-transferred	string	Total amount of data read and written since the last sampling time.
total-data-transferred-numeric	uint64	Unformatted total-data-transferred value.
data-read	string	Amount of data read since the last sampling time.
data-read-numeric	uint64	Unformatted data-read value.

Table 33 disk-hist-statistics properties

Name	Type	Description
data-written	string	Amount of data written since the last sampling time.
data-written-numeric	uint64	Unformatted data-written value.
total-iops	uint64	Total number of read and write operations per second since the last sampling time.
read-iops	uint64	Number of read operations per second since the last sampling time.
write-iops	uint64	Number of write operations per second since the last sampling time.
total-bytes-per-sec	string	Total data transfer rate, in bytes per second, since the last sampling time.
total-bytes-per-sec-numeric	uint64	Unformatted total-bytes-per-second value.
read-bytes-per-sec	string	Data transfer rate, in bytes per second, for read operations since the last sampling time.
read-bytes-per-sec-numeric	uint64	Unformatted read-bytes-per-second value.
write-bytes-per-sec	string	Data transfer rate, in bytes per second, for write operations last sampling time.
write-bytes-per-sec-numeric	uint64	Unformatted write-bytes-per-second value.
queue-depth	uint64	Average number of pending read and write operations being serviced since the last sampling time. This value represents periods of activity only and excludes periods of inactivity.
avg-rsp-time	uint64	Average response time, in microseconds, for read and write operations since the last sampling time.
avg-read-rsp-time	uint64	Average response time, in microseconds, for read operations since the last sampling time.
avg-write-rsp-time	uint64	Average response time, in microseconds, for write operations since the last sampling time.
avg-io-size	string	Average data size of read and write operations since the last sampling time.
avg-io-size-numeric	uint64	Unformatted avg-io-size value.
avg-read-io-size	string	Average data size of read operations since the last sampling time.
avg-read-io-size-numeric	uint64	Unformatted avg-read-io-size value.
avg-write-io-size	string	Average data size of write operations since the last sampling time.
avg-write-io-size-numeric	uint64	Unformatted avg-write-io-size value.

Table 33 disk-hist-statistics properties

Name	Type	Description
number-of-disk-errors	uint64	Total number of disk errors detected since the last sampling time. Error types include: number of SMART events; number of timeouts accessing the disk; number of times the disk did not respond; number of attempts by the storage system to spin-up the disk; media errors generated by the disk as specified by its manufacturer; non-media errors (generated by the storage system, or by the disk and not categorized as media errors); number of bad-block reassignments.
sample-time	string	Date and time, in the format *year-month-day hour:minutes:seconds*, when the data sample was taken.
sample-time-numeric	uint32	Unformatted sample-time value.

disk-statistics

This basetype is used by show disk-statistics when the historical parameter is omitted.

Table 34 disk-statistics properties

Name	Type	Description
durable-id	string	Disk ID in the format disk_*enclosure-number.disk-number*.
location	string	The disk location in the format disk_*enclosure-number.disk-number*.
serial-number	string	Disk serial number.
power-on-hours	uint32	The total number of hours that the disk has been powered on since it was manufactured. This value is stored in disk metadata and is updated in 30-minute increments.
bytes-per-second	string	The data transfer rate, in bytes per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.
bytes-per-second-numeric	uint64	Unformatted bytes-per-second value.
iops	uint32	Input/output operations per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.
number-of-reads	uint64	Number of read operations since these statistics were last reset or since the controller was restarted.
number-of-writes	uint64	Number of write operations since these statistics were last reset or since the controller was restarted.
data-read	string	Amount of data read since these statistics were last reset or since the controller was restarted.
data-read-numeric	uint64	Unformatted data-read value.
data-written	string	Amount of data written since these statistics were last reset or since the controller was restarted.

Table 34 disk-statistics properties

Name	Type	Description
`data-written-numeric`	uint64	Unformatted `data-written` value.
`queue-depth`	uint32	Number of pending I/O operations currently being serviced.
`lifetime-data-read`	string	The amount of data read from the disk in its lifetime.
`lifetime-data-read-numeric`	uint64	Unformatted `lifetime-data-read` value.
`lifetime-data-written`	string	The amount of data written to the disk in its lifetime.
`lifetime-data-written-numeric`	uint64	Unformatted `lifetime-data-written` value.
`reset-time`	string	Date and time, in the format *`year-month-day hour:minutes:seconds`*, when these statistics were last reset, either by a user or by a controller restart.
`reset-time-numeric`	uint32	Unformatted `reset-time` value.
`start-sample-time`	string	Date and time, in the format *`year-month-day hour:minutes:seconds`*, when sampling started for the iops and bytes-per-second values.
`start-sample-time-numeric`	uint32	Unformatted `start-sample-time` value.
`stop-sample-time`	string	Date and time, in the format *`year-month-day hour:minutes:seconds`*, when sampling stopped for the iops and bytes-per-second values.
`stop-sample-time-numeric`	uint32	Unformatted `stop-sample-time` value.
`smart-count-1`	uint32	For port 1, the number of SMART events recorded.
`io-timeout-count-1`	uint32	For port 1, the number of timeouts accessing the disk.
`no-response-count-1`	uint32	For port 1, the number of times the disk did not respond.
`spinup-retry-count-1`	uint32	For port 1, the number of attempts by the storage system to spin up the disk.
`number-of-media-errors-1`	uint32	For port 1, the number of media errors generated by the disk, as specified by its manufacturer.
`number-of-nonmedia-errors-1`	uint32	For port 1, the number of other errors generated by the storage system, or generated by the disk and not categorized as media errors.
`number-of-block-reassigns-1`	uint32	For port 1, the number of times blocks were reassigned to alternate locations.
`number-of-bad-blocks-1`	uint32	For port 1, the number of bad blocks encountered.
`smart-count-2`	uint32	For port 2, the number of pending I/O operations currently being serviced.
`io-timeout-count-2`	uint32	For port 2, the number of SMART events recorded.

Table 34 disk-statistics properties

Name	Type	Description
no-response-count-2	uint32	For port 2, the number of timeouts accessing the disk.
spinup-retry-count-2	uint32	For port 2, the number of times the disk did not respond.
number-of-media-errors-2	uint32	For port 2, the number of attempts by the storage system to spin up the disk.
number-of-nonmedia-errors-2	uint32	For port 2, the number of media errors generated by the disk, as specified by its manufacturer.
number-of-block-reassigns-2	uint32	For port 2, the number of other errors generated by the storage system, or generated by the disk and not categorized as media errors.
number-of-bad-blocks-2	uint32	For port 2, the number of times blocks were reassigned to alternate locations.

drawers

This basetype is used by show enclosures.

Table 35 drawers properties

Name	Type	Description
durable-id	string	Drawer ID.
drawer-id (5U84 chassis)	uint8	• 0: Top • 1: Bottom
drawer-id (2U12/24 chassis)	uint8	Not applicable (255).
drawer-wwn	string	Drawer WWN.
part-number	string	Drawer part number.
name	string	Drawer name.
position	string	The drawer position in the chassis, as viewed from the front. • Left • Right • Top • Bottom
position-numeric	uint32	Numeric equivalents for position values. • 0: Left • 1: Right • 2: Top • 3: Bottom
rows	uint8	Number of rows of disk slots.

Table 35 drawers properties

Name	Type	Description
columns	uint8	Number of columns of disk slots.
slots	uint8	Number of disk slots in drawer.
number-of-disks	uint8	Number of disk slots (not installed disks) in drawer.
emp-a-busid	string	SCSI channel ID of the Enclosure Management Processor (EMP) A in a drawer's Expander Controller.
emp-a-targetid	string	SCSI target ID of the Enclosure Management Processor (EMP) Sin a drawer's Expander Controller.
emp-a-rev	string	Firmware revision for the Enclosure Management Processor (EMP) A in a drawer's Expander Controller.
emp-b-busid	string	SCSI channel ID of the Enclosure Management Processor (EMP) B in a drawer's Expander Controller.
emp-b-targetid	string	SCSI target ID of the Enclosure Management Processor (EMP) B in a drawer's Expander Controller.
emp-b-rev	string	Firmware revision for the Enclosure Management Processor (EMP) B in a drawer's Expander Controller.
emp-a	string	Shows the field name EMP A in console format.
emp-a-ch-id-rev	string	Channel ID and firmware revision of the Enclosure Management Processor A in a drawer's Expander Controller
emp-b	string	Shows the field name EMP B in console format.
emp-b-ch-id-rev	string	Channel ID and firmware revision of the Enclosure Management Processor B in a drawer's Expander Controller
locator-led	string	Shows the state of the locator LED on a drawer: • Off • On
locator-led-numeric	uint32	Numeric equivalents for locator-led values. • 0: Off • 1: On
status	string	Drawer status. • Unsupported • OK • Critical • Warning • Unrecoverable • Not Installed • Unknown • Unavailable

Table 35 drawers properties

Name	Type	Description
status-numeric	uint32	Numeric equivalents for status values. • 0: Unsupported • 1: OK • 2: Critical • 3: Warning • 4: Unrecoverable • 5: Not Installed • 6: Unknown • 7: Unavailable
extended-status	hex32	A numeric value that supplements the standard SES status shown by the status and status-numeric properties, and represents a specific condition.
health	string	• OK • Degraded • Fault • N/A • Unknown
health-numeric	uint32	Numeric equivalents for health values. • 0: OK • 1: Degraded • 2: Fault • 3: Unknown • 4: N/A
health-reason	string	If Health is not OK, the reason for the health state.
health-recommendation	string	If Health is not OK, the recommended actions to take to resolve the health issue.
unhealthy-component	Embedded; see unhealthy-component.	
sideplane-details	Embedded; see sideplanes.	

drive-parameters

This basetype is used by show disk-parameters.

Table 36 drive-parameters properties

Name	Type	Description
smart	string	Shows whether SMART (Self-Monitoring Analysis and Reporting Technology) is enabled or disabled for disks. • Detect-Only: Each disk in the system retains its individual SMART setting, as will new disks added to the system. • Enabled: SMART is enabled for all disks in the system and will be enabled for new disks added to the system. • Disabled: SMART is disabled for all disks in the system and will be disabled for new disks added to the system.
smart-numeric	uint32	Numeric equivalents for smart values. • 0: Detect-Only • 1: Enabled • 2: Disabled
drive-write-back-cache	string	• Disabled: Disk write-back cache is disabled for all disks in the system and will be enabled for new disks added to the system. This value cannot be changed.
drive-write-back-cache-numeric	uint32	Numeric equivalents for drive-write-back-cache values. • 2: Disabled
drive-timeout-retry-max	uint8	Maximum number of times a timed-out I/O operation can be retried before the operation is failed. This value cannot be changed.
drive-attempt-timeout	uint8	Number of seconds before an I/O operation is aborted and possibly retried. This value cannot be changed.
drive-overall-timeout	uint8	Total time in seconds before an I/O operation is failed regardless of the drive-attempt-timeout and drive-timeout-retry-max settings. This value cannot be changed.
disk-dsd-enable	string	Shows whether spinning disks that are available or are global spares will spin down after a period of inactivity shown by the disk-dsd-delay property. • Disabled: Drive spin down for available disks and global spares is disabled. • Enabled: Drive spin down for available disks and global spares is enabled.
disk-dsd-enable-numeric	uint32	Numeric equivalents for disk-dsd-enable values. • 0: Disabled • 1: Enabled
disk-dsd-delay	uint16	Shows the period of inactivity in minutes after which spinning disks that are available or are global spares will spin down, from 1 to 360 minutes. The value 0 means spin down is disabled.

drive-summary

This basetype is used by show disk-statistics when the `historical` parameter is specified.

Table 37 drive-summary properties

Name	Type	Description
`durable-id`	string	Disk ID in the format `disk_`*`enclosure-number.disk-number`*.
`serial-number`	string	Disk serial number.
`disk-hist-statistics`	Embedded; see disk-hist-statistics.	

drives

This basetype is used by show configuration and show disks.

Table 38 drives properties

Name	Type	Description
`durable-id`	string	Disk ID in the format `disk_`*`enclosure-ID.slot-number`*.
`enclosure-id`	uint32	Enclosure ID.
`drawer-id` (5U84 chassis)	uint8	• `0`: Top • `1`: Bottom
`drawer-id` (2U12/24 chassis)	uint8	Not applicable (255).
`slot`	uint32	Disk slot number.
`location`	string	Disk's enclosure ID and slot number.
`port`	uint32	For internal use only.
`scsi-id`	uint32	SCSI ID assigned to this disk for the primary channel.
`blocksize`	uint32	The size of a block, in bytes.
`blocks`	uint64	The number of blocks, whose size is specified by the `blocksize` property.
`serial-number`	string	Disk serial number.
`vendor`	string	Disk vendor.
`model`	string	Disk model.
`revision`	string	Disk firmware revision level.
`secondary-channel`	uint32	SCSI ID assigned to this disk for the secondary channel.
`container-index`	uint32	Container index.
`member-index`	uint32	Index for this disk in the disk group list.

Table 38 drives properties

Name	Type	Description
description	string	Disk description. • SAS: Enterprise SAS spinning disk. • SAS MDL: Midline SAS spinning disk. • SSD SAS: SAS solid-state disk.
description-numeric	uint32	Numeric equivalents for description values. • 4: SAS • 8: SSD SAS • 11: SAS MDL
architecture	string	Disk architecture. • HDD • SSD
architecture-numeric	uint32	Numeric equivalents for architecture values. • 0: SSD • 1: HDD
interface	string	Disk interface. • SAS
interface-numeric	uint32	Numeric equivalents for interface values. • 0: SAS
single-ported	string	• Disabled: The disk has a dual-port connection to the midplane. • Enabled: The disk has a single-port connection to the midplane.
single-ported-numeric	uint32	Numeric equivalents for single-ported values. • 0: Disabled • 1: Enabled
type	string	Type of disk. • SAS: Enterprise SAS. • SAS MDL: Midline SAS. • sSAS: SAS SSD.
type-numeric	uint32	Numeric equivalents for type values. • 4: SAS • 8: sSAS • 11: SAS MDL

Table 38 drives properties

Name	Type	Description
usage	string	Shows the disk's usage. • AVAIL: The disk is available. • DEDICATED SP: The disk is a spare assigned to a linear disk group. • FAILED: The disk is unusable and must be replaced. Reasons for this status include: excessive media errors, SMART error, disk hardware failure, or unsupported disk. • GLOBAL SP: The disk is a global spare. • LEFTOVR: The disk is a leftover. • LINEAR POOL: The disk is a member of a linear disk group. • UNUSABLE: The disk cannot be used in a disk group because the system is secured or the disk is locked to data access. • VDISK: The disk is a member of a linear disk group. • VDISK SP: The disk is a spare assigned to a linear disk group. • VIRTUAL POOL: The disk is a member of a disk group in a virtual pool.
usage-numeric	uint32	Numeric equivalents for usage values. • 0: AVAIL • 1: VDISK or LINEAR POOL • 2: VDISK SP or DEDICATED SP • 3: GLOBAL SP • 5: LEFTOVR • 7: FAILED • 8: UNUSABLE • 9: VIRTUAL POOL

Table 38 drives properties

Name	Type	Description
job-running	string	Job running on the disk, if any. • (blank): None. • DRSC: The disk group is being scrubbed. • EXPD: The disk group is being expanded. • INIT: The disk group is being initialized. • RBAL: The ADAPT disk group is being rebalanced. • RCON: The disk group is being used in a reconstruct operation. • VDRAIN: The virtual disk group is being removed and its data is being drained to another disk group. • VPREP: The virtual disk group is being prepared for use in a virtual pool. • VRECV: The virtual disk group is being recovered to restore its membership in the virtual pool. • VREMV: The disk group and its data are being removed. • VRFY: The disk group is being verified. • VRSC: The disk group is being scrubbed.
job-running-numeric	uint32	Numeric equivalents for job-running values. • 0: None • 2: INIT • 3: RCON • 4: VRFY • 5: EXPD • 6: VRSC • 7: DRSC • 9: VREMV • 12: VPREP • 13: VDRAIN • 14: VRECV • 16: RBAL
state	string	Shows the disk's usage value.
current-job-completion	string	• 0%–99%: Percent complete of running job. • (blank): No job is running (job has completed).
blink	uint32	Deprecated; locator LED status now shown by locator-led property.
locator-led	string	Shows the state of the locator LED on a disk. • Off • On

Table 38 drives properties

Name	Type	Description
locator-led-numeric	uint32	Numeric equivalents for locator-led values. • 0: Off • 1: On
speed	uint32	Not used.
smart	string	• Disabled: SMART is disabled for this disk. • Enabled: SMART is enabled for this disk.
smart-numeric	uint32	Numeric equivalents for smart values. • 0: Disabled • 1: Enabled
dual-port	uint32	• 0: Single-ported disk. • 1: Dual-ported disk.
error	uint32	Not used.
fc-p1-channel	uint32	Port 1 channel ID.
fc-p1-device-id	uint32	Port 1 device ID.
fc-p1-node-wwn	string	Port 1 WWNN.
fc-p1-port-wwn	string	Port 1 WWPN.
fc-p1-unit-number	uint32	Port 1 unit number.
fc-p2-channel	uint32	Port 2 channel number.
fc-p2-device-id	uint32	Port 2 device ID.
fc-p2-node-wwn	string	Port 2 WWNN.
fc-p2-port-wwn	string	Port 2 WWPN.
fc-p2-unit-number	uint32	Port 2 unit number.
drive-down-code	uint8	Numeric code indicating why the disk is down.
owner	string	Current owner, which is either the preferred owner during normal operation or the partner controller when the preferred owner is offline. • A: Controller A. • B: Controller B.
owner-numeric	uint32	Numeric equivalents for owner values. • 0: B • 1: A
index	uint32	For internal use only.
rpm	uint32	The speed of a spinning disk, in thousands of revolutions per minute, as specified by the disk vendor. For an SSD, 0 is shown.
size	string	Disk capacity, formatted to use the current base, precision, and units.
size-numeric	uint64	Unformatted size value in blocks.

Table 38 drives properties

Name	Type	Description
sector-format	string	The disk sector format. • 512n: The disk uses 512-byte native sector size. Each logical block and physical block is 512 bytes. • 512e: The disk uses 512-byte emulated sector size. Each logical block is 512 bytes and each physical block is 4096 bytes. Eight logical blocks will be stored sequentially in each physical block. Logical blocks may or may not be aligned with physical block boundaries.
sector-format-numeric	uint32	Numeric equivalents for sector-format values. • 0: 512n • 1: 512e
transfer-rate	string	Disk data transfer rate in Gbit/s. It is normal behavior for the rate to vary. • 1.5 • 3.0 • 6.0 Some 6-Gbit/s disks might not consistently support a 6-Gbit/s transfer rate. If this happens, the controller automatically adjusts transfers to those disks to 3 Gbit/s, increasing reliability and reducing error messages with little impact on system performance. This rate adjustment persists until the controller is restarted or power-cycled.
transfer-rate-numeric	uint32	For internal use only.
attributes	string	Shows which controller a single-ported disk is connected to. • A: Controller A. • B: Controller B.
attributes-numeric	uint32	For internal use only.
enclosure-wwn	string	Chassis WWN.

Table 38 drives properties

Name	Type	Description
status	string	Disk status. • Up: The disk is present and is properly communicating with the expander. • Spun Down: The disk is present and has been spun down by the drive spin down feature. • Warning: The disk is present but the system is having communication problems with the disk LED processor. For disk and midplane types where this processor also controls power to the disk, power-on failure will result in Error status. • Error: The disk is present but is not detected by the expander. • Unknown: Initial status when the disk is first detected or powered on. • Not Present: The disk slot indicates that no disk is present. • Unrecoverable: The disk is present but has unrecoverable errors. • Unavailable: The disk is present but cannot communicate with the expander. • Unsupported: The disk is present but is an unsupported type.
recon-state	string	The state of the disk (source or destination) if it is involved in a reconstruct operation. • From: This disk is being used as the source of a reconstruct operation. • To: This disk is being used as the target of a reconstruct operation. • N/A: This disk is not being used in a reconstruct operation.
recon-state-numeric	uint32	Numeric equivalents for recon-state values. • 0: N/A • 1: From • 2: To
copyback-state	string	Not applicable.
copyback-state-numeric	uint32	Not applicable.
virtual-disk-serial	string	If the disk is in a linear disk group, the disk group name. Otherwise, blank.
disk-group	string	If the disk is in a linear or virtual disk group, the disk group name. Otherwise, blank.
storage-pool-name	string	If the disk is in a linear or virtual pool, the pool name. Otherwise, blank.

Table 38 drives properties

Name	Type	Description
storage-tier	string	• Archive: The disk is in the lowest storage tier, which uses midline spinning SAS disks (<10k RPM, high capacity). • N/A: Not applicable. • Performance: The disk is in the highest storage tier, which uses SSDs (high speed). • Read Cache: The disk is an SSD providing high-speed read cache for a storage pool. • Standard: The disk is in the storage tier that uses enterprise-class spinning SAS disks (10k/15k RPM, higher capacity).
storage-tier-numeric	uint32	Numeric equivalents for storage-tier values. • 0: N/A • 1: Performance • 2: Standard • 4: Archive • 8: Read Cache
ssd-life-left	string	• 100%–0%: For an SSD, this value shows the percentage of disk life remaining. This value is polled every 5 minutes. When the value decreases to 20%, event 502 is logged with Informational severity. Event 502 is logged again with Warning severity when the value decreases to 5%, 2% or 1%, and 0%. If a disk crosses more than one percentage threshold during a polling period, only the lowest percentage will be reported. • N/A: The disk is not an SSD.
ssd-life-left-numeric	uint32	Numeric equivalents for ssd-life-left values. • 0–100 • 255: N/A
led-status	string	Disk LED status. • Rebuild: The disk's disk group is being reconstructed. • Fault: The disk has a fault. • ID: The disk’s identification LED is illuminated. • Remove: The disk is ready to be removed from the chassis. • Blank if the disk is not part of a disk group or is spun down.
led-status-numeric	uint32	Numeric equivalents for led-status values. • 1: Online • 2: Rebuild • 4: Fault • 8: Pred Fail • 16: ID • 32: Remove

Table 38 drives properties

Name	Type	Description
disk-dsd-count	uint32	Number of times the DSD feature has spun down this disk.
spun-down	uint32	Shows whether the disk is spun down by the DSD feature. • 0: Not spun down. • 1: Spun down.
number-of-ios	uint64	Total number of I/O operations (reads and writes).
total-data-transferred	string	The total number of bytes transferred.
total-data-transferred-numeric	uint64	Unformatted total-data-transferred value.
avg-rsp-time	uint64	Average I/O response time in microseconds.
fde-state	string	The FDE state of the disk. • Unknown: The FDE state is unknown. • Not FDE Capable: The disk is not FDE-capable. • Not Secured: The disk is not secured. • Secured, Unlocked: The system is secured and the disk is unlocked. • Secured, Locked: The system is secured and the disk is locked to data access, preventing its use. • FDE Protocol Failure: A temporary state that can occur while the system is securing the disk.
fde-state-numeric	uint32	Numeric equivalents for fde-state values. • 0: Not FDE Capable • 1: Not Secured • 2: Secured, Unlocked • 3: Secure, Locked • 4: FDE Protocol Failure • 5: Unknown
lock-key-id	string	Current lock ID, or 00000000 if not set.
import-lock-key-id	string	Import lock ID, or 00000000 if not set.
fde-config-time	string	If the system is secured, the time at which the current lock ID was set in the format *year-month-day hour:minutes:seconds* (UTC). Otherwise, N/A.
fde-config-time-numeric	uint32	Unformatted fde-config-time value.
temperature	string	Temperature of the disk.
temperature-numeric	uint32	Numeric equivalent for the temperature value.

Table 38 drives properties

Name	Type	Description
`temperature-status`	string	• `OK`: The disk sensor is present and detects no error condition. • `Warning`: The disk sensor detected a non-critical error condition. The temperature is between the warning and critical thresholds. • `Critical`: The disk sensor detected a critical error condition. The temperature currently exceeds the critical threshold. • `Unknown`: The disk sensor is present but status is not available.
`temperature-status-numeric`	uint32	Numeric equivalents for `temperature-status` values. • `1: OK` • `2: Critical` • `3: Warning` • *`other`*`: Unknown`
`pi-formatted`	string	Not supported.
`pi-formatted-numeric`	uint32	Not supported.
`power-on-hours`	unit32	The total number of hours that the disk has been powered on since it was manufactured. This value is stored in disk metadata and is updated in 30-minute increments.

Table 38 drives properties

Name	Type	Description
extended-status	uint64	A numeric value that supplements the standard SES status shown by the status and status-numeric properties, and represents a specific condition. • 0x00000000: OK • 0x00000001: Single-pathed, A down • 0x00000002: SSD exhausted • 0x00000004: Degraded warning • 0x00000008: Spun down • 0x00000010: Downed by user • 0x00000020: Reconstruction failed • 0x00000040: Leftover, no reason • 0x00000080: Previously missing • 0x00000100: Medium error • 0x00000200: SMART event • 0x00000400: Hardware failure • 0x00000800: Foreign disk unlocked • 0x00001000: Non-FDE disk • 0x00002000: FDE protocol failure • 0x00004000: Using alternate path • 0x00008000: Initialization failed • 0x00010000: Unsupported type • 0x00040000: Recovered errors • 0x00080000: Unexpected leftover • 0x00100000: Not auto-secured • 0x00200000: SSD nearly exhausted • 0x00400000: Degraded critical • 0x00800000: Single-pathed, B down • 0x01000000: Foreign disk secured • 0x02000000: Foreign disk secured and locked • 0x04000000: Unexpected usage • 0x08000000: Chassis fault sensed • 0x10000000: Unsupported block size • 0x20000000: Unsupported vendor • 0x40000000: Timed-out • 0x200000000: Preemptive pending degraded

Table 38 drives properties

Name	Type	Description
health	string	Disk health. • OK • Degraded • Fault • Unknown • N/A
health-numeric	uint32	Numeric equivalents for health values. • 0: OK • 1: Degraded • 2: Fault • 3: Unknown • 4: N/A
health-reason	string	If Health is not OK, the reason for the health state.
health-recommendation	string	If Health is not OK, the recommended actions to take to resolve the health issue.

email-parameters

This basetype is used by show email-parameters.

Table 39 email-parameters properties

Name	Type	Description
email-notification	string	Shows whether email (SMTP) notification of events is enabled. • Disabled: Email notification is disabled. • Enabled: Email notification is enabled.
email-notification-numeric	uint32	Numeric equivalents for email-notification values. • 0: Disabled • 1: Enabled

Table 39 email-parameters properties

Name	Type	Description
email-notification-filter	string	The minimum severity for which the system should send notifications: • crit: Sends notifications for Critical events only. • error: Sends notifications for Error and Critical events. • warn: Sends notifications for Warning, Error, and Critical events. • resolved: Sends notifications for Resolved, Warning, Error, and Critical events. • info: Sends notifications for all events. • none: Disables email notification. This parameter does not apply to managed-logs notifications.
email-notification-filter-numeric	uint32	Numeric equivalents for email-notification-filter values. • 0: info • 1: resolved • 2: warn • 3: error • 4: crit • 5: none
email-notify-address-1	string	Up to three email addresses for recipients of event notifications.
email-notify-address-2	string	
email-notify-address-3	string	
email-notify-address-4	string	Shows the email address for the log-collection system used by the log-management feature.
email-security-protocol	string	• TLS: Transport Layer Security (TLS) authentication is enabled. • SSL: Secure Sockets Layer (SSL) authentication is enabled. • None: No authentication is enabled.
email-security-protocol-numeric	uint32	Numeric equivalents for email-security-protocol values. • 0: None • 1: TLS • 2: SSL
email-smtp-port	string	The port on which the configured SMTP server is listening.
email-server	string	The IP address of the SMTP mail server to use for the email messages.
email-domain	string	The domain name that, with the sender name, forms the “from” address for remote notification.
email-sender	string	The sender name that, with the domain name, forms the “from” address for remote notification.

Table 39 email-parameters properties

Name	Type	Description
email-sender-password	string	The sender password.
persistent-alerts	string	Not applicable.
persistent-alerts-numeric	uint32	Not applicable.
include-logs	string	Shows whether system log files will automatically be attached for email notification messages generated by the log-management feature. This is the "push" mode of log management.
include-logs-numeric	uint32	Numeric equivalents for include-logs values. • 0: Disabled • 1: Enabled

enclosure-fru

This basetype is used by show configuration and show frus.

Table 40 enclosure-fru properties

Name	Type	Description
name	string	FRU name. • CHASSIS_MIDPLANE: Chassis and midplane circuit board • RAID_IOM: Controller module • BOD_IOM: Expansion module • POWER_SUPPLY: Power supply module • MEMORY CARD: CompactFlash card
description	string	FRU long description.
part-number	string	FRU part number.
serial-number	string	FRU serial number.
revision	string	FRU hardware revision level.
dash-level	string	FRU template revision number.
fru-shortname	string	FRU short description.
mfg-date	string	Date and time, in the format *year-month-day hour:minutes:seconds* (UTC), when a PCBA was programmed or a power supply module was manufactured.
mfg-date-numeric	uint32	Unformatted mfg-date value.
mfg-location	string	City, state/province, and country where the FRU was manufactured.
mfg-vendor-id	string	JEDEC ID (global manufacturing code) of the FRU manufacturer.

Table 40 enclosure-fru properties

Name	Type	Description
fru-location	string	Location of the FRU in the chassis. • MID-PLANE SLOT: Chassis midplane. • UPPER IOM SLOT: Controller module or expansion module A. • LOWER IOM SLOT: Controller module or expansion module B. • LEFT IOM SLOT: Controller module or expansion module A, in the left slot as viewed from the back. • RIGHT IOM SLOT: Controller module or expansion module B, in the right slot as viewed from the back. • LEFT PSU SLOT: Power supply module on the left, as viewed from the back. • RIGHT PSU SLOT: Power supply module on the right, as viewed from the back. • CONTROLLER A: Controller module A. • CONTROLLER B: Controller module B. • UPPER IOM MEMORY CARD SLOT: Memory card slot in controller module A. • LOWER IOM MEMORY CARD SLOT: Memory card slot in controller module B. • LEFT IOM MEMORY CARD SLOT: Memory card slot in controller module B. • RIGHT IOM MEMORY CARD SLOT: Memory card slot in controller module A.
configuration-serialnumber	string	Configuration serial number.
fru-status	string	• Absent: The FRU is not present. • Fault: The FRU's health is Degraded or Fault. • Invalid Data: The FRU ID data is invalid. The FRU's EEPROM is improperly programmed. • OK: The FRU is operating normally. • Power OFF: The FRU is powered off.
fru-status-numeric	uint32	• 0: Invalid Data • 1: Fault • 2: Absent • 3: Power OFF • 4: OK • 5: N/A
original-serialnumber	string	For a power supply module, the original manufacturer serial number. Otherwise, N/A.

Table 40 enclosure-fru properties

Name	Type	Description
original-partnumber	string	For a power supply module, the original manufacturer part number. Otherwise, N/A.
original-revision	string	For a power supply module, the original manufacturer hardware revision. Otherwise, N/A.
enclosure-id	uint32	Enclosure ID.

enclosure-list

This basetype is used by show configuration, and by show disks when the encl parameter is specified.

Table 41 enclosure-list properties

Name	Type	Description
status	string	Disk slot status. • Up: The disk is present and is properly communicating with the expander. • Spun Down: The disk is present and has been spun down by the drive spin down feature. • Warning: The disk is present but the system is having communication problems with the disk LED processor. For disk and midplane types where this processor also controls power to the disk, power-on failure will result in Error status. • Error: The disk is present but is not detected by the expander. • Unknown: Initial status when the disk is first detected or powered on. • Not Present: The disk slot indicates that no disk is present. • Unrecoverable: The disk is present but has unrecoverable errors. • Unavailable: The disk is present but cannot communicate with the expander. • Unsupported: The disk is present but is an unsupported type.
status-numeric	uint32	Numeric equivalents for status values. • 0: Unsupported • 1: Up • 2: Error • 3: Warning • 4: Unrecoverable • 5: Not Present • 6: Unknown • 7: Unavailable • 20: Spun Down

Table 41 enclosure-list properties

Name	Type	Description
enclosure-id	uint32	Enclosure ID.
slot	uint32	Disk slot number.
vendor	string	Disk vendor.
model	string	Disk model.
serial-number	string	Disk serial number.
size	string	Disk capacity, formatted to use the current base, precision, and units.
size-numeric	uint64	Unformatted size value in blocks.

enclosures

This basetype is used by show configuration and show enclosures.

Table 42 enclosures properties

Name	Type	Description
durable-id	string	Enclosure ID in the format enclosure_*number*.
enclosure-id	uint8	Enclosure ID.
enclosure-wwn	string	Chassis WWN.
name	string	Chassis name.
type	string	Internal name for the chassis type.
type-numeric	uint32	Numeric equivalents for type values.
iom-type	string	I/O module type.
iom-type-numeric	uint32	Numeric equivalents for iom-type values.
platform-type	string	Hardware platform type.
platform-type-numeric	uint32	Numeric equivalents for platform-type values.
board-model	string	Board model.
board-model-numeric	uint32	Numeric equivalents for board-model values.
location	string	Chassis location, or blank if not set.
rack-number	uint8	Number of the rack that contains the chassis.
rack-position	uint8	Position of the chassis in the rack.
number-of-coolings-elements	uint8	Number of fan units in the chassis.
number-of-disks	uint8	Number of disk slots (not installed disks) in the chassis.
number-of-power-supplies	uint8	Number of power supplies in the chassis.

Table 42 enclosures properties

Name	Type	Description
`status`	string	Chassis status. • `Unsupported` • `OK` • `Critical` • `Warning` • `Unrecoverable` • `Not Installed` • `Unknown` • `Unavailable`
`status-numeric`	uint32	Numeric equivalents for `status` values. • `0: Unsupported` • `1: OK` • `2: Critical` • `3: Warning` • `4: Unrecoverable` • `5: Not Installed` • `6: Unknown` • `7: Unavailable`
`extended-status`	hex32	A numeric value that supplements the standard SES status shown by the `status` and `status-numeric` properties, and represents a specific condition. • `0x01`: IOM A incompatible • `0x02`: IOM B incompatible
`midplane-serial-number`	string	Midplane serial number.
`vendor`	string	Chassis vendor.
`model`	string	Chassis model.
`fru-shortname`	string	FRU short description.
`fru-location`	string	FRU location. • `MID-PLANE SLOT`: Chassis midplane. • (blank): Not applicable.
`part-number`	string	FRU part number.
`mfg-date`	string	Date and time, in the format *`year-month-day hour:minutes:seconds`* (UTC), when a PCBA was programmed or a power supply module was manufactured.
`mfg-date-numeric`	uint32	Unformatted `mfg-date` value.
`mfg-location`	string	City, state/province, and country where the FRU was manufactured.

Table 42 enclosures properties

Name	Type	Description
description	string	FRU long description.
revision	string	Hardware revision level for the FRU.
dash-level	string	FRU template revision number.
emp-a-rev	string	Firmware revision of controller A's EMP.
emp-b-rev	string	Firmware revision of controller B's EMP.
rows	uint8	Number of rows of disk slots.
columns	uint8	Number of columns of disk slots.
slots	uint8	Number of disk slots in this chassis
locator-led	string	Shows the state of the locator LED on an chassis. • Off • On
locator-led-numeric	uint32	Numeric equivalents for locator-led values. • 0: Off • 1: On
drive-orientation	string	• vertical: Disks are oriented vertically. • horizontal: Disks are oriented horizontally.
drive-orientation-numeric	uint32	Numeric equivalents for drive-orientation values. • 0: vertical • 1: horizontal
enclosure-arrangement	string	• vertical: Disks are numbered vertically (by column from top to bottom, proceeding rightward). • horizontal: Disks are numbered horizontally (by row from left to right. proceeding downward).
enclosure-arrangement-numeric	uint32	Numeric equivalents for enclosure-arrangement values. • 0: vertical • 1: horizontal
emp-a-busid	string	SCSI channel ID of controller A's EMP.
emp-a-targetid	string	SCSI target ID of controller A's EMP.
emp-b-busid	string	SCSI channel ID of controller B's EMP.
emp-b-targetid	string	SCSI target ID of controller B's EMP.
emp-a	string	Shows the field name EMP A in console format.
emp-a-ch-id-rev	string	SCSI address and firmware revision of controller A's EMP.
emp-b	string	Shows the field name EMP B in console format.
emp-b-ch-id-rev	string	SCSI address and firmware revision of controller B's EMP.

Table 42 enclosures properties

Name	Type	Description
midplane-type	string	An abbreviation that describes the chassis midplane's rack-unit height, maximum number of disks, maximum data rate to disks (Gbit/s), and hardware version.
midplane-type-numeric	uint32	Numeric equivalents for midplane-type values.
midplane-rev	uint8	Midplane revision number.
enclosure-power	string	Chassis power in watts.
pcie2-capable	string	• False: Chassis is not capable of using PCI Express version 2. • True: Chassis is capable of using PCI Express version 2.
pcie2-capable-numeric	uint32	Numeric equivalents for pcie2-capable values. • 0: False • 1: True
health	string	• OK • Degraded • Fault • Unknown • N/A
health-numeric	uint32	Numeric equivalents for health values. • 0: OK • 1: Degraded • 2: Fault • 3: Unknown • 4: N/A
health-reason	string	If Health is not OK, the reason for the health state.
health-recommendation	string	If Health is not OK, the recommended actions to take to resolve the health issue.
unhealthy-component	Embedded; see unhealthy-component.	
drawer	Embedded; see drawers.	
controllers	Embedded; see controllers, io-modules.	
power-supplies	Embedded; see power-supplies.	
fan-modules	Embedded; see fan-modules.	
fan-details	Embedded; see fan.	

events

This basetype is used by show events.

Table 43 events properties

Name	Type	Description
time-stamp	string	Date and time, in the format *year-month-day hour:minutes:seconds* (UTC), when this event was detected.
time-stamp-numeric	uint32	Unformatted time-stamp value.
event-code	string	Event code. For event-code descriptions, see the Event Descriptions Reference Guide.
event-id	string	Event ID.
model	string	Controller model.
serial-number	string	Controller serial number.
controller	string	• A: Controller A. • B: Controller B.
controller-numeric	uint32	Numeric equivalents for controller values. • 0: B • 1: A
severity	string	Event severity. • CRITICAL: A failure occurred that may cause a controller to shut down. Correct the problem immediately. • ERROR: A failure occurred that may affect data integrity or system stability. Correct the problem as soon as possible. • WARNING: A problem occurred that may affect system stability but not data integrity. Evaluate the problem and correct it if necessary. • INFORMATIONAL: A configuration or state change occurred, or a problem occurred that the system corrected. No action is required. • RESOLVED: A condition that caused an event to be logged has been resolved.
severity-numeric	uint32	Numeric equivalents for severity values. • 0: INFORMATIONAL • 1: WARNING • 2: ERROR • 3: CRITICAL • 4: RESOLVED
message	string	Brief description of the event that occurred. For some events, the message includes data about affected components.

Table 43 events properties

Name	Type	Description
additional-information	string	Shows additional information, if available, about the event.
recommended-action	string	Recommends actions to take, if any, to resolve the issue reported by the event.

eventsLogs

This basetype is used by show events when the logs parameter is specified.

Table 44 eventsLogs properties

Name	Type	Description
event-id	string	Event ID prefaced by A or B to identify the controller that logged the event.
time-stamp	string	Date and time, in the format *year-month-day hour:minutes:seconds* (UTC), when this event was detected.
time-stamp-numeric	string	Unformatted time-stamp value.
event-code	string	Event code identifying the type of event to help diagnose problems.
severity	string	Event severity. • CRITICAL: A failure occurred that may cause a controller to shut down. Correct the problem immediately. • ERROR: A failure occurred that may affect data integrity or system stability. Correct the problem as soon as possible. • WARNING: A problem occurred that may affect system stability but not data integrity. Evaluate the problem and correct it if necessary. • INFORMATIONAL: A configuration or state change occurred, or a problem occurred that the system corrected. No action is required. • RESOLVED: A condition that caused an event to be logged has been resolved.
severity-numeric	uint32	Numeric equivalents for severity values. • 0: INFORMATIONAL • 1: WARNING • 2: ERROR • 3: CRITICAL • 4: RESOLVED
message	string	Message giving details about the event.

expander-ports

This basetype is used by show sas-link-health.

Table 45 expander-ports properties

Name	Type	Description
durable-id	string	Expander port ID.
enclosure-id	uint32	Enclosure ID.
controller	string	• A: Controller A. • B: Controller B.
controller-numeric	uint32	Numeric equivalents for controller values. • 0: B • 1: A
sas-port-type	string	• Drawer Port Egress • Drawer Port Ingress • Expansion Port Egress • Expansion Port Ingress • Expansion Port Universal
sas-port-type-numeric	uint32	Numeric equivalents for sas-port-type values. • 1: Drawer Port Egress • 2: Drawer Port Ingress • 3: Expansion Port Egress • 4: Expansion Port Ingress • 5: Expansion Port Universal
sas-port-index	uint32	The expander port index. For an IOM with two expansion ports, this value differentiates the two egress ports (0–1) and two ingress ports (0–1) for each path A and B. This value is appended to the port's durable-id value.
name	string	• Out Port: Egress (expansion) port on controller module or an expansion module. Can be connected to an ingress port in an expansion module. • In Port: Ingress port on an expansion module. Can be connected to an egress (expansion) port in a controller module or an expansion module. • Universal Port: Port that can function as either an egress or ingress port in a controller module or an expansion module.

Table 45 expander-ports properties

Name	Type	Description
status	string	Expander port status. • Up: The port is cabled and has an I/O link. • Warning: Not all of the port's PHYs are up. • Error: The port is reporting an error condition. • Not Present: The controller module is not installed or is down. • Disconnected: Either no I/O link is detected or the port is not cabled.
status-numeric	uint32	Numeric equivalents for status values. • 0: Up • 1: Warning • 2: Error • 3: Not Present • 4: Unknown • 6: Disconnected
health	string	• OK • Degraded • Fault • N/A • Unknown
health-numeric	uint32	Numeric equivalents for health values. • 0: OK • 1: Degraded • 2: Fault • 3: Unknown • 4: N/A
health-reason	string	If Health is not OK, the reason for the health state.
health-recommendation	string	If Health is not OK, the recommended actions to take to resolve the health issue.

expander-versions

This basetype is used by show versions with the `frus` parameter.

Table 46 expander-versions properties

Name	Type	Description
`name`	string	Expander name.
`location`	string	Expander location.
`enclosure-id`	uint32	Enclosure ID.
`drawer-id`	uint8	• `0`: Top • `1`: Bottom
`expander-id`	uint8	Expander ID.
`controller`	string	• `A`: Controller A. • `B`: Controller B.
`controller-numeric`	uint32	Numeric equivalents for `controller` values. • `0: B` • `1: A`
`fw-revision`	string	Expander firmware version, short form.
`fw-revision-full`	string	Expander firmware version, long form.
`vpd-format-version`	string	Vital Product Data (VPD) version.
`vpd-crc`	string	VPD CRC.
`cfg-format-version`	string	Configuration format version.
`cfg-crc`	string	CFG CRC.
`bootloader-version`	string	Boot loader version.
`cpld-version`	string	Complex Programmable Logic Device (CPLD) firmware version

expanders

This basetype is used by show enclosures.

Table 47 expanders properties

Name	Type	Description
`durable-id`	string	Expander ID.
`enclosure-id`	uint32	Enclosure ID.
`drawer-id` (5U84 chassis)	uint8	• `0`: Top • `1`: Bottom
`drawer-id` (2U12/24 chassis)	uint8	Not applicable (255).

Table 47 expanders properties

Name	Type	Description
dom-id	uint32	The expander position, shown as an index value that starts at 0 and increments from left to right as viewed from the back of the chassis.
path-id	string	• A: Controller A. • B: Controller B.
path-id-numeric	uint32	Numeric equivalents for path-id values. • 0: B • 1: A
name	string	Expander name.
location	string	Expander location.
status	string	Expander status. • Unsupported • OK • Critical • Warning • Unrecoverable • Not Installed • Unknown • Unavailable
status-numeric	uint32	Numeric equivalents for status values. • 0: Unsupported • 1: OK • 2: Critical • 3: Warning • 4: Unrecoverable • 5: Not Installed • 6: Unknown • 7: Unavailable
extended-status	hex32	Always 0 for this component.
fw-revision	string	Expander firmware revision.
health	string	• OK • Degraded • Fault • N/A • Unknown

Table 47 expanders properties

Name	Type	Description
health-numeric	uint32	Numeric equivalents for health values. • 0: OK • 1: Degraded • 2: Fault • 3: Unknown • 4: N/A
health-reason	string	If Health is not OK, the reason for the health state.
health-recommendation	string	If Health is not OK, the recommended action to take to resolve the health issue.
unhealthy-component	Embedded; see unhealthy-component.	
sas-port-details	Embedded; see expander-ports.	

fan

This basetype is used by show fans and show power-supplies.

Table 48 fan properties

Name	Type	Description
durable-id	string	Fan ID.
name	string	Fan name.
location	string	Fan location.
status-ses	string	Fan status. • Unsupported • OK • Critical • Warning • Unrecoverable • Not Installed • Unknown • Unavailable

Table 48 fan properties

Name	Type	Description
status-ses-numeric	uint32	Numeric equivalents for status-ses values. • 0: Unsupported • 1: OK • 2: Critical • 3: Warning • 4: Unrecoverable • 5: Not Installed • 6: Unknown • 7: Unavailable
extended-status	hex32	Always 0 for this component.
status	string	Fan unit status. • Up • Error • Off • Missing
status-numeric	uint32	Numeric equivalents for status values. • 0: Up • 1: Error • 2: Off • 3: Missing
speed	uint32	Fan speed (revolutions per minute).
position	string	Fan position, as viewed from the back of the chassis. • Left • Right • N/A
position-numeric	uint32	Numeric equivalents for position values. • 0: Left • 1: Right • 6: N/A
serial-number	string	• (blank): Not applicable.
part-number	string	• (blank): Not applicable.
fw-revision	string	• (blank): Not applicable. • Firmware revision of a fan FRU.
hw-revision	string	• (blank): Not applicable.

Table 48 fan properties

Name	Type	Description
locator-led	string	Shows the state of the locator LED on a fan unit. • Off • On
locator-led-numeric	uint32	Numeric equivalents for locator-led values. • 0: Off • 1: On
health	string	• OK • Degraded • Fault • N/A • Unknown
health-numeric	uint32	Numeric equivalents for health values. • 0: OK • 1: Degraded • 2: Fault • 3: N/A • 4: Unknown
health-reason	string	If Health is not OK, the reason for the health state.
health-recommendation	string	If Health is not OK, the recommended actions to take to resolve the health issue.

fan-modules

This basetype is used by show fan-modules.

Table 49 fan-modules properties

Name	Type	Description
durable-id	string	Fan module ID.
enclosure-id	uint32	Enclosure ID.
dom-id	uint32	The fan module position, shown as an index value that starts at 0 and increments from left to right as viewed from the back of the chassis.
name	string	Fan module name.
location	string	Fan module location.

Table 49 fan-modules properties

Name	Type	Description
status	string	Fan module status. • Unsupported • OK • Critical • Warning • Unrecoverable • Not Installed • Unknown • Unavailable
status-numeric	uint32	Numeric equivalents for status values. • 0: Unsupported • 1: OK • 2: Critical • 3: Warning • 4: Unrecoverable • 5: Not Installed • 6: Unknown • 7: Unavailable
extended-status	hex32	A numeric value that supplements the standard SES status shown by the status and status-numeric properties, and represents a specific condition.
position	string	Fan module position, as viewed from the back of the chassis. • Indexed
position-numeric	uint32	Numeric equivalents for position values. • 5: Indexed
health	string	• OK • Degraded • Fault • N/A • Unknown
health-numeric	uint32	Numeric equivalents for health values. • 0: OK • 1: Degraded • 2: Fault • 3: Unknown • 4: N/A

Table 49 fan-modules properties

Name	Type	Description
health-reason	string	If Health is not OK, the reason for the health state.
health-recommendation	string	If Health is not OK, the recommended action to take to resolve the health issue.
unhealthy-component	Embedded; see unhealthy-component.	
fan-details	Embedded; see fan.	

fc-port

This basetype is used by show ports for a Fibre Channel port.

Table 50 fc-port properties

Name	Type	Description
configured-topology	string	Configured topology. • Loop: Fibre Channel arbitrated loop (public or private). • PTP: Fibre Channel point-to-point. • Auto: Loop preferred, otherwise point-to-point, based on the detected connection type.
configured-topology-numeric	uint32	Numeric equivalents for configured-topology values. • 0: Loop • 1: PTP • 2: Auto
primary-loop-id	string	If the port is using loop topology and the port status is Up, this field shows the primary loop ID. If the port is not using loop topology or the port status is not Up, this field shows N/A.
sfp-status	string	SFP status. • OK • Not present: No SFP is inserted in this port. • Not compatible: The SFP in this port is not qualified for use in this system. When this condition is detected, event 464 is logged. • Incorrect protocol: The SFP protocol does not match the port protocol. When this condition is detected, event 464 is logged.
sfp-status-numeric	uint32	Numeric equivalents for sfp-status values. • 0: Not compatible • 1: Incorrect protocol • 2: Not present • 3: OK

Table 50 fc-port properties

Name	Type	Description
sfp-present	string	Shows whether the port contains an SFP. • Not Present • Present
sfp-present-numeric	uint32	Numeric equivalents for sfp-present values. • 0: Not Present • 1: Present
sfp-vendor	string	The SFP vendor.
sfp-part-number	string	The SFP part number.
sfp-revision	string	The SFP revision.
sfp-supported-speeds	string	The link speeds that the SFP supports.
sfp-supported-speeds-numeric	uint32	Numeric equivalents for sfp-supported-speeds values.

fde-state

This basetype is used by show fde-state.

Table 51 fde-state properties

Name	Type	Description
fde-security-status	string	Shows whether the system is secured or unsecured: • Unsecured: The system has not been secured with a passphrase. • Secured: The system has been secured with a passphrase. • Secured, Lock Ready: The system has been secured and lock keys have been cleared. The system will become locked after the next power cycle. • Secured, Locked: The system is secured and the disks are locked to data access, preventing their use.
fde-security-status-numeric	uint32	Numeric equivalents for fde-security-status values. • 1: Unsecured • 2: Secured • 3: Secured, Lock Ready • 4: Secured, Locked
lock-key-id	string	Current lock ID.
import-lock-key-id	string	The previous or import lock ID.

Table 51 fde-state properties

Name	Type	Description
fde-config-time	string	If the system is secured, the time at which the current lock ID was set in the format *year-month-day hour:minutes:seconds* (UTC).
fde-config-time-numeric	uint32	Unformatted fde-config-time value.

fenced-data

This basetype is used by show fenced-data.

Table 52 fenced-data properties

Name	Type	Description
volume	string	The volume name for which fenced data is reported.
volume-serial	string	The volume serial number for which fenced data is reported.
volume-lba	string	The LBA in the volume at which fenced data is reported.
virtual-disk	string	The name of the disk group for which fenced data is reported.
virtual-disk-serial	string	The serial number of the disk group for which fenced data is reported.
virtual-disk-lba	string	The LBA in the disk group at which fenced data is reported.

fru-versions

This basetype is used by show versions when the frus parameter is specified.

Table 53 fru-versions properties

Name	Type	Description
enclosure-id	uint32	The enclosure ID.
midplane-versions	Embedded; see midplane-versions.	
expander-versions	Embedded; see expander-versions.	
fan-module-versions	Embedded; see fan-modules.	
psu-versions	Embedded; see psu-versions.	

host

This basetype is used by show host-groups.

Table 54 host properties

Name	Type	Description
durable-id	string	Host ID.
name	string	The name of the host.
serial-number	string	The serial number of the host.
member-count	uint32	The number of initiators in the host.
host-group	uint32	If the host is a member of a host group, the serial number of the host group. Otherwise, UNGROUPEDHOSTS.
group-key	string	If the host is a member of a host group, the durable ID of the host group. Otherwise, HGU.
initiator	Embedded; see initiator.	

host-group

This basetype is used by show host-groups.

Table 55 host-group properties

Name	Type	Description
durable-id	string	Host group ID.
name	string	The name of the host group.
serial-number	string	The serial number of the host group.
member-count	uint32	The number of hosts in the host group.
host	Embedded; see host.	

host-group-view

This basetype is used by show maps when the initiator parameter is specified.

Table 56 host-group-view properties

Name	Type	Description
durable-id	string	Host group ID.
serial-number	string	The serial number of the host group.
group-name	string	The name of the host group in the format host-group.*.*, where the first * represents all hosts in the group and the second * represents all initiators in those hosts.

Table 56 host-group-view properties

Name	Type	Description
host-profile	string	• Standard: Default profile. • HP-UX: The host uses Flat Space Addressing. • OpenVMS: The initiator does not allow LUN 0 to be assigned to a mapping.
host-profile-numeric	uint32	Numeric equivalents of host-profile values. • 0: Standard • 1: HP-UX • 2: OpenVMS
host-view-mappings	Embedded; see host-view-mappings.	

host-port-statistics

This basetype is used by show host-port-statistics.

Table 57 host-port-statistics properties

Name	Type	Description
durable-id	string	Host port ID in the format hostport_*controller-ID-and-port-number*.
bytes-per-second	string	The data transfer rate, in bytes per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.
bytes-per-second-numeric	uint64	Unformatted bytes-per-second value.
iops	uint32	Input/output operations per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.
number-of-reads	uint64	Number of read operations since these statistics were last reset or since the controller was restarted.
number-of-writes	uint64	Number of write operations since these statistics were last reset or since the controller was restarted.
data-read	string	Amount of data read since these statistics were last reset or since the controller was restarted.
data-read-numeric	uint64	Unformatted data-read value.
data-written	string	Amount of data written since these statistics were last reset or since the controller was restarted.
data-written-numeric	uint64	Unformatted data-written value.
queue-depth	uint32	The number of pending I/O operations currently being serviced.

Table 57 host-port-statistics properties

Name	Type	Description
avg-rsp-time	uint32	Average response time in microseconds for read and write operations, calculated over the interval since these statistics were last requested or reset.
avg-read-rsp-time	uint32	Average response time, in microseconds, for all read operations, calculated over the interval since these statistics were last requested or reset
avg-write-rsp-time	uint32	Average response time, in microseconds, for all write operations, calculated over the interval since these statistics were last requested or reset.
reset-time	string	Date and time, in the format *year-month-day hour:minutes:seconds*, when these statistics were last reset, either by a user or by a controller restart.
reset-time-numeric	uint32	Unformatted reset-time value.
start-sample-time	string	Date and time, in the format year-month-day hour:minutes:seconds, when sampling started for the iops and bytes-per-second values.
start-sample-time-numeric	uint32	Unformatted start-sample-time value.
stop-sample-time	string	Date and time, in the format year-month-day hour:minutes:seconds, when sampling stopped for the iops and bytes-per-second values.
stop-sample-time-numeric	uint32	Unformatted stop-sample-time value.

host-view-mappings

This basetype is used by show maps when the initiator parameter is specified.

Table 58 host-view-mappings properties

Name	Type	Description
volume-name	string	Volume name.
volume-serial	string	Volume serial number.
lun	string	LUN assigned to the mapping.
access	string	Type of host access to the volume. • read-write: Read and write. • read-only: Read only. • no-access: No access (masked). • not-mapped: Not mapped.

Table 58 host-view-mappings properties

Name	Type	Description
access-numeric	uint32	Numeric equivalents of access values. • 0: not-mapped • 1: no-access • 2: read-only • 3: read-write
ports	string	Controller host ports assigned to the mapping.

initiator

This basetype is used by show initiators.

Table 59 initiator properties

Name	Type	Description
durable-id	string	Initiator ID.
nickname	string	The nickname of the initiator, or blank.
discovered	string	• Yes: The initiator was discovered and its entry was automatically created. • No: The initiator was manually created.
mapped	string	• Yes: At least one volume is explicitly mapped to the initiator. • No: No volumes are explicitly mapped to the initiator.
profile	string	• Standard: Default profile. • HP-UX: The host uses Flat Space Addressing. • OpenVMS: The initiator does not allow LUN 0 to be assigned to a mapping.
profile-numeric	uint32	Numeric equivalents of profile values. • 0: Standard • 1: HP-UX • 2: OpenVMS
host-bus-type	string	• If the host was discovered and its entry was automatically created, its host interface type: FC; iSCSI; SAS. • If the host entry was manually created: Undefined.
host-bus-type-numeric	uint32	Numeric equivalents of host-bus-type values. • 0: UNKNOWN • 6: FC • 8: SAS • 9: iSCSI

Table 59 initiator properties

Name	Type	Description
id	string	• For an FC initiator, its WWPN. • For a SAS initiator, its WWPN. • For an iSCSI initiator, its node name (typically the IQN).
host-id	string	If the initiator is a member of a host, the serial number of the host. Otherwise, NOHOST.
host-key	string	If the initiator is a member of a host, the durable ID of the host. Otherwise, HU.
host-port-bits-a	uint32	For internal use only.
host-port-bits-b	uint32	For internal use only.

initiator-view

This basetype is used by show maps when the initiator parameter is specified.

Table 60 initiator-view properties

Name	Type	Description
id	string	• For an FC initiator, its WWPN. • For a SAS initiator, its WWPN. • For an iSCSI initiator, its node name (typically the IQN).
hba-nickname	string	The nickname of the initiator.
host-profile	string	• Standard: Default profile. • HP-UX: The host uses Flat Space Addressing. • OpenVMS: The initiator does not allow LUN 0 to be assigned to a mapping.
host-profile-numeric	uint32	Numeric equivalents of host-profile values. • 0: Standard • 1: HP-UX • 2: OpenVMS
host-view-mappings	Embedded; see host-view-mappings.	

inquiry

This basetype is used by show inquiry.

Table 61 inquiry properties

Name	Type	Description
mc-fw	string	Management Controller firmware version.
mc-loader	string	Management Controller loader firmware version.
sc-fw	string	Storage Controller firmware version.
sc-loader	string	Storage Controller loader firmware version.
serial-number	string	Controller serial number.
mac-address	string	Controller network port MAC address.
ip-address	string	Controller network port IP address.
nvram-defaults	string	For internal use only.

io-modules

This basetype is used by show enclosures for an expansion module.

Table 62 io-modules properties

Name	Type	Description
durable-id	string	Expansion module ID.
controller-id	string	• A: Controller A. • B: Controller B.
controller-id-numeric	uint32	Numeric equivalents for controller-id values. • 0: B • 1: A
name	string	FRU name.
description	string	FRU long description.
part-number	string	FRU part number.
serial-number	string	FRU serial number.
revision	string	FRU hardware revision level.
dash-level	string	FRU template revision number.
fru-shortname	string	FRU short description.
mfg-date	string	Date and time, in the format *year-month-day hour:minutes:seconds* (UTC), when the controller's PCBA was programmed or a power supply module was manufactured.
mfg-date-numeric	uint32	Unformatted mfg-date value.
mfg-location	string	City, state/province, and country where the FRU was manufactured.

Table 62 io-modules properties

Name	Type	Description
mfg-vendor-id	string	JEDEC ID of the FRU manufacturer.
position	string	FRU position, as viewed from the back of the chassis. • Left • Right • Top • Bottom
position-numeric	uint32	Numeric equivalents for position values. • 0: Left • 1: Right • 2: Top • 3: Bottom
rotation	string	Rotation of the controller module in the chassis. • 0 Degrees • 90 Degrees • 180 Degrees • 270 Degrees
rotation-numeric	uint32	Numeric equivalents for position values. • 0: 0 Degrees • 1: 90 Degrees • 2: 180 Degrees • 3: 270 Degrees
configuration-serialnumber	string	Configuration serial number.
phy-isolation	string	Shows whether the automatic disabling of SAS expander PHYs having high error counts is enabled or disabled for this controller. • Enabled: PHY fault isolation is enabled. • Disabled: PHY fault isolation is disabled.
phy-isolation-numeric	uint32	Numeric equivalents for phy-isolation values. • 0: Enabled • 1: Disabled
locator-led	string	Shows the state of the locator LED on an expansion module. • Off • On
locator-led-numeric	uint32	Numeric equivalents for locator-led values. • 0: Off • 1: On

Table 62 io-modules properties

Name	Type	Description
status	string	• Operational • Down • Not installed • Unknown
status-numeric	uint32	Numeric equivalents for status values. • 0: Operational • 1: Down • 2: Not installed • 3: Unknown
health	string	• OK • Degraded • Fault • N/A • Unknown
health-numeric	uint32	Numeric equivalents for health values. • 0: OK • 1: Degraded • 2: Fault • 3: Unknown • 4: N/A
health-reason	string	If Health is not OK, the reason for the health state.
health-recommendation	string	If Health is not OK, the recommended action to take to resolve the health issue.
unhealthy-component	Embedded; see unhealthy-component.	
enclosure-id	Embedded; see expander-ports.	
expander-details	Embedded; see expanders.	

iom-versions

This basetype is used by show versions when the `frus` parameter is specified.

Table 63 iom-versions properties

Name	Type	Description
`name`	string	Expansion IOM name in the format `IOM` *`enclosure-ID, position`*.
`fw-revision`	string	IOM firmware version, short form.
`fw-revision-full`	string	IOM firmware version, long form.
`vpd-format-version`	string	Vital Product Data (VPD) version.
`vpd-crc`	string	VPD CRC.
`cfg-format-version`	string	Configuration format version.
`cfg-crc`	string	CFG CRC.
`bootloader-version`	string	Boot loader version.
`cpld-version`	string	Complex Programmable Logic Device (CPLD) firmware version.
`fru-descriptor`	string	FRU descriptor.
`part-number`	string	IOM part number.
`iom-serial-number`	string	IOM serial number.

iscsi-parameters

This basetype is shown by show iscsi-parameters.

Table 64 iscsi-parameters properties

Name	Type	Description
`chap`	string	Shows whether Challenge-Handshake Authentication Protocol (CHAP) is enabled. • `Enabled`: CHAP is enabled. • `Disabled`: CHAP is disabled.
`chap-numeric`	uint32	Numeric equivalents for `chap` values. • `0: Disabled` • `1: Enabled`
`jumbo-frames`	string	Shows whether support for jumbo frames is enabled. • `Enabled`: Jumbo-frame support is enabled. • `Disabled`: Jumbo-frame support is disabled.
`jumbo-frames-numeric`	uint32	Numeric equivalents for `jumbo-frames` values. • `0: Disabled` • `1: Enabled`

Table 64 iscsi-parameters properties

Name	Type	Description
isns	string	Shows whether support for Internet Storage Name Service (iSNS) is enabled. • Enabled: iSNS is enabled. • Disabled: iSNS is disabled.
isns-numeric	uint32	Numeric equivalents for isns values. • 0: Disabled • 1: Enabled
isns-ip	string	Address of the iSNS server. The default address is all zeroes.
isns-alt-ip	string	Address of the alternate iSNS server. The default address is all zeroes.
iscsi-speed	string	iSCSI host port link speed. • auto: The proper speed is auto-negotiated. • 1Gbps: The speed is forced to 1 Gbit/s, overriding a downshift that can occur during auto-negotiation with 1-Gbit/s HBAs. This setting does not apply to 10-Gbit/s HBAs.
iscsi-speed-numeric	uint32	Numeric equivalents for iscsi-speed values. • 0: auto • 1: 1Gbps
iscsi-ip-version	uint8	iSCSI IP version. • 4: iSCSI host port addresses use IPv4 format. • 6: iSCSI host port addresses use IPv6 format.

iscsi-port

This basetype is used by show ports for an iSCSI host port.

Table 65 iscsi-port properties

Name	Type	Description
ip-version	string	iSCSI IP version. • IPv4: iSCSI host port addresses use IPv4 format. • IPv6: iSCSI host port addresses use IPv6 format.
ip-address	string	Assigned port IP address.
gateway	string	For IPv4, gateway IP address for assigned IP address.
netmask	string	For IPv4, subnet mask for assigned IP address.
default-router	string	For IPv6, default router for the assigned IP address.
link-local-address	string	For IPv6, the link-local address that is automatically generated from the MAC address and assigned to the port.

Table 65 iscsi-port properties

Name	Type	Description
mac-address	string	Unique Media Access Control (MAC) hardware address, also called the physical address.
sfp-status	string	SFP status. • OK • Not present: No SFP is inserted in this port. • Not compatible: The SFP in this port is not qualified for use in this system. When this condition is detected, event 464 is logged. • Incorrect protocol: The SFP protocol does not match the port protocol. When this condition is detected, event 464 is logged.
sfp-status-numeric	uint32	Numeric equivalents for sfp-status values. • 0: Not compatible • 1: Incorrect protocol • 2: Not present • 3: OK
sfp-present	string	Shows whether the port contains an SFP. • Not Present • Present
sfp-present-numeric	uint32	Numeric equivalents for sfp-present values. • 0: Not Present • 1: Present
sfp-vendor	string	The SFP vendor.
sfp-part-number	string	The SFP part number.
sfp-revision	string	The SFP revision.
sfp-10G-compliance	string	The SFP's 10G compliance code, if supported, or No Support.
sfp-10G-compliance-numeric	uint32	Numeric equivalents of sfp-10G-compliance values.
sfp-ethernet-compliance	string	The SFP's Ethernet compliance code, if supported, or No Support.
sfp-ethernet-compliance-numeric	uint32	Numeric equivalents of sfp-ethernet-compliance values.
sfp-cable-technology	string	Shows whether the SFP supports active or passive cable technology.
sfp-cable-technology-numeric	uint32	Numeric equivalents of sfp-cable-technology values.
sfp-cable-length	uint8	The link length (in meters) that is supported by the SFP while operating in compliance with applicable standards for the cable type.

license

This basetype is used by show license.

Table 66 license properties

Name	Type	Description
`license-key`	string	• The license key, if a license is installed and valid. • Blank if a license is not installed.
`license-serial-number`	string	The serial number to use when requesting a license.
`platform-max-snapshots`	uint32	Maximum number of snapshots that the highest-level license allows.
`base-max-snapshots`	uint32	Maximum number of snapshots allowed without an installed license.
`max-snapshots`	uint32	Maximum number of snapshots allowed by the installed license.
`in-use-snapshots`	uint32	Number of existing licensed snapshots.
`max-snapshots-expiry`	string	Shows when the snapshot license will expire. • `Never`: License doesn't expire. • *`days`*: Number of days remaining for a temporary license. • `Expired`: Temporary license has expired and cannot be renewed.
`max-snapshots-expiry-numeric`	uint32	Numeric equivalents for `max-snapshots-expiry` values. • `0: Never` • `255: Expired` • *`days`*: Number of days remaining
`virtualization`	string	Shows whether the capability to create and manage virtual pools is enabled or disabled. • `Disabled`: The capability is disabled. • `Enabled`: The capability is enabled.
`virtualization-numeric`	uint32	Numeric equivalents for `virtualization` values. • `0: Disabled` • `1: Enabled`
`virtualization-expiry`	string	Shows when the virtualization license will expire. • `Never`: License is purchasable and doesn't expire.
`virtualization-expiry-numeric`	uint32	Numeric equivalents for `virtualization-expiry` values. • `0: Never`
`performance-tier`	string	Shows whether the capability to create a Performance tier comprised of SSDs is enabled or disabled. • `Disabled`: The capability is disabled. • `Enabled`: The capability is enabled.

Table 66 license properties

Name	Type	Description
performance-tier-numeric	uint32	Numeric equivalents for performance-tier values. • 0: Disabled • 1: Enabled
performance-tier-expiry	string	Shows when the performance tier license will expire. • Never: License is purchasable and doesn't expire. • *days*: Number of days remaining for a temporary license. • Expired: Temporary license has expired and cannot be renewed.
performance-tier-expiry-numeric	uint32	Numeric equivalents for performance-tier-expiry values. • 0: Never • 255: Expired • *days*: Number of days remaining
volume-copy	string	Shows whether the capability to copy volumes is enabled or disabled. • Disabled: The capability is disabled. • Enabled: The capability is enabled.
volume-copy-numeric	uint32	Numeric equivalents for volume-copy values. • 0: Disabled • 1: Enabled
volume-copy-expiry	string	Shows when the volume copy license will expire. • Never: Always enabled and doesn't expire.
volume-copy-expiry-numeric	uint32	Numeric equivalents for volume-copy-expiry values. • 0: Never
remote-snapshot-replication	string	Shows whether the capability to replicate volumes to a remote system is enabled or disabled. • Disabled: The capability is disabled. • Enabled: The capability is enabled.
remote-snapshot-replication-numeric	uint32	Numeric equivalents for remote-snapshot-replication values. • 0: Disabled • 1: Enabled
remote-snapshot-replication-expiry	string	Shows when the volume replication feature will expire. • Never: License is purchasable and doesn't expire. • *days*: Number of days remaining for a temporary license. • Expired: Temporary license has expired and cannot be renewed.

Table 66 license properties

Name	Type	Description
remote-snapshot-replication-expiry-numeric	uint32	Numeric equivalents for remote-snapshot-replication values. • 0: Never • 255: Expired • *days*: Number of days remaining
vds	string	Shows whether the VDS (Virtual Disk Service) Hardware Provider is enabled. • Disabled: VDS is disabled. • Enabled: VDS is enabled.
vds-numeric	uint32	Numeric equivalents for vds values. • 0: Disabled • 1: Enabled
vds-expiry	string	Shows when the VDS (Virtual Disk Service) Hardware Provider will expire. • Never: License and doesn't expire. • *days*: Number of days remaining for a temporary license. • Expired: Temporary license has expired and cannot be renewed.
vds-expiry-numeric	uint32	Numeric equivalents for vds-expiry values. • 0: Never • 255: Expired • *days*: Number of days remaining
vss	string	Shows whether the VSS (Volume Shadow Copy Service) Hardware Provider is enabled. • Disabled: VSS is disabled. • Enabled: VSS is enabled.
vss-numeric	uint32	Numeric equivalents for vss values. • 0: Disabled • 1: Enabled
vss-expiry	string	Shows when the VSS (Volume Shadow Copy Service) Hardware Provider will expire. • Never: License and doesn't expire. • *days*: Number of days remaining for a temporary license. • Expired: Temporary license has expired and cannot be renewed.
vss-expiry-numeric	uint32	Numeric equivalents for vss-expiry values. • 0: Never • 255: Expired • *days*: Number of days remaining

Table 66 license properties

Name	Type	Description
`dsd`	string	Shows whether the Drive Spin Down (DSD) feature is enabled. • `Disabled`: DSD is disabled. • `Enabled`: DSD is enabled.
`dsd-numeric`	uint32	Numeric equivalents for `dsd` values. • `0: Disabled` • `1: Enabled`
`dsd-expiry`	string	Shows when the Drive Spin Down (DSD) feature will expire. • `Never`: Always enabled and doesn't expire.
`dsd-expiry-numeric`	uint32	Numeric equivalents for `dsd-expiry` values. • `0: Never`
`sra`	string	Shows whether Storage Replication Adapter (SRA) support is enabled. • `Disabled`: SRA is disabled. • `Enabled`: SRA is enabled.
`sra-numeric`	uint32	Numeric equivalents for `sra` values. • `0: Disabled` • `1: Enabled`
`sra-expiry`	string	Shows when the SRA feature will expire. • `Never`: License and doesn't expire. • *`days`*: Number of days remaining for a temporary license. • `Expired`: Temporary license has expired and cannot be renewed.
`sra-expiry-numeric`	uint32	Numeric equivalents for `sra-expiry` values. • `0: Never` • `255: Expired` • *`days`*: Number of days remaining

local-ports

This basetype is used by show peer-connections.

Table 67 local-ports properties

Name	Type	Description
`local-host-port`	string	The ID of the port in the local system.
`port-address`	string	The assigned port address.

local-ports-detail

This basetype is used by show peer-connections when the `verify-links` parameter is specified.

Table 68 local-ports-detail properties

Name	Type	Description
`local-host-port`	string	The ID of the port in the local system.
`port-address`	string	The assigned port address.
`remote-links`	string	The IDs of linked ports in the remote system.

log-header-table

This basetype is used in the log file downloaded from the system by using the Disk Management Utility or FTP.

Table 69 log-header-table properties

Name	Type	Description
`log-contact`	string	Contact person's name, if specified in the Disk Management Utility Save Logs panel.
`log-email`	string	Contact's email address, if specified in the Disk Management Utility Save Logs panel.
`log-phone`	string	Contact's phone number, if specified in the Disk Management Utility Save Logs panel.
`log-comments`	string	Comments describing the problem and specifying the date and time when the problem occurred, if specified in the Disk Management Utility Save Logs panel.
`log-content`	uint32	For internal use only.
`log-timestamp`	string	Date and time, in the format *`year-month-day hour:minutes:seconds`* (UTC), when log content was saved to the file.
`log-timestamp-numeric`	uint32	Unformatted `log-timestamp` value.

midplane-versions

This basetype is used by show versions when the `frus` parameter is specified.

Table 70 midplane-versions properties

Name	Type	Description
`vpd-format-version`	string	Vital Product Data (VPD) version.
`vpd-crc`	string	VPD CRC.
`cfg-mismatch-version`	string	Configuration mismatch version.
`cpld-version`	string	Complex Programmable Logic Device (CPLD) firmware version.
`fru-descriptor`	string	FRU descriptor.
`part-number`	string	Midplane part number.
`midplane-serial-number`	string	Midplane serial number.

network-parameters

This basetype is used by show network-parameters.

Table 71 network-parameters properties

Name	Type	Description
`durable-id`	string	Controller network port ID in the format `mgmtport_`*`controller-ID`*`.`
`active-version`	uint32	The configured network port IP version. • `4`: IPv4
`ip-address`	string	Controller network port IP address.
`gateway`	string	Controller network port gateway IP address
`subnet-mask`	string	Controller network port IP subnet mask
`mac-address`	string	Controller network port MAC address.
`addressing-mode`	string	• `Manual`: Network settings are set manually (statically). • `DHCP`: DHCP is used to set network parameters.
`addressing-mode-numeric`	uint32	Numeric equivalents for `addressing-mode` values. • `1: Manual` • `2: DHCP`
`link-speed`	string	• `Unknown`: For a system operating in Single Controller mode, this controller module is not present. • `10mbps`: The network port link speed is set to 10 Mb/s. • `100mbps`: The network port link speed is set to 100 Mb/s. • `1000mbps`: The network port link speed is set to 1000 Mb/s.

Table 71 network-parameters properties

Name	Type	Description
link-speed-numeric	uint32	Numeric equivalents for link-speed values. • 0: 10mbps • 1: 100mbps • 2: 1000mbps
duplex-mode	string	• Undefined: For a system operating in Single Controller mode, this controller module is not present. • Half: The network port duplex mode is set to half duplex. • Full: The network port duplex mode is set to full duplex.
duplex-mode-numeric	uint32	Numeric equivalents for duplex-mode values. • 0: full • 1: half • 2: Undefined
auto-negotiation	string	Not applicable.
auto-negotiation-numeric	uint32	Not applicable.
health	string	The health of the network connection. • OK • Degraded • Fault • N/A • Unknown
health-numeric	uint32	Numeric equivalents for health values. • 0: OK • 1: Degraded • 2: Fault • 3: Unknown • 4: N/A
health-reason	string	If Health is not OK, the reason for the health state.
health-recommendation	string	If Health is not OK, the recommended actions to take to resolve the health issue.
ping-broadcast	string	• Enabled: The system will respond to a broadcast ping. • Disabled: The system will not respond to a broadcast ping.
ping-broadcast-numeric	uint32	Numeric equivalents for ping-broadcast values. • 0: Disabled • 1: Enabled

ntp-status

This basetype is used by show ntp-status.

Table 72 ntp-status properties

Name	Type	Description
`ntp-status`	string	Shows whether use of Network Time Protocol (NTP) is enabled. • `activated`: NTP is enabled. • `deactivated`: NTP is disabled.
`ntp-server-address`	string	• The current NTP server IP address if NTP is enabled. • The last-set NTP server IP address if NTP was enabled and has been disabled. • `0.0.0.0` if the NTP server IP address has not been set.
`ntp-contact-time`	string	• Date and time, in the format *`year-month-day hour:minutes:seconds`* (UTC), of the last message received from the NTP server. • `none`: No contact.

peer-connection-info

This basetype is used by query peer-connection.

Table 73 peer-connection-info properties

Name	Type	Description
`system-name`	string	The name of the system.
`system-contact`	string	The name of the person who administers the system.
`system-location`	string	The location of the system.
`system-information`	string	A brief description of what the system is used for or how it is configured.
`midplane-serial-number`	string	The serial number of the controller chassis midplane.
`vendor-name`	string	The vendor name.
`product-id`	string	The product model identifier.
`license-key` and other license properties	See license.	
`peer-controllers`	Embedded; see peer-controllers.	

peer-connections

This basetype is used by show peer-connections.

Table 74 peer-connections properties

Name	Type	Description
peer-connection-name	string	The name of the peer connection.
serial-number	string	The serial number of the peer connection.
connection-type	string	The type of ports being used for the peer connection: • FC • iSCSI
connection-type-numeric	uint32	Numeric equivalents for connection-type values. • 1: FC • 2: iSCSI
connection-status	string	• Online: The systems have a valid connection. • Offline: No connection is available to the remote system.
connection-status-numeric	uint32	Numeric equivalents for connection-status values.
health	string	• OK • Fault • Unknown
health-numeric	uint32	Numeric equivalents for health values. • 0: OK • 1: Degraded • 2: Fault • 3: Unknown • 4: N/A
health-reason	string	If Health is not OK, this field shows the reason for the health state.
health-recommendation	string	If Health is not OK, this field shows recommended actions to take to resolve the health issue.
local-ports	Embedded; see local-ports.	
remote-ports	Embedded; see remote-ports.	

peer-controllers

This basetype is used by query peer-connection.

Table 75 peer-controllers properties

Name	Type	Description
`controller`	string	• `A`: Controller A. • `B`: Controller B.
`controller-numeric`	uint32	Numeric equivalents for `controller` values. • `0: A` • `1: B`
`sc-fw`	string	Storage Controller firmware version.
`sc-loader`	string	Storage Controller loader firmware version.
`mc-fw`	string	Management Controller firmware version.
`mc-loader`	string	Management Controller loader firmware version
`ec-fw`	string	Controller firmware version.
`pld-rev`	string	Complex Programmable Logic Device (CPLD) firmware version.
`hw-rev`	string	Controller hardware version.
`ip-address`	string	Controller network port IP address.
`local-ports`	Embedded; see peer-ports.	

peer-ports

This basetype is used by query peer-connection.

Table 76 peer-ports properties

Name	Type	Description
`local-host-port`	string	The ID of the port in the local system.
`connection-type`	string	The type of ports being used for the peer connection: • `iSCSI`
`connection-type-numeric`	uint32	Numeric equivalents for `connection-type` values. • `2: iSCSI`
`host-port-health`	string	• `OK` • `Degraded` • `Fault` • `N/A`

Table 76 peer-ports properties

Name	Type	Description
host-port-health-numeric	uint32	Numeric equivalents for health values. • 0: OK • 1: Degraded • 2: Fault • 3: Unknown • 4: N/A
port-address	string	The assigned port address.
local-links	string	The IDs of linked ports in the local system

pool-hist-statistics

This basetype is used by show pool-statistics when the historical parameter is specified.

Table 77 pool-hist-statistics properties

Name	Type	Description
number-of-ios	uint64	The total number of read and write operations since the last sampling time.
number-of-reads	uint64	The number of read operations since the last sampling time.
number-of-writes	uint64	The number of write operations since the last sampling time.
total-data-transferred	string	The total amount of data read and written since the last sampling time.
total-data-transferred-numeric	uint64	Unformatted total-data-transferred value.
data-read	string	The amount of data read since the last sampling time.
data-read-numeric	uint64	The amount of data written since the last sampling time.
data-written	string	The amount of data written since the last sampling time.
data-written-numeric	uint64	The amount of data written since the last sampling time.
total-iops	uint64	The total number of read and write operations per second since the last sampling time.
read-iops	uint64	The number of read operations per second since the last sampling time.
write-iops	uint64	The number of write operations per second since the last sampling time.
total-bytes-per-sec	string	The total data transfer rate, in bytes per second, since the last sampling time.
total-bytes-per-sec-numeric	uint64	Unformatted total-bytes-per-second value.

Table 77 pool-hist-statistics properties

Name	Type	Description
read-bytes-per-sec	string	The data transfer rate, in bytes per second, for read operations since the last sampling time.
read-bytes-per-sec-numeric	uint64	Unformatted read-bytes-per-second value.
write-bytes-per-sec	string	The data transfer rate, in bytes per second, for write operations since the last sampling time.
write-bytes-per-sec-numeric	uint64	Unformatted write-bytes-per-second value.
number-of-allocated-pages	uint64	The number of 4-MB pages allocated to volumes in the pool.
sample-time	string	Date and time, in the format *year-month-day hour:minutes:seconds*, when the data sample was taken.
sample-time-numeric	uint32	Unformatted sample-time value.

pool-statistics

This basetype is used by show pool-statistics.

Table 78 pool-statistics properties

Name	Type	Description
sample-time	string	Date and time, in the format *year-month-day hour:minutes:seconds*, when the data sample was taken.
sample-time-numeric	uint32	Unformatted sample-time value.
serial-number	string	The serial number of the pool.
pool	string	The name of the pool.
pages-alloc-per-minute	uint32	The rate, in pages per minute, at which pages are allocated to volumes in the pool because they need more space to store data.
pages-alloc-per-hour	uint32	The rate, in pages per hour, at which pages are allocated to volumes in the pool because they need more space to store data.
pages-dealloc-per-minute	uint32	The rate, in pages per minute, at which pages are deallocated from volumes in the pool because they no longer need the space to store data.
pages-dealloc-per-hour	uint32	The rate, in pages per hour, at which pages are deallocated from volumes in the pool because they no longer need the space to store data.
num-pages-unmap-per-minute	uint32	The number of 4-MB pages that host systems have unmapped per minute, through use of the SCSI UNMAP command, to free storage space as a result of deleting files or formatting volumes on the host.
num-pages-unmap-per-hour	uint32	The number of 4-MB pages that host systems have unmapped per hour, through use of the SCSI UNMAP command, to free storage space as a result of deleting files or formatting volumes on the host.

Table 78 pool-statistics properties

Name	Type	Description
num-blocked-ssd-promotions-per-minute	uint32	The rate, in pages per minute, at which pages cannot be moved to SSD. A consistent non-zero rate may indicate the SSD tier is too small for the current workload.
num-blocked-ssd-promotions-per-hour	uint32	The rate, in pages per hour, at which pages cannot be moved to SSD. A consistent non-zero rate may indicate the SSD tier is too small for the current workload.
num-page-allocations	uint64	The number of pages allocated to volumes in the pool because they need more space to store data.
num-page-deallocations	uint64	The number of pages deallocated from volumes in the pool because they no longer need the space to store data.
num-page-unmaps	uint64	The number of 4-MB pages that host systems have unmapped since statistics were last reset.
num-page-promotions-to-ssd-blocked	uint64	The number of pages that could not be moved to SSD since statistics were last reset.
num-hot-page-moves	uint64	The number of "hot" pages promoted from lower tiers to higher tiers since statistics were last reset.
num-cold-page-moves	uint64	The number of "cold" pages promoted from lower tiers to higher tiers since statistics were last reset.
resettable-statistics	Embedded; see resettable-statistics.	
tier-statistics	Embedded; see tier-statistics.	

pool-summary

This basetype is used by show pool-statistics when the `historical` parameter is specified.

Table 79 pool-summary properties

Name	Type	Description
serial-number	string	The serial number of the pool.
pool	string	The name of the pool.
pool-hist-statistics	Embedded; see pool-hist-statistics.	

pools

This basetype is used by show configuration and show pools.

Table 80 pools properties

Name	Type	Description
name	string	The name of the pool.
serial-number	string	The serial number of the pool.
storage-type	string	• Linear: Linear pool. • Virtual: Virtual pool.
storage-type-numeric	uint32	Numeric equivalents for storage-type values. • 0: Linear • 1: Virtual
blocksize	uint32	The size of a block, in bytes.
total-size	string	The total capacity of the pool.
total-size-numeric	unit64	Unformatted total-size value in blocks.
total-avail	string	The available capacity in the pool.
total-avail-numeric	unit64	Unformatted total-avail value in blocks.
snap-size	string	Not applicable.
snap-size-numeric	unit64	Not applicable.
allocated-pages	uint32	For a virtual pool, the number of 4-MB pages that are currently in use. For a linear pool, 0.
available-pages	uint32	For a virtual pool, the number of 4-MB pages that are still available to be allocated. For a linear pool, 0.
overcommit	string	• Disabled: The capacity allocated to volumes when they are created cannot exceed the physical capacity of the pool. • Enabled: The pool uses thin provisioning, which means that more capacity can be allocated to volumes than physically exists in the pool. • N/A: Not applicable (linear pool).
overcommit-numeric	uint32	Numeric equivalents for overcommit values. • 0: Disabled • 1: Enabled • 2: N/A
over-committed	string	• True: The pool is overcommitted. • False: The pool is not overcommitted.
over-committed-numeric	uint32	Numeric equivalents for over-committed values. • 0: Disabled • 1: Enabled

Table 80 pools properties

Name	Type	Description
disk-groups	uint16	The number of disk groups in the pool.
volumes	uint16	The number of volumes in the pool.
page-size	string	The page size, formatted to use the current base, precision, and units.
page-size-numeric	uint64	Unformatted page-size value in blocks.
low-threshold	string	The low threshold for page allocation as a percentage of pool capacity.
middle-threshold	string	The middle threshold for page allocation as a percentage of pool capacity.
high-threshold	string	The high threshold for page allocation as a percentage of pool capacity. The threshold value is automatically calculated based on the available capacity of the pool minus 200 GB of reserved space.
utility-running	string	Job running on the disk, if any. • (blank): None. • DRSC: The disk group is being scrubbed. • EXPD: The disk group is being expanded. • INIT: The disk group is being initialized. • RBAL: The ADAPT disk group is being rebalanced. • RCON: At least one disk in the disk group is being reconstructed. • VDRAIN: The virtual disk group is being removed and its data is being drained to another disk group. • VPREP: The virtual disk group is being prepared for use in a virtual pool. • VRECV: The virtual disk group is being recovered to restore its membership in the virtual pool. • VREMV: The disk group and its data are being removed. • VRFY: The disk group is being verified. • VRSC: The disk group is being scrubbed.

Table 80 pools properties

Name	Type	Description
utility-running-numeric	uint32	Numeric equivalents for utility-running values. • 0: None • 2: INIT • 3: RCON • 4: VRFY • 5: EXPD • 6: VRSC • 7: DRSC • 9: VREMV • 12: VPREP • 13: VDRAIN • 14: VRECV • 16: RBAL
preferred-owner	string	Controller that owns the disk group and its volumes during normal operation. • A: Controller A. • B: Controller B.
preferred-owner-numeric	uint32	Numeric equivalents for preferred-owner values. • 0: B • 1: A
owner	string	Current owner, which is either the preferred owner during normal operation or the partner controller when the preferred owner is offline. • A: Controller A. • B: Controller B.
owner-numeric	uint32	Numeric equivalents for owner values. • 0: B • 1: A
rebalance	string	For internal use only.
rebalance-numeric	uint32	For internal use only.
migration	string	For internal use only.
migration-numeric	uint32	For internal use only.
zero-scan	string	For internal use only.
zero-scan-numeric	uint32	For internal use only.
idle-page-check	string	For internal use only.
idle-page-check-numeric	uint32	For internal use only.

Table 80 pools properties

Name	Type	Description
read-flash-cache	string	For internal use only.
read-flash-cache-numeric	uint32	For internal use only.
metadata-vol-size	string	The size of the pool's metadata volume, formatted to use the current base, precision, and units. This needs to be taken into consideration to account for all pages in the pool that are used.
metadata-vol-size-numeric	uint64	Unformatted metadata-vol-size value in blocks.
total-rfc-size	string	The total size in blocks of the read cache in the pool.
total-rfc-size-numeric	uint64	Unformatted total-rfc-size value in blocks.
available-rfc-size	string	The unused read-cache space in blocks that is available for use by the pool.
available-rfc-size-numeric	uint64	Unformatted available-rfc-size value in blocks.
reserved-size	string	The total number of pages that are reserved for virtual volumes in the pool.
reserved-size-numeric	unit64	Unformatted reserved-size value in blocks.
reserved-unalloc-size	string	The total number of pages that are reserved, but not yet allocated, for virtual volumes in the pool.
reserved-unalloc-size-numeric	unit64	Unformatted reserved-unalloc-size value in blocks.
pool-sector-format	string	The sector format of disks in the disk group. • 512n: All disks use 512-byte native sector size. Each logical block and physical block is 512 bytes. • 512e: All disks use 512-byte emulated sector size. Each logical block is 512 bytes and each physical block is 4096 bytes. Eight logical blocks will be stored sequentially in each physical block. Logical blocks may or may not be aligned with physical block boundaries. • Mixed: The disk group contains a mix of 512n and 512e disks. This is supported, but for consistent and predictable performance, do not mix disks of different sector size types (512n, 512e).
pool-sector-format-numeric	uint32	Numeric equivalents for pool-sector-format values. • 0: 512n • 1: 512e • 3: Mixed

Table 80 pools properties

Name	Type	Description
health	string	• OK • Degraded • Fault • N/A • Unknown
health-numeric	uint32	Numeric equivalents for health values. • 0: OK • 1: Degraded • 2: Fault • 3: Unknown • 4: N/A
health-reason	string	If Health is not OK, the reason for the health state.
health-recommendation	string	If Health is not OK, the recommended actions to take to resolve the health issue.
disk-groups	Embedded; see disk-groups.	
tiers	Embedded; see tiers.	
unhealthy-component	Embedded; see unhealthy-component.	

port

This basetype is used by show configuration and show ports.

Table 81 port properties

Name	Type	Description
durable-id	string	Controller host port ID in the format hostport_*controller-ID-and-portnumber*.
controller	string	• A: Controller A. • B: Controller B.
controller-numeric	uint32	Numeric equivalents for controller values. • 0: B • 1: A
port	string	Controller ID and port number.
port-type	string	• FC: Fibre Channel. • iSCSI: Internet SCSI. • SAS: Serial Attached SCSI.

Table 81 port properties

Name	Type	Description
port-type-numeric	uint32	Numeric equivalents for port-type values. • 0: UNKNOWN • 6: FC • 8: SAS • 9: iSCSI
media	string	• FC(P): Fibre Channel Point-to-Point. • FC(L): Fibre Channel-Arbitrated Loop (public or private). • FC(-): Not applicable, as when the port is disconnected. • SAS: Serial Attached SCSI. • iSCSI: Internet SCSI.
target-id	string	• For an FC port, its WWPN. • For a SAS port, its WWPN. • For an iSCSI port, its node name (typically the IQN).
status	string	Port status. • Up: The port is cabled and has an I/O link. • Warning: Not all of the port's PHYs are up. • Error: The port is reporting an error condition. • Not Present: The controller module is not installed or is down. • Disconnected: Either no I/O link is detected or the port is not cabled.
status-numeric	uint32	Numeric equivalents for status values. • 0: Up • 1: Warning • 2: Error • 3: Not Present • 6: Disconnected
actual-speed	string	Actual link speed in Mbit/s or Gbit/s. • 10Mb • 100Mb • 1Gb • 4Gb • 6Gb • 8Gb • 12Gb • 16Gb • (blank): Port is disconnected.

Table 81 port properties

Name	Type	Description
actual-speed-numeric	uint32	Numeric equivalents for actual-speed values. • 0: 1Gb • 2: 4Gb • 6: 6Gb • 7: 8Gb • 8: 10Mb • 9: 100Mb • 11: 12Gb • 12: 16Gb • 255: Port is disconnected.
configured-speed	string	Configured host-port link speed in Gbit/s. • Auto • 1Gb • 4Gb • 8Gb • 12Gb • 16Gb
configured-speed-numeric	uint32	Numeric equivalents for configured-speed values. • 0: 1Gb • 2: 4Gb • 3: Auto • 7: 8Gb • 11: 12Gb • 12: 16Gb
health	string	• OK • Degraded • Fault • N/A • Unknown
health-numeric	uint32	Numeric equivalents for health values. • 0: OK • 1: Degraded • 2: Fault • 3: Unknown • 4: N/A

Table 81 port properties

Name	Type	Description
health-reason	string	If Health is not OK, the reason for the health state.
health-recommendation	string	If Health is not OK, the recommended actions to take to resolve the health issue.
port-details	Embedded; see fc-port, iscsi-port, sas-port.	

power-supplies

This basetype is used by show power-supplies.

Table 82 power-supplies properties

Name	Type	Description
durable-id	string	Power supply ID in the format psu_*enclosure-ID.power-supply-number*.
enclosure-id	uint32	Enclosure ID.
dom-id	uint32	The power supply position, shown as an index value that starts at 0 and increments from left to right as viewed from the back of the chassis.
serial-number	string	Power supply serial number.
part-number	string	FRU part number.
description	string	FRU long description.
name	string	Power supply identifier and location.
fw-revision	string	• (blank): Not applicable. • Firmware revision of the power supply.
revision	string	FRU hardware revision level.
model	string	Power supply model.
vendor	string	Power supply vendor.
location	string	Power supply location in the format Enclosure *enclosure-ID - position*, where the position is as viewed from the back of the chassis.
position	string	Power supply position, as viewed from the back of the chassis. • Left • Right • Top • Bottom
position-numeric	uint32	Numeric equivalents for position values. • 0: Left • 1: Right • 2: Top • 3: Bottom

Table 82 power-supplies properties

Name	Type	Description
dash-level	string	FRU template revision number.
fru-shortname	string	FRU short description.
mfg-date	string	Date and time, in the format *year-month-day hour:minutes:seconds* (UTC), when the power supply module was manufactured.
mfg-date-numeric	uint32	Unformatted mfg-date value.
mfg-location	string	City, state/province, and country where the FRU was manufactured.
mfg-vendor-id	string	JEDEC ID of the FRU manufacturer.
configuration-serialnumber	string	Configuration serial number.
dc12v	uint32	Deprecated; power-supply sensor status is shown by the sensors property.
dc5v	uint32	
dc33v	uint32	
dc12i	uint32	
dc5i	uint32	
dctemp	uint32	
health	string	• OK • Degraded • Fault • N/A • Unknown
health-numeric	uint32	Numeric equivalents for health values. • 0: OK • 1: Degraded • 2: Fault • 3: Unknown • 4: N/A
health-reason	string	If Health is not OK, the reason for the health state.
health-recommendation	string	If Health is not OK, the recommended actions to take to resolve the health issue.
status	string	Power supply status. • Up • Warning • Error • Not Present • Unknown

Table 82 power-supplies properties

Name	Type	Description
status-numeric	uint32	Numeric equivalents for status values. • 0: Up • 1: Warning • 2: Error • 3: Not Present • 4: Unknown
unhealthy-component	Embedded; see unhealthy-component.	
fan-details	Embedded; see fan.	

product-info

This basetype is used by show inquiry.

Table 83 product-info properties

Name	Type	Description
vendor-name	string	Vendor name.
product-id	string	Product model identifier.
scsi-vendor-id	string	Vendor name returned by the SCSI INQUIRY command.

provisioning

This basetype is used by show provisioning.

Table 84 provisioning properties

Name	Type	Description
volume	string	• Volume name. • Blank if the disk group or pool does not have a volume.
volume-serial	string	Volume serial number.
wwn	string	• Volume World Wide Name. • Blank if the disk group or pool does not have a volume.
controller	string	Owning controller of the disk group or pool. • A: Controller A. • B: Controller B.

Table 84 provisioning properties

Name	Type	Description
controller-numeric	uint32	Numeric equivalents for controller values. • 0: B • 1: A
disk-display	string	Shorthand list of the disks within a disk group or pool.
disk-display-full	string	List or range of the disks in the disk group or pool specified by the virtual-disk property.
virtual-disk	string	Name of the disk group or pool.
virtual-disk-serial	string	Serial number of the disk group or pool.
health	string	Health of the associated disk group or pool. • OK • Degraded • Fault • N/A • Unknown
health-numeric	uint32	Numeric equivalents for health values. • 0: OK • 1: Degraded • 2: Fault • 3: Unknown • 4: N/A
mapped	string	• Yes: The volume is mapped. • No: The volume is not mapped.
lun-view	Embedded; see volume-view-mappings.	

psu-versions

This basetype is used by show versions when the frus parameter is specified.

Table 85 psu-versions properties

Name	Type	Description
name	string	Power supply unit (PSU) name in the format PSU enclosure-ID, *position*.
fw-revision	string	PSU firmware version.
dsp-version	string	PSU Digital Signal Processor (DSP) firmware version.
vpd-format-version	string	Vital Product Data (VPD) version.

Table 85 psu-versions properties

Name	Type	Description
vpd-crc	string	VPD CRC.
fru-descriptor	string	FRU descriptor.
part-number	string	PSU part number.
psu-serial-number	string	PSU serial number.

readcache-hist-statistics

This basetype is used by show pool-statistics when the historical parameter is specified.

Table 86 readcache-hist-statistics properties

Name	Type	Description
number-of-ios	uint64	The total number of read and write operations since the last sampling time.
number-of-reads	uint64	The number of read operations since the last sampling time.
number-of-writes	uint64	The number of write operations since the last sampling time.
total-data-transferred	string	The total amount of data read and written since the last sampling time.
total-data-transferred-numeric	uint64	Unformatted total-data-transferred value.
data-read	string	The amount of data read since the last sampling time.
data-read-numeric	uint64	Unformatted data-read value.
data-written	string	The amount of data written since the last sampling time.
data-written-numeric	uint64	Unformatted data-written value.
total-iops	uint64	The total number of read and write operations per second since the last sampling time.
read-iops	uint64	The number of read operations per second since the last sampling time.
write-iops	uint64	The number of write operations per second since the last sampling time.
total-bytes-per-sec	string	The total data transfer rate, in bytes per second, since the last sampling time.
total-bytes-per-sec-numeric	uint64	Unformatted total-bytes-per-second value.
read-bytes-per-sec	string	The data transfer rate, in bytes per second, for read operations since the last sampling time.
read-bytes-per-sec-numeric	uint64	Unformatted read-bytes-per-second value.
write-bytes-per-sec	string	Data transfer rate, in bytes per second, for write operations since the last sampling time.

Table 86 readcache-hist-statistics properties

Name	Type	Description
write-bytes-per-sec-numeric	uint64	Unformatted write-bytes-per-second value.
number-of-allocated-pages	uint64	The number of 4-MB pages allocated to volumes in the pool.
number-of-pages-copied	uint64	The number of pages copied to read cache in the sample time period.
number-of-pages-discarded	uint64	The number of pages discarded from read cache (to make room for new hot data) in the sample time period.
sample-time	string	Date and time, in the format *year-month-day hour:minutes:seconds*, when the data sample was taken.
sample-time-numeric	uint32	Unformatted sample-time value.

redundancy

This basetype is used by show redundancy-mode.

Table 87 redundancy properties

Name	Type	Description
redundancy-mode	string	The system's operating mode, also called the cache redundancy mode. • Independent Cache Performance Mode: For a dual-controller system, controller failover is disabled and data in a controller's write-back cache is not mirrored to the partner controller. This improves write performance at the risk of losing unwritten data if a controller failure occurs while there is data in controller cache. • Active-Active ULP: Both controllers are active using ULP (Unified LUN Presentation). Data for volumes configured to use write-back cache is automatically mirrored between the two controllers to provide fault tolerance. • Single Controller: The chassis contains a single controller. • Failed Over: Operation has failed over to one controller because its partner is not operational. The system has lost redundancy. • Down: Both controllers are not operational.
redundancy-mode-numeric	uint32	Numeric equivalents for redundancy-mode values. • 1: Independent Cache Performance Mode • 2: Active-Active ULP • 3: Single Controller • 4: Failed Over • 5: Down

Table 87 redundancy properties

Name	Type	Description
redundancy-status	string	• Redundant with independent cache: Both controllers are operational but are not mirroring their cache metadata to each other. • Redundant: Both controllers are operational. • Operational but not redundant: In active-active mode, one controller is operational and the other is offline. In single-controller mode, the controller is operational. • Down: This controller is not operational. • Unknown: Status information is not available.
redundancy-status-numeric	uint32	Numeric equivalents for redundancy-status values. • 0: Redundant with independent cache • 1: Redundant • 3: Operational but not redundant • 4: Down • 5: Unknown
controller-a-status	string	• Operational: The controller is operational. • Down: The controller is installed but not operational. • Not Installed: The controller is not installed.
controller-a-status-numeric	uint32	Numeric equivalents for controller-a-status values. • 0: Operational • 1: Down • 2: Not Installed
controller-a-serial-number	string	• Controller module serial number • Not Available: The controller is down or not installed.
controller-b-status	string	• Operational: The controller is operational. • Down: The controller is installed but not operational. • Not Installed: The controller is not installed.
controller-b-status-numeric	uint32	Numeric equivalents for controller-b-status values. • 0: Operational • 1: Down • 2: Not Installed
controller-b-serial-number	string	• Controller module serial number • Not Available: The controller is down or not installed.

Table 87 redundancy properties

Name	Type	Description
other-MC-status	string	The operational status of the Management Controller in the partner controller. This is not factored into system health. • Not Communicating • Not Operational • Operational • Unknown
other-MC-status-numeric	uint32	Numeric equivalents for other-mc-status values. • 1524: Not Communicating • 3231: Not Operational • 4749: Operational • 1496: Unknown

refresh-counters

This basetype is used by show refresh-counters.

Table 88 refresh-counters properties

Name	Type	Description
basetype-name	(Not shown)	Shows when the data represented by the base type was last updated. • 0: The data has never been updated and is not cached. • *nonzero-number*: A timestamp indicating that the data has been updated. If the value has changed since the last time you called this command then the data has changed.

remote-ports

This basetype is used by show peer-connections.

Table 89 remote-ports properties

Name	Type	Description
remote-host-port	string	The ID of the port in the remote system.
port-address	string	The assigned port address

remote-ports-detail

This basetype is used by show peer-connections when the `verify-links` parameter is specified.

Table 90 remote-ports-detail properties

Name	Type	Description
`remote-host-port`	string	The ID of the port in the remote system.
`port-address`	string	The assigned port address.
`local-links`	string	The IDs of linked ports in the local system.

remote-system

This basetype is used by show remote-systems.

Table 91 remote-system properties

Name	Type	Description
`id`	string	Remote system ID.
`system-name`	string	• The name of the remote system. • `Uninitialized Name`: The default value.
`system-contact`	string	• The name of the person who administers the remote system. • `Uninitialized Contact`: The default value.
`system-location`	string	• The location of the remote system. • `Uninitialized Location`: The default value.
`system-information`	string	• A brief description of the remote system. • `Uninitialized Info`: The default value.
`vendor-name`	string	The vendor name of the remote system.
`product-id`	string	The product model identifier of the remote system.
`product-brand`	string	The brand name of the remote system.
`ip-address-a`	string	• The IP address of the network port in controller A in the remote system. • `Not Present`
`ip-address-b`	string	• The IP address of the network port in controller B in the remote system. • `Not Present`
`username`	string	The name of a user that is configured in the remote system. This must be a user with the manage role to remotely configure or provision that system.

Table 91 remote-system properties

Name	Type	Description
status	string	• Uninitialized: This system hasn't communicated with the remote system. • Ready: This system has contacted the remote system and it is ready to use. • Connected: This system is transferring data to the remote system. • Not Connected: The system is not connected to the remote system.
status-numeric	uint32	Numeric equivalents for status values. • 0: Uninitialized • 1: Ready • 2: Connected
last-connected	string	Date and time, in the format *year-month-day hour:minutes:seconds* (UTC), when successful communication was last established between the Management Controller in the local system and the Management Controller in the remote system. This value does not indicate when connection status was last determined, and will not be updated if the remote Management Controller is not accessible or if the connection status is Not Connected.
interfaces	string	• FC • iSCSI • SAS • Hybrid: FC and iSCSI.
interfaces-numeric	uint32	Numeric equivalents for interfaces values. • 0: FC • 1: iSCSI • 2: SAS • 3: Hybrid
storage-model	string	• LINEAR
storage-model-numeric	uint32	Numeric equivalents for storage-model values. • 0: LINEAR
isvalid-ip-a	string	• False: The IP address is not valid for controller module A in the remote system. • True: The IP address is valid for controller module A in the remote system.
isvalid-ip-a-numeric	uint32	Numeric equivalents for isvalid-ip-a values. • 0: False • 1: True

Table 91 remote-system properties

Name	Type	Description
isvalid-ip-b	string	• False: The IP address is not valid for controller B in the remote system. • True: The IP address is valid for controller B in the remote system.
isvalid-ip-b-numeric	uint32	Numeric equivalents for isvalid-ip-b values. • 0: False • 1: True

replication-snapshot-history

This basetype is used by show replication-snapshot-history.

Table 92 **replication-snapshot-history properties**

Name	Type	Description
name		The replication set name.
serial-number		The replication set serial number.
snapshot-history	string	Specifies whether to maintain a replication snapshot history for the replication set. • disabled or off: A snapshot history will not be kept. • secondary: A snapshot history set will be kept on the secondary system for the secondary volume. • both: A snapshot history will be kept for the primary volume on the primary system and for the secondary volume on the secondary system.
snapshot-history-numeric	uint32	Numeric equivalents for snapshot-history values. • 0: disabled • 1: secondary • 2: both
snapshot-count	uint32	The number of snapshots to retain in snapshot history. When a new snapshot exceeds this limit, the oldest snapshot in the snapshot history is deleted.
snapshot-basename	string	The user-defined prefix for the snapshots.

Table 92 replication-snapshot-history properties

Name	Type	Description
`retention-priority`	string	The retention priority for snapshots, which is used when automatic deletion of snapshots is enabled by using the set snapshot-space command. In a snapshot tree, only leaf snapshots can be deleted automatically. Deletion based on retention priority is unrelated to deleting the oldest snapshots to maintain a snapshot count. • `never-delete`: Snapshots will never be deleted automatically to make space. The oldest snapshot in the snapshot history will be deleted once the snapshot-count value has been exceeded. • `high`: Snapshots can be deleted after all eligible medium-priority snapshots have been deleted. • `medium`: Snapshots can be deleted after all eligible low-priority snapshots have been deleted. • `low`: Snapshots can be deleted.
`retention-priority-numeric`	uint32	Numeric equivalents for `retention-priority` values. • `0: never-delete` • `1: low` • `2: medium` • `3: high`
`current-replication-snapshots`	Embedded; see current-replication-snapshots.	

reset-snapshot-tasks

This basetype is used by show tasks for a `ResetSnapshot` task.

Table 93 reset-snapshot-tasks properties

Name	Type	Description
`snapshot-name`	string	Name of the snapshot to reset.
`snapshot-serial`	string	Serial number of the snapshot to reset.

resettable-statistics

This basetype is used by show pool-statistics and show tier-statistics.

Table 94 resettable-statistics properties

Name	Type	Description
serial-number	string	The serial number of the pool or tier.
time-since-reset	uint32	The amount of time, in seconds, since these statistics were last reset, either by a user or by a controller restart.
time-since-sample	uint32	The amount of time, in milliseconds, since this set of statistics was last sampled by the Storage Controller.
number-of-reads	uint64	The number of read operations since these statistics were last reset or since the controller was restarted.
number-of-writes	uint64	The number of write operations since these statistics were last reset or since the controller was restarted.
data-read	string	The amount of data read since these statistics were last reset or since the controller was restarted.
data-read-numeric	uint64	Unformatted data-read value.
data-written	string	The amount of data written since these statistics were last reset or since the controller was restarted.
data-written-numeric	uint64	Unformatted data-written value.
bytes-per-second	string	The data transfer rate, in bytes per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.
bytes-per-second-numeric	uint64	Unformatted bytes-per-second value.
iops	uint32	The number of input/output operations per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.
avg-rsp-time	uint32	The average response time, in microseconds, for read and write operations since the last sampling time.
avg-read-rsp-time	uint32	The average response time, in microseconds, for read operations since the last sampling time.
avg-write-rsp-time	uint32	The average response time, in microseconds, for write operations since the last sampling time.

sas-host-phy-statistics

This basetype is used by show host-phy-statistics.

Table 95 sas-host-phy-statistics properties

Name	Type	Description
port	string	The controller ID and port number.
phy	uint32	The PHY's logical location within a group, based on the PHY type. Logical IDs are 0–3 for host port PHYs. Each SAS host will have multiple PHYs.
disparity-errors	uint32	The number of doublewords containing running disparity errors that have been received by the PHY, not including those received during Link Reset sequences. A running disparity error occurs when positive and negative values in a signal do not alternate.
lost-dwords	uint32	The number of times the PHY has lost doubleword synchronization and restarted the Link Reset sequence.
invalid-dwords	uint32	The number of invalid doublewords that have been received by the PHY, not including those received during Link Reset sequences.
reset-error-counter	uint32	The number of times the PHY Reset sequence has failed.

sas-port

This basetype is used by show ports for a SAS host port.

Table 96 sas-port properties

Name	Type	Description
configured-topology	string	• Direct
width	uint8	Number of PHY lanes in the SAS port.
sas-lanes-expected	uint8	Expected number of PHY lanes in the SAS port.
sas-active-lanes	uint8	Number of active lanes in the SAS port. If the port is connected and fewer lanes are active than are expected, the port status will change to Warning, the health will change to Degraded, and event 354 will be logged.
sas-disabled-lanes	uint8	Number of disabled lanes in the SAS port.

sas-status-controller-a

This basetype is used by show expander-status for controller A and controller B.

Table 97 sas-status-controller-a properties

Name	Type	Description
enclosure-id	uint32	Enclosure ID.
drawer-id (5U84 chassis)	uint8	• 0: Top • 1: Bottom
drawer-id (2U12/24 chassis)	uint8	Not applicable (255).
expander-id	uint8	Expander ID.
controller	string	• A: Controller A. • B: Controller B.
controller-numeric	uint32	Numeric equivalents for controller values. • 0: B • 1: A
wide-port-index	uint32	The wide-port index.
phy-index	uint32	The PHY index.
wide-port-role	string	The wide-port role. • Unknown • Drive • Drawer Egress • Drawer Ingress • Expansion Egress • Expansion Ingress • SC Primary • SC Alternate • Inter Expander • Unused • Expander Universal

Table 97 sas-status-controller-a properties

Name	Type	Description
`wide-port-role-numeric`	uint32	Numeric equivalents for `wide-port-role` values. • `0: Unknown` • `1: Drive` • `2: Drawer Egress` • `3: Drawer Ingress` • `4: Expansion Egress` • `5: Expansion Ingress` • `6: SC Primary` • `7: SC Alternate` • `8: Inter Expander` • `9: Unused` • `10: Expander Universal`
`wide-port-num`	uint32	The wide-port number.
`type`	string	The PHY type. • `Drawer0-Egress`: Drawer 0 egress PHY. • `Drawer0-Ingress`: Drawer 0 ingress PHY. • `Drawer1-Egress`: Drawer 1 egress PHY. • `Drawer1-Ingress`: Drawer 1 drawer ingress PHY. • `Drawer2-Egress`: Drawer 2 egress PHY. • `Drawer2-Ingress`: Drawer 2 ingress PHY. • `Drive`: Drive slot PHY. • `Egress`: Expansion port egress PHY. • `Expander-Egress-0`: Expansion port 0 egress PHY. • `Expander-Egress-1`: Expansion port 1 egress PHY. • `Expander-Ingress-0`: Expansion port 0 ingress PHY. • `Expander-Ingress-1`: Expansion port 1 ingress PHY. • `Expander-Universal-0`: Expansion port 0 universal PHY.

Table 97 sas-status-controller-a properties

Name	Type	Description
type (continued)	string	• Expander-Universal-1: Expansion port 1 universal PHY. • Expander-Universal-2: Expansion port 2 universal PHY. • Ingress: Expansion port ingress PHY. • Inter-Exp: Inter-expander PHY. • SC: Storage Controller PHY. • SC-0: Storage Controller primary PHY. • SC-1: Storage Controller alternate PHY. • SC-A: Storage Controller alternate PHY. • SC-P: Storage Controller primary PHY. • SCA-A: Storage Controller A alternate PHY. • SCA-P: Storage Controller A primary PHY. • SCB-A: Storage Controller B alternate PHY. • SCB-P: Storage Controller B primary PHY.
status	string	PHY status. • Unavailable: No status information is available. • Enabled - Healthy: The PHY is enabled and healthy. • Enabled - Degraded: The PHY is enabled but degraded. • Disabled: The PHY has been disabled by a user or by the system.
status-numeric	uint32	Numeric equivalents for status values. • 0: Unavailable • 1: Enabled - Healthy • 2: Enabled - Degraded • 3: Disabled

elem-status	string	The SES status that corresponds to the PHY status.
		• Disabled: Critical condition is detected.
		• Error: Unrecoverable condition is detected. Appears only if there is a firmware problem related to PHY definition data.
		• OK: Element is installed and no error conditions are known.
		• Non-critical: Non-critical condition is detected.
		• Not Used: Element is not installed in chassis.
		• Unknown: Either:
		  • Sensor has failed or element status is not available. Appears only if an I/O module indicates it has fewer PHYs than the reporting I/O module, in which case all additional PHYs are reported as unknown.
		  • Element is installed with no known errors, but the element has not been turned on or set into operation.

Table 97 sas-status-controller-a properties

Name	Type	Description
elem-status-numeric	uint32	Numeric equivalents for elem-status values. • 0: Error • 1: OK • 2: Disabled • 3: Non-critical • 4: Error • 5: Not Used • 6: Unknown • 7: Unknown • 8: Unknown
elem-disabled	string	• Enabled: PHY is enabled. • Disabled: PHY is disabled.
elem-disabled-numeric	uint32	Numeric equivalents for elem-disabled values. • 0: Enabled • 1: Disabled
elem-reason	string	More information about the status value. • Blank if elem-status is OK. • Error count interrupts: PHY disabled because of error-count interrupts. • PHY control: PHY disabled by a SES control page as a result of action by a Storage Controller or user. • Not ready: PHY is enabled but not ready. Appears for SC-1 PHYs when the partner I/O module is not installed. Appears for Drive, SC-1, or Ingress PHYs when a connection problem exists such as a broken connector. • Disk removed: PHY disabled because drive slot is empty. • Unused - disabled by default: PHY is disabled by default because it is not used. • Excessive PHY changes: PHY is disabled because of excessive PHY change counts. • Did not initialize: PHY is enabled but not ready because it did not pass COMINIT.

Table 97 sas-status-controller-a properties

Name	Type	Description
elem-reason-numeric	uint32	Numeric equivalents for elem-reason values. • 0: (blank) • 3: Error count interrupts • 5: PHY control • 6: Not ready • 8: Disk removed • 9: Unused - disabled by default • 10: Excessive PHY changes • 11: Did not initialize
change-counter	hex32	Number of times the PHY originated a BROADCAST (CHANGE). A BROADCAST (CHANGE) is sent if doubleword synchronization is lost or at the end of a Link Reset sequence.
code-violations	hex32	Number of times the PHY received an unrecognized or unexpected signal.
disparity-errors	hex32	Number of doublewords containing running disparity errors that have been received by the PHY, not including those received during Link Reset sequences. A running disparity error occurs when positive and negative values in a signal don't alternate.
crc-errors	hex32	In a sequence of SAS transfers (frames), the data is protected by a cyclic redundancy check (CRC) value. The crc-errors value specifies the number of times the computed CRC does not match the CRC stored in the frame, which indicates that the frame might have been corrupted in transit.
conn-crc-errors	hex32	Number of times the lane between two expanders experienced a communication error.
lost-dwords	hex32	Number of times the PHY has lost doubleword synchronization and restarted the Link Reset sequence.
invalid-dwords	hex32	Number of invalid doublewords that have been received by the PHY, not including those received during Link Reset sequences.
reset-error-counter	hex32	Number of times the expander performed a reset of error counters.
flag-bits	hex32	PHY status flag bits, for internal use.

sas-status-drawer

This basetype is used by show expander-status and has the same properties as sas-status-controller-a.

schedules

This basetype is used by show schedules.

Table 98 schedules properties

Name	Type	Description
`name`	string	Schedule name.
`schedule-specification`	string	Schedule settings for running the associated task.
`status`	string	Schedule status. • `Uninitialized`: The schedule is not yet ready to run. • `Ready`: The schedule is ready to run at the next scheduled time. • `Suspended`: The schedule had an error and is holding in its current state. • `Expired`: The schedule has exceeded a constraint and will not run again. • `Invalid`: The schedule is invalid. • `Deleted`: The task has been deleted.
`next-time`	string	Date and time, in the format *`year-month-day hour:minutes:seconds`* (UTC), when the schedule will next run, or `N/A` if the schedule has expired.
`next-time-numeric`	uint32	Unformatted `next-time` value.
`task-to-run`	string	Name of the task that the schedule runs.
`error-message`	string	• If an error occurred while running the schedule, the error message. • Blank if no error occurred.
`task`	Embedded; see tasks.	

security-communications-protocols

This basetype is used by show protocols.

Table 99 security-communications-protocols properties

Name	Type	Description
wbi-http	string	• Disabled: The standard Disk Management Utility web server is disabled. • Enabled: The standard Disk Management Utility web server is enabled.
wbi-http-numeric	uint32	Numeric equivalents for wbi-http values. • 0: Disabled • 1: Enabled
wbi-https	string	• Disabled: The secure Disk Management Utility web server is disabled. • Enabled: The secure Disk Management Utility web server is enabled
wbi-https-numeric	uint32	Numeric equivalents for wbi-https values. • 0: Disabled • 1: Enabled
cli-telnet	string	• Disabled: The standard CLI is disabled. • Enabled: The standard CLI is enabled.
cli-telnet-numeric	uint32	Numeric equivalents for cli-telnet values. • 0: Disabled • 1: Enabled
cli-ssh	string	• Disabled: The secure shell CLI is disabled. • Enabled: The secure shell CLI is enabled.
cli-ssh-numeric	uint32	Numeric equivalents for cli-ssh values. • 0: Disabled • 1: Enabled
smis	string	• Disabled: The secure SMI-S interface is disabled. • Enabled: The secure SMI-S interface is enabled. This option allows SMI-S clients to communicate with each controller's embedded SMI-S provider via HTTP port 5989.
smis-numeric	uint32	Numeric equivalents for smis values. • 0: Disabled • 1: Enabled
usmis	string	• Disabled: The unsecure SMI-S interface is disabled. • Enabled: The unsecure SMI-S interface is enabled. This option allows SMI-S clients to communicate with each controller's embedded SMI-S provider via HTTP port 5988.

Table 99 security-communications-protocols properties

Name	Type	Description
usmis-numeric	uint32	Numeric equivalents for smis values. • 0: Disabled • 1: Enabled
slp	string	• Disabled: The SLP interface is disabled. • Enabled: The SLP interface is enabled.
slp-numeric	uint32	Numeric equivalents for slp values. • 0: Disabled • 1: Enabled
ftp	string	• Disabled: The FTP interface is disabled. • Enabled: The FTP interface is enabled.
ftp-numeric	uint32	Numeric equivalents for ftp values. • 0: Disabled • 1: Enabled
sftp	string	• Disabled: The SFTP interface is disabled. • Enabled: The SFTP interface is enabled.
sftp-numeric	uint32	Numeric equivalents for sftp values. • 0: Disabled • 1: Enabled
snmp	string	• Disabled: The SNMP interface is disabled. All SNMP requests to the MIB are disabled and SNMP traps are disabled. • Enabled: The SNMP interface is enabled.
snmp-numeric	uint32	Numeric equivalents for snmp values. • 0: Disabled • 1: Enabled
debug-interface	string	• Disabled: The Telnet debug port is disabled. • Enabled: The Telnet debug port is enabled.
debug-interface-numeric	uint32	Numeric equivalents for debug-interface values. • 0: Disabled • 1: Enabled
inband-ses	string	• Disabled: The in-band SES interface is disabled. • Enabled: The in-band SES interface is enabled.
inband-ses-numeric	uint32	Numeric equivalents for inband-ses values. • 0: Disabled • 1: Enabled

Table 99 security-communications-protocols properties

Name	Type	Description
activity-progress	string	• Enabled: Access to the activity progress interface via HTTP port 8081 is enabled. This mechanism reports whether a firmware update or partner firmware update operation is active and shows the progress through each step of the operation. In addition, when the update operation completes, status is presented indicating either the successful completion, or an error indication if the operation failed. • Disabled: Access to the activity progress interface via HTTP port 8081 is disabled.
activity-progress-numeric	uint32	Numeric equivalents for activity-progress values. • 0: Disabled • 1: Enabled
management-mode	string	The default management mode. • Linear: Uses linear-storage terminology in command output and system messages. For example, vdisk for disk groups and pools. • Virtual: Uses terminology in command output and system messages that is generalized for managing virtual and linear storage. For example, disk group for disk groups and pool for pools.
management-mode-numeric	uint32	Numeric equivalents for management-mode values. • 2: Linear • 3: Virtual

sensors

This basetype is used by show sensor-status.

Table 100 sensors properties

Name	Type	Description
durable-id	string	Sensor ID.
enclosure-id	uint32	Enclosure ID.
drawer-id (5U84 chassis)	uint8	• 0: Top • 1: Bottom
drawer-id (2U12/24 chassis)	uint8	Not applicable (255).
controller-id	string	• A: Controller A. • B: Controller B. • both: Both controllers. • N/A

Table 100 sensors properties

Name	Type	Description
`controller-id-numeric`	uint32	Numeric equivalents for `controller-id` values. • `0: B` • `1: A` • `2: both` • `3: N/A`
`sensor-name`	string	Sensor name and location.
`value`	string	• For a sensor, its value. • For overall unit status, one of the status values below.
`status`	string	• `OK`: The sensor is present and detects no error condition. • `Warning`: The sensor detected a non-critical error condition. Temperature, voltage, or current is between the warning and critical thresholds. • `Critical`: The sensor detected a critical error condition. Temperature, voltage, or current exceeds the critical threshold. • `Unavailable`: The sensor is present with no known errors, but has not been turned on or set into operation because it is initializing. This typically occurs during controller startup. • `Unrecoverable`: The enclosure management processor (EMP) cannot communicate with the sensor. • `Unknown`: The sensor is present but status is not available. • `Not Installed`: The sensor is not present. • `Unsupported`: Status detection is not implemented.
`status-numeric`	uint32	Numeric equivalents for `status` values. • `0: Unsupported` • `1: OK` • `2: Critical` • `3: Warning` • `4: Unrecoverable` • `5: Not Installed` • `6: Unknown` • `7: Unavailable`
`sensor-location`	uint32	Superseded by the `container` property.

Table 100 sensors properties

Name	Type	Description
container	string	Hardware component that contains the sensor. • controllers • enclosures • fan • iom • midplane • power-supplies
container-numeric	uint32	Numeric equivalents for container values. • 17: enclosures • 18: midplane • 19: controllers • 20: iom • 21: power-supplies • 22: fan
sensor-type	string	• Temperature • Voltage • Current • Charge Capacity • Unknown Type
sensor-type-numeric	uint32	Numeric equivalents for sensor-type values. • 0: Temperature • 1: Current • 2: Voltage • 3: Charge capacity • 4: Unknown Type

sessions

This basetype is used by show sessions.

Table 101 sessions properties

Name	Type	Description
username	string	The name of the user for which session information is shown.
interface	string	Shows whether the session is using the CLI or the Disk Management Utility.

Table 101 sessions properties

Name	Type	Description
management-mode	string	The management mode used in the session. • Linear: Uses linear-storage terminology in command output and system messages. For example, vdisk for disk groups and pools. • Virtual: Enables access to virtual replication commands and uses terminology in command output and system messages that is generalized for managing virtual and linear storage. For example, *disk group* for disk groups and *pool* for pools.
management-mode-numeric	uint32	Numeric equivalents for management-mode values. • 2: Linear • 3: Virtual
locale	string	The display language.
locale-numeric	uint32	Numeric equivalents for locale values. • 0: English • 3: Spanish • 4: French • 5: German • 6: Italian • 7: Japanese • 8: Korean • 9: Dutch • 11: Chinese-simplified • 12: Chinese-traditional
host	string	For a CLI session, the connected system's IP address and port number.
state	uint32	• Active • Expired
timeout	uint32	The time in seconds that the session can be idle before it automatically ends.
timeout-counter	uint32	The time in seconds remaining before the session automatically ends.
idle-time	uint32	The time in seconds that the session has been idle.
first-access	string	The date and time when the session started.
first-access-numeric	uint32	Unformatted first-access value.
last-access	string	The date and time when the session was last accessed. It updates to the current time when a command is issued.
last-access-numeric	uint32	Unformatted last-access value.

show-other-MC-status

This basetype is used by show shutdown-status.

Table 102 show-other-MC-status properties

Name	Type	Description
other-MC	string	Other MC Status
other-MC-status	string	The operational status of the Management Controller in the partner controller. This is not factored into system health. • `Not Communicating` • `Not Operational` • `Operational` • `Unknown`
other-MC-status-numeric	uint32	Numeric equivalents for `other-mc-status` values. • `1524: Not Communicating` • `3231: Not Operational` • `4749: Operational` • `1496: Unknown`

shutdown-status

This basetype is used by show shutdown-status.

Table 103 shutdown-status properties

Name	Type	Description
`controller`	string	• `A`: Controller A. • `B`: Controller B.
`status`	string	• `up`: The controller is operational. • `down`: The controller is shut down. • `not installed`: The controller is not installed.
`status-numeric`	uint32	Numeric equivalents for `status` values. • `0`: up • `1`: down • `2`: not installed

sideplanes

This basetype is used by show enclosures.

Table 104 sideplanes properties

Name	Type	Description
durable-id	string	Sideplane ID.
enclosure-id	uint32	Enclosure ID.
drawer-id (5U84 chassis)	uint8	• 0: Top • 1: Bottom
drawer-id (2U12/24 chassis)	uint8	Not applicable (255).
dom-id	uint32	The sideplane position, shown as an index value that starts at 0 and increments from left to right as viewed from the back of the chassis.
path-id	string	• A: Controller A. • B: Controller B.
path-id-numeric	uint32	Numeric equivalents for path-id values. • 0: B • 1: A
name	string	Sideplane name.
location	string	Sideplane location.
position	string	Sideplane position, as viewed from the front of the chassis. • Left • Right
position-numeric	uint32	Numeric equivalents for position values. • 0: Left • 1: Right
status	string	Sideplane status. • Unsupported • OK • Critical • Warning • Unrecoverable • Not Installed • Unknown • Unavailable

Table 104 sideplanes properties

Name	Type	Description
status-numeric	uint32	Numeric equivalents for status values. • 0: Unsupported • 1: OK • 2: Critical • 3: Warning • 4: Unrecoverable • 5: Not Installed • 6: Unknown • 7: Unavailable
extended-status	hex32	A numeric value that supplements the standard SES status shown by the status and status-numeric properties, and represents a specific condition. • 0x01: Not powered • 0x02: Cable fault • 0x03: Other fault
health	string	• OK • Degraded • Fault • N/A • Unknown
health-numeric	uint32	Numeric equivalents for health values. • 0: OK • 1: Degraded • 2: Fault • 3: Unknown • 4: N/A
health-reason	string	If Health is not OK, the reason for the health state.
health-recommendation	string	If Health is not OK, the recommended action to take to resolve the health issue.
unhealthy-component	Embedded; see unhealthy-component.	
expander-details	Embedded; see expanders.	

snap-space

This basetype is used by show snapshot-space.

Table 105 snap-space properties

Name	Type	Description
pool	string	The pool for which information is displayed (A or B).
serial-number	string	The serial number of the pool.
snap-limit-threshold	string	The percentage of the pool that can be used for snapshots (the snapshot space).
snap-limit-size	string	The actual size of the snapshot space.
snap-limit-size-numeric	uint64	Numeric equivalents for snap-limit-size values.
allocated-percent-pool	string	The percentage of the pool currently used by snapshots.
allocated-percent-snapspace	string	The percentage of the snapshot space currently used by snapshots.
allocated-size	string	The actual amount of space currently used by snapshots.
allocated-size-numeric	uint64	Numeric equivalents for allocated-size values.
snap-low-threshold	string	A percentage of the snapshot space designated as the low threshold.
snap-middle-threshold	string	A percentage of the snapshot space designated as the middle threshold.
snap-high-threshold	string	A percentage of the snapshot space designated as the high threshold.
limit-policy	string	The limit policy for when the percentage of the pool designated for snapshots is reached. • notify-only: When the snapshot space is reached an event is generated and logged. • delete: When the snapshot space is reached an event is generated and logged and automatic deletion of snapshots occurs.
limit-policy-numeric	uint32	Numeric equivalents for limit-policy values. • 0: notify-only • 1: delete

snapshots

This basetype is used by show snapshots.

Table 106 snapshots properties

Name	Type	Description
durable-id	string	Snapshot ID.
virtual-disk-name	string	The name of the disk group or pool that contains the snapshot.
storage-pool-name	string	The name of the disk group or pool that contains the snapshot.
serial-number	string	Snapshot serial number.
name	string	Snapshot name.
creation-date-time	string	Date and time, in the format *year-month-day hour:minutes:seconds* (UTC), when the snapshot was prepared or committed.
creation-date-time-numeric	uint32	Unformatted creation-date-time value.
status	string	Snapshot status. • Available • Unavailable: See the status-reason value.
status-numeric	uint32	• 0: Available • Nonzero: Unavailable
status-reason	string	Shows N/A for Available status, or one of the following reasons for Unavailable status: • snapshot not found • master volume not found • snapshot pending (not yet committed) • master volume not accessible • Volume copy with modified data is in progress • Unknown reason
status-reason-numeric	uint32	Numeric equivalents for status-reason values. • 1: snapshot pending (not yet committed) • 4: master volume not accessible • 7: Volume copy with modified data is in progress • 8: snapshot not found • 10: master volume not found • 254: N/A • *hex-code*: Unknown reason
master-volume-name	string	Name of the volume of which the snapshot was taken.
volume-parent	string	The name of the volume of which the snapshot was taken.

Table 106 snapshots properties

Name	Type	Description
base-volume	string	The root of the snapshot tree, if any. A snapshot tree is a series of inter-related snapshots of a volume and can be 254 levels deep.
base-serial-number	string	The serial number of the base volume.
num-children	uint32	The number of child snapshots (snapshots taken of this snapshot).
num-snaps-tree	uint32	The number of snapshots taken of the base volume and its children. This count includes the base volume and all snapshots that share the base volume as their root.
snap-pool-name	string	• The name of the snap pool for linear snapshots. • Blank for virtual snapshots.
snap-data	string	The total amount of write data associated with the snapshot.
snap-data-numeric	uint64	Unformatted snap-data value in blocks.
uniquedata	string	The amount of write data that is unique to the snapshot.
uniquedata-numeric	uint64	Unformatted uniquedata value in blocks.
shareddata	string	The amount of write data that is shared between this snapshot and other snapshots.
shareddata-numeric	uint64	Unformatted shareddata value in blocks.
retention-priority	string	The retention priority for the snapshot. • never-delete: Snapshots will never be deleted. • high: Snapshots may be deleted after all eligible medium-priority snapshots have been deleted. • medium: Snapshots may be deleted after all eligible low-priority snapshots have been deleted. • low: Snapshots may be deleted. Snapshots that are mapped or are not leaves of a volume's snapshot tree are not eligible for automatic deletion.
retention-priority-numeric	uint64	Numeric equivalents for retention-priority values. • 0: never-delete • 1: high • 2: medium • 3: low
priority-value	string	Retention priority for the snapshot, based on the snapshot attributes and the user-defined retention priority for the snapshot type. • 0x6000: Standard snapshot. • 0xa000: Volume-copy snapshot. Snapshot that is being used to copy data from a source volume to a destination volume.
user-priority-value	string	User-defined retention priority for the snapshot type.

Table 106 snapshots properties

Name	Type	Description
snapshot-type	string	Snapshot type. • Standard snapshot: Snapshot of a source volume that consumes a snapshot license.
snapshot-type-numeric	uint64	Numeric equivalents for snapshot-type values. • 0x00004000: Standard snapshot • 0x00000000: N/A
storage-type	string	• Linear: Linear pool. • Virtual: Virtual pool.
storage-type-numeric	uint64	Numeric equivalents for storage-type values. • 0: Linear • 1: Virtual
total-size	string	The total size of the snapshot.
total-size-numeric	uint64	Unformatted total-size value in blocks.

snapshot-with-retention-tasks

This basetype is used by show tasks for a TakeSnapshot task.

Table 107 snapshot-with-retention-tasks properties

Name	Type	Description
master-volume-name	string	Source volume name.
master-volume-serial	string	Source volume serial number.
snapshot-prefix	string	A label to identify snapshots created by this task.
retention-count	uint32	Number of snapshots to retain with this prefix. When a new snapshot exceeds this limit, the oldest snapshot with the same prefix is deleted.
last-created	string	• The name of the last snapshot created by the task. • Blank if the task has not created a snapshot.
snapshot	Embedded; see snap-tasks.	

snap-tasks

This basetype is used by show schedules, and show tasks for a task that has created at least one snapshot.

Table 108 snap-tasks properties

Name	Type	Description
`snapshot-name`	string	Snapshot name.
`snapshot-serial`	string	Snapshot serial number.

snmp-parameters

This basetype is used by show snmp-parameters.

Table 109 snmp-parameters properties

Name	Type	Description
`snmp-enabled`	string	Shows whether the Simple Network Management Protocol (SNMP) interface is enabled or disabled. • `Disabled`: SNMP is disabled. • `Enabled`: SNMP is enabled.
`snmp-enabled-numeric`	uint32	Numeric equivalents for `snmp-enabled` values. • `0: Disabled` • `1: Enabled`
`snmp-filter`	string	Minimum level of events to include for SNMP traps. • `crit`: Sends notifications for Critical events only. • `error`: Sends notifications for Error and Critical events. • `warn`: Sends notifications for Warning, Error, and Critical events. • `resolved`: Sends notifications for Resolved, Warning, Error, and Critical events. • `info`: Sends notifications for all events. • `none`: No events are sent as traps and traps are disabled.
`snmp-filter-numeric`	uint32	Numeric equivalents for `snmp-filter` values. • `0: info` • `1: resolved` • `2: warn` • `3: error` • `4: crit` • `5: none`
`snmp-trap-host-1`	string	Trap host IP address.
`snmp-trap-host-2`	string	Trap host IP address.

Table 109 snmp-parameters properties

Name	Type	Description
snmp-trap-host-3	string	Trap host IP address.
snmp-read-community	string	The community string for read-only access. The value is obscured for users having only the monitor role and is shown in clear text for users having the manage role.
snmp-write-community	string	The community string for write access. The value is obscured for users having only the monitor role and is shown in clear text for users having the manage role.

spares-preview

This basetype is used by add storage when the preview parameter is specified.

Table 110 spares-preview properties

Name	Type	Description
location		Disk's enclosure ID and slot number.
type	string	Disk description. • SAS: Enterprise SAS spinning disk. • SAS MDL: Midline SAS spinning disk. • SSD SAS: SAS solid-state disk.
type-numeric	uint32	Numeric equivalents for type values. • 4: SAS • 8: SSD SAS • 11: SAS MDL
tier	string	• Archive: The disk is in the lowest storage tier, which uses midline spinning SAS disks (<10k RPM, high capacity). • N/A: Not applicable. • Performance: The disk is in the highest storage tier, which uses SSDs (high speed). • Read Cache: The disk is an SSD providing high-speed read cache for a storage pool. • Standard: The disk is in the storage tier that uses enterprise-class spinning SAS disks (10k/15k RPM, higher capacity).
tier-numeric	uint32	Numeric equivalents for tier values. • 0: N/A • 1: Performance • 2: Standard • 4: Archive • 8: Read Cache

Table 110 spares-preview properties

Name	Type	Description
size	string	Disk capacity, formatted to use the current base, precision, and units.
size-numeric	uint64	Unformatted size value in blocks.
rpm	uint32	The speed of a spinning disk, in thousands of revolutions per minute, as specified by the disk vendor. For an SSD, 0 is shown.
sector-format	string	The disk sector format. • 512n: The disk uses 512-byte native sector size. Each logical block and physical block is 512 bytes. • 512e: The disk uses 512-byte emulated sector size. Each logical block is 512 bytes and each physical block is 4096 bytes. Eight logical blocks will be stored sequentially in each physical block. Logical blocks may or may not be aligned with physical block boundaries.
sector-format-numeric	uint32	Numeric equivalents for sector-format values. • 0: 512n • 1: 512e
pi-formatted	string	Not supported.
pi-formatted-numeric	uint32	Not supported.
fde-state	string	The FDE state of the disk. • Unknown: The FDE state is unknown. • Not FDE Capable: The disk is not FDE-capable. • Not Secured: The disk is not secured. • Secured, Unlocked: The system is secured and the disk is unlocked. • Secured, Locked: The system is secured and the disk is locked to data access, preventing its use. • FDE Protocol Failure: A temporary state that can occur while the system is securing the disk.
fde-state-numeric	uint32	Numeric equivalents for fde-state values. • 0: Not FDE Capable • 1: Not Secured • 2: Secured, Unlocked • 3: Secure, Locked • 4: FDE Protocol Failure • 5: Unknown

status

This basetype is used by all commands except `exit`, `help`, and `meta`. (`exit` does not provide a response; `help` always prints text; `meta` does not use the `status` object.)

Table 111 status properties

Name	Type	Description
`response-type`	string	• `Success`: The command succeeded. • `Error`: The command failed. • `Info`: The command returned an informational message. • `Warning`: The command returned a warning message.
`response-type-numeric`	uint32	• `0: Success` • `1: Error` • `2: Info` • `3: Warning`
`response`	string	A message stating what the command accomplished, why the command failed, or information about the command's progress.
`return-code`	sint32	• `0`: The command completed. • *`-nnnnn`*: The command failed.
`component-id`	string	Not used.
`time-stamp`	string	Date and time, in the format *`year-month-day hour:minutes:seconds`* (UTC), when the command was issued.
`time-stamp-numeric`	uint32	Unformatted `time-stamp` value.

storage-preview

This basetype is used by add storage when the `preview` parameter is specified.

Table 112 storage-preview properties

Name	Type	Description
`storage-type`	string	• `Linear`: The disk group acts as a linear pool. • `Virtual`: The disk group is in a virtual pool.
`storage-type-numeric`	uint32	Numeric equivalents for `storage-type` values. • `0: Linear` • `1: Virtual`
`suggestions`	string	Suggestions to consider before provisioning, if any.
`disk-groups-preview`	Embedded; see disk-groups-preview.	
`adapt-expand-preview`	Embedded; see adapt-expand-preview.	

Table 112 storage-preview properties

Name	Type	Description
`spares-preview`	Embedded; see spares-preview.	
`unused-disks-preview`	Embedded; see unused-disks-preview.	

syslog-parameters

This basetype is used by show syslog-parameters.

Table 113 syslog-parameters properties

Name	Type	Description
`syslog-host-ip`	string	The IP address of the remote syslog server to use for the notifications.
`syslog-notification-level`	string	Shows the minimum severity for which the system sends notifications: • `crit`: Sends notifications for Critical events only. • `error`: Sends notifications for Error and Critical events. • `warn`: Sends notifications for Warning, Error, and Critical events. • `resolved`: Sends notifications for Resolved, Warning, Error, and Critical events. • `info`: Sends notifications for all events. • `none`: Disables syslog notification and clears the settings.
`syslog-notification-level-numeric`	uint32	Numeric equivalents for `syslog-notification-level` values. • `0: info` • `1: resolved` • `2: warn` • `3: error` • `4: crit`
`syslog-host-port`	uint32	The port on which the remote syslog facility is expected to listen for notifications.

system

This basetype is used by show configuration and show system.

Table 114 system properties

Name	Type	Description
system-name	string	The name of the storage system.
system-contact	string	The name of the person who administers the system.
system-location	string	The location of the system.
system-information	string	A brief description of what the system is used for or how it is configured.
midplane-serial-number	string	The serial number of the controller chassis midplane.
vendor-name	string	The vendor name.
product-id	string	The product model identifier.
product-brand	string	The product brand name.
scsi-vendor-id	string	The vendor name returned by the SCSI INQUIRY command.
scsi-product-id	string	The product identifier returned by the SCSI INQUIRY command.
enclosure-count	uint32	The number of chassis in the system.
health	string	• OK • Degraded • Fault • N/A • Unknown
health-numeric	uint32	Numeric equivalents for health values. • 0: OK • 1: Degraded • 2: Fault • 3: Unknown • 4: N/A
health-reason	string	If Health is not OK, the reason for the health state.
other-MC-status	string	The operational status of the Management Controller in the partner controller. This is not factored into system health. • Operational • Not Operational • Not Communicating • Unknown

Table 114 system properties

Name	Type	Description
other-MC-status-numeric	uint32	Numeric equivalents for other-mc-status values. • 1524: Not Communicating • 3231: Not Operational • 4749: Operational • 1496: Unknown
pfuStatus	string	Shows whether partner firmware update is running on the system, or is idle.
supported-locales	string	Supported display languages.
current-node-wwn	string	Storage system node World Wide Name (WWNN).
fde-security-status	string	• Unsecured: The system has not been secured with a passphrase. • Secured: The system has been secured with a passphrase. • Secured, Lock Ready: The system has been secured and lock keys have been cleared. The system will become locked after the next power cycle. • Secured, Locked: The system is secured and the disks are locked to data access, preventing their use.
fde-security-status-numeric	uint32	Numeric equivalents for fde-security-status values. • 1: Unsecured • 2: Secured • 3: Secured, Lock Ready • 4: Secured, Locked
platform-type	string	Platform type.
platform-type-numeric	uint32	Numeric equivalent for the platform-type value.
platform-brand	string	Active platform brand of the Management Controller firmware.
platform-brand-numeric	uint32	Numeric equivalent for the platform-brand value.
redundancy-mode	Embedded; see redundancy.	
unhealthy-component	Embedded; see unhealthy-component.	

system-parameters-table

This basetype is used by show system-parameters.

Table 115 system-parameters-table properties

Name	Type	Description
ulp-enabled	string	Shows true to indicate that the system is using Unified LUN Presentation, which can expose all LUNs through all host ports on both controllers. The interconnect information is managed in the controller firmware. ULP appears to the host as an active-active storage system where the host can choose any available path to access a LUN regardless of disk group ownership. When ULP is in use, the system's operating/cache-redundancy mode is shown as Active-Active ULP. ULP uses the T10 Technical Committee of INCITS Asymmetric Logical Unit Access (ALUA) extensions, in SPC-3, to negotiate paths with aware host systems. Unaware host systems see all paths as being equal.
profiles-enabled	string	Shows whether host profiles are enabled. • true: Host profiles are enabled. • false: Host profiles are disabled.
max-ports	uint32	Number of host-interface ports in the controller chassis.
max-drives	uint32	Number of disks that the system supports.
max-volumes	uint32	Number of volumes that the system supports.
max-vdisks	uint32	Number of linear disk groups that the system supports.
max-luns	uint32	Number of LUNs that the system supports.
max-owned-arrays-per-controller	uint32	Number of linear disk groups that each controller supports.
max-storage-pools-per-controller	uint32	The number of virtual pools that each controller supports.
max-components-per-storage-pool	uint32	The number of virtual pools that each pool can contain.
max-storage-pool-size	uint64	The maximum size of a virtual pool.
max-capi-arrays	uint32	Same as max-vdisks.
max-chunk-size	uint32	Maximum chunk size for disk groups.
min-chunk-size	uint32	Minimum chunk size for disk groups.
physical-position-offset	uint32	Starting index for physical components (chassis, disks, etc.) in the storage system.
backoff-percentage	uint32	Percentage of disk capacity that is reserved to compensate for minor capacity differences between disk drives so they can be used interchangeably. This is not settable by users.
vdisk-metadata-size-perdisk-blocks	uint32	Amount of space reserved on a disk for metadata, in blocks.

Table 115 system-parameters-table properties

Name	Type	Description
vdisk-metadata-size-blocks	uint32	Amount of metadata, in blocks, stored on each disk.
max-host-groups	uint32	The number of host groups that the system supports.
max-hosts-per-host-group	uint32	The maximum number of hosts that a host group can contain.
max-initiator	uint32	The maximum number of initiators that a host can contain.
max-volume-groups-per-controller	uint32	The maximum number of volume groups that each controller supports.
max-volumes-per-volume-group	uint32	The maximum number of volumes that a volume group can contain.
max-replication-sets	uint32	Number of replication sets that the system supports.
max-enclosures	uint32	Number of chassis that the system supports.
local-controller	string	The ID of the controller you are accessing. • A: Controller A. • B: Controller B.
local-controller-numeric	uint32	Numeric equivalents for local-controller values. • 0: B • 1: A
serial-number	string	Last six digits of the midplane serial number.
external-targetid-control	string	Not used.
external-targetid-control-numeric	uint32	Not used.
lan-heartbeat	string	Not used.
lan-heartbeat-numeric	uint32	Not used.
ip-address-mode	string	• CAPI_TWO_IP_ADDRESSES_MODE: Dual controller system has a unique IP address for each controller. • CAPI_ONE_IP_ADDRESS_MODE: Dual controller system has the same IP address for both controllers, only one active at a time.
ip-address-mode-numeric	uint32	Numeric equivalents for ip-address-mode values. • 0: CAPI_TWO_IP_ADDRESSES_MODE • 1: CAPI_ONE_IP_ADDRESS_MODE
debug-flags	uint32	For use by service personnel.
enclosure-flags	uint32	For internal use only.
num-global-spares	uint32	Number of global-spare disks defined in the storage system.

Table 115 system-parameters-table properties

Name	Type	Description
dynamic-spare-rescan-rate	uint32	Interval at which the system is scanned for disks automatically designated as spares, if the dynamic spares feature is enabled.
performance-tuning-flags	string	For internal use only.
performance-tuning-flags-numeric	uint32	Numeric equivalents for performance-tuning-flags values. • 0: Disabled • 1: Enabled
min-backing-store-size	uint32	Not applicable.
max-task-retention-count	uint32	Maximum retention count for a task that creates snapshots or replication volumes.
max-fc-speed	string	Maximum FC host-port speed.
max-fc-speed-numeric	uint32	Numeric equivalent for the max-fc-speed value.
max-iscsi-speed	string	Maximum iSCSI host-port speed.
max-iscsi-speed-numeric	uint32	Numeric equivalent for the max-iscsi-speed value.
max-peers-allowed	uint32	The maximum number of peer connections that the system supports.
peers-in-use-count	uint32	The number of peer connections present in the system.
max-ar-vols-allowed	uint32	The maximum number of virtual replication volumes that the system supports.
ar-sets-in-use-count	uint32	The number of virtual replication volumes present in the system.
linear-replication-configured	string	Not applicable.
linear-replication-configured-numeric	uint32	Not applicable.
virtual-replication-configured	string	• False: No virtual replication sets exist on the system. • True: At least one virtual replication set exists on the system.
virtual-replication-configured-numeric	uint32	Numeric equivalents for virtual-replication-configured values. • 0: False • 1: True
max-adapt-drives-per-disk-group	uint32	The maximum number of disks that an ADAPT disk group can contain.
min-adapt-drives-per-disk-group	uint32	The minimum number of disks that an ADAPT disk group can contain.

Table 115 system-parameters-table properties

Name	Type	Description
max-adapt-disk-groups-per-system	uint32	The maximum number of ADAPT disk groups that the system supports.
max-adapt-drives-per-expansion	uint32	The maximum number of disks by which an ADAPT disk group can be expanded.

tasks

This basetype is used by show tasks.

Table 116 tasks properties

Name	Type	Description
name	string	Task name.
type	string	Type of operation this task performs. • TakeSnapshot • ResetSnapshot • Replicate • EnableDSD • DisableDSD
status	string	Task status. • Uninitialized: Task is not yet ready to run. • Ready: Task is ready to run. • Active: Task is running. • Error: Task has an error. • Complete: For a TakeSnapshot task only, the task is complete but not yet ready to run again. • Deleted: The task is expired but this state is not yet synchronized to the partner controller.

Table 116 tasks properties

Name	Type	Description

state	string	Current step of the task.
		• For an EnableDSD or DisableDSD task:
		  • Start
		• For a TakeSnapshot task:
		  • Start
		  • VerifyVolume
		  • ValidateLicensingLimit
		  • CreateName
		  • CreateSnap
		  • VerifySnap
		  • InspectRetention
		  • FindOldestSnap
		  • UnmapSnap
		  • ResetSnap
		  • RenameSnap
		• For a ResetSnapshot task:
		  • Start
		  • VerifySnap
		  • UnmapSnap
		  • ResetSnap
		• For a Replicate task:
		  • Idle
		  • Replicate
		  • VerifyRunning

error-message	string	• If an error occurred while processing the task, the error message. • Blank if no error has occurred.
associated-vdisk-serial	string	Not applicable.
task-details	Embedded; see cs-replicate-tasks, reset-snapshot-tasks, snap-tasks, snapshot-with-retention-tasks.	

tier-hist-statistics

This basetype is used by show pool-statistics when the `historical` parameter is specified.

Table 117 tier-hist-statistics properties

Name	Type	Description
`number-of-ios`	uint64	Total number of read and write operations since the last sampling time.
`number-of-reads`	uint64	Number of read operations since the last sampling time.
`number-of-writes`	uint64	Number of write operations since the last sampling time.
`total-data-transferred`	string	Total amount of data read and written since the last sampling time.
`total-data-transferred-numeric`	uint64	Unformatted `total-data-transferred` value.
`data-read`	string	Amount of data read since the last sampling time.
`data-read-numeric`	uint64	Unformatted `data-read` value.
`data-written`	string	Amount of data written since the last sampling time.
`data-written-numeric`	uint64	Unformatted `data-written` value.
`total-iops`	uint64	Total number of read and write operations per second since the last sampling time.
`read-iops`	uint64	Number of read operations per second since the last sampling time.
`write-iops`	uint64	Number of write operations per second since the last sampling time.
`total-bytes-per-sec`	string	Total data transfer rate, in bytes per second, since the last sampling time.
`total-bytes-per-sec-numeric`	uint64	Unformatted `total-bytes-per-second` value.
`read-bytes-per-sec`	string	Data transfer rate, in bytes per second, for read operations since the last sampling time.
`read-bytes-per-sec-numeric`	uint64	Unformatted `read-bytes-per-sec` value.
`write-bytes-per-sec`	string	Data transfer rate, in bytes per second, for write operations last sampling time.
`write-bytes-per-sec-numeric`	uint64	Unformatted `write-bytes-per-sec` value.
`number-of-allocated-pages`	uint64	The number of 4-MB pages allocated to volumes in the pool.
`number-of-page-moves-in`	uint64	The number of pages moved into this tier from a different tier.
`number-of-page-moves-out`	uint64	The number of pages moved out of this tier to other tiers.

Table 117 tier-hist-statistics properties

Name	Type	Description
number-of-page-rebalances	uint64	The number of pages moved between disks in this tier to automatically load balance.
number-of-initial-allocations	uint64	The number of 4-MB pages that are allocated as a result of host writes. This number does not include pages allocated as a result of background tiering page movement. (Tiering moves pages from one tier to another, so one tier will see a page deallocated, while another tier will show pages allocated. These background moves are not considered initial allocations.)
number-of-unmaps	uint64	The number of 4-MB pages that are automatically reclaimed and deallocated because they are empty (they contain only zeroes for data).
number-of-rfc-copies	uint64	The number of 4-MB pages copied from spinning disks to SSD read cache (read flash cache).
number-of-zero-pages-reclaimed	uint64	The number of empty (zero-filled) pages that were reclaimed during this sample period.
sample-time	string	Date and time, in the format *year-month-day hour:minutes:seconds*, when the data sample was taken.
sample-time-numeric	uint32	Unformatted sample-time value.

tier-statistics

This basetype is used by show tier-statistics and show pool-statistics.

Table 118 tier-statistics properties

Name	Type	Description
serial-number	string	The serial number of the tier or pool.
pool	string	The name of the pool.
tier	string	• Archive: The lowest storage tier, which uses midline spinning SAS disks (<10k RPM, high capacity). • Performance: The highest storage tier, which uses SSDs (high speed). • Read Cache: The tier that provides read cache for a storage pool. • Standard: The tier that uses enterprise-class spinning SAS disks (10k/15k RPM, higher capacity).
tier-numeric	uint32	Numeric equivalents for tier values. • 0: N/A • 1: Performance • 2: Standard • 4: Archive • 8: Read Cache
pages-alloc-per-minute	uint32	The rate, in pages per minute, at which pages are allocated to volumes in the pool because they need more space to store data.

Table 118 tier-statistics properties

Name	Type	Description
pages-dealloc-per-minute	uint32	The rate, in pages per minute, at which pages are deallocated from volumes in the pool because they no longer need the space to store data.
pages-reclaimed	uint32	The number of 4-MB pages that have been automatically reclaimed and deallocated because they are empty (they contain only zeroes for data).
num-pages-unmap-per-minute	uint32	The number of 4-MB pages that host systems have unmapped per minute, through use of the SCSI UNMAP command, to free storage space as a result of deleting files or formatting volumes on the host.
resettable-statistics	Embedded; see resettable-statistics.	

tier-summary

This basetype is used by show pool-statistics when the historical parameter is specified.

Table 119 tier-summary properties

Name	Type	Description
serial-number	string	The serial number of the pool.
pool	string	The name of the pool.
tier	string	• Archive: The lowest storage tier, which uses midline spinning SAS disks (<10k RPM, high capacity). • Performance: The highest storage tier, which uses SSDs (high speed). • Read Cache: The tier that provides read cache for a storage pool. • Standard: The tier that uses enterprise-class spinning SAS disks (10k/15k RPM, higher capacity).
tier-numeric	uint32	Numeric equivalents for tier values. • 0: N/A • 1: Performance • 2: Standard • 4: Archive • 8: Read Cache
tier-hist-statistics	Embedded; see tier-hist-statistics.	
readcache-hist-statistics	Embedded; see readcache-hist-statistics.	

tiers

This basetype is used by show pools and show tiers.

Table 120 tiers properties

Name	Type	Description
serial-number	string	The serial number of the tier.
pool	string	The name of the pool.
tier	string	• Archive: The lowest storage tier, which uses midline spinning SAS disks (<10k RPM, high capacity). • Performance: The highest storage tier, which uses SSDs (high speed). • Read Cache: The tier that provides read cache for a storage pool. • Standard: The tier that uses enterprise-class spinning SAS disks (10k/15k RPM, higher capacity).
tier-numeric	uint32	Numeric equivalents for tier values. • 0: N/A • 1: Performance • 2: Standard • 4: Archive • 8: Read Cache
pool-percentage	uint8	The percentage of pool capacity that the tier occupies.
diskcount	uint8	The number of disks in the tier.
raw-size	string	The raw capacity of the disks in the tier, irrespective of space reserved for RAID overhead and so forth, formatted to use the current base, precision, and units.
raw-size-numeric	uint64	Unformatted raw-size value in blocks.
total-size	string	The total capacity of the tier.
total-size-numeric	uint64	Unformatted total-size value in blocks.
allocated-size	string	The amount of space currently allocated to volumes in the tier.
allocated-size-numeric	uint64	Unformatted allocated-size value in blocks.
available-size	string	The available capacity in the tier.
available-size-numeric	uint64	Unformatted available-size value in blocks.
affinity-size	string	The total size of volumes configured to have affinity for that tier.
affinity-size-numeric	uint64	Unformatted affinity-size value in blocks.

time-settings-table

This basetype is used by show controller-date.

Table 121 time-settings-table properties

Name	Type	Description
`date-time`	string	Date and time, in the format *`year-month-day hour:minutes:seconds`* (UTC), reported by the controller being accessed.
`date-time-numeric`	uint32	Unformatted `date-time` value.
`time-zone-offset`	string	The system's time zone as an offset in hours and minutes from UTC. This is shown only if NTP is enabled.
`ntp-state`	string	Shows whether Network Time Protocol (NTP) is in use. • `activated`: NTP is enabled. • `deactivated`: NTP is disabled.
`ntp-address`	string	NTP server IP address, or `0.0.0.0` if not set.

unhealthy-component

This basetype is used by all commands that show component health.

Table 122 unhealthy-component properties

Name	Type	Description
`component-type`	string	Component type. • `super-cap`: Supercapacitor pack • `MC`: Management Controller • `port`: Host port • `controller`: Controller module • `expansion module`: Expansion module • `PSU`: Power supply unit • `disk`: Disk • `enclosure`: Chassis • `vdisk`: Disk group (v2) • `disk group`: Disk group (v3) • `fan` • `CompactFlash` • `disk slot` • `SAS port` • `sensor`

Table 122 unhealthy-component properties

Name	Type	Description
component-type (continued)	string	• network port • virtual pool • virtual disk group • volume • volume: Source volume • snapshot • host • volume map • system
component-type-numeric	uint32	Numeric equivalents for component-type values. • 0: super-cap • 1: MC • 2: port • 3: controller • 4: expansion module • 5: PSU • 6: disk • 7: enclosure • 8: vdisk (v2) or disk group (v3) • 9: fan • 10: CompactFlash • 11: disk slot • 12: SAS port • 13: sensor • 14: network port • 15: virtual pool • 16: virtual disk group • 17: volume • 19: volume (source volume) • 20: snapshot • 21: host • 25: volume map • 26: system
component-id	string	Component identifier, such as A for controller A.
basetype	string	Component basetype.

Table 122 unhealthy-component properties

Name	Type	Description
primary-key	string	Durable ID of the component.
health	string	Component health. • OK • Degraded • Fault • Unknown • N/A
health-numeric	uint32	Numeric equivalents for health values. • 0: OK • 1: Degraded • 2: Fault • 3: Unknown • 4: N/A
health-reason	string	If Health is not OK, the reason for the health state.
health-recommendation	string	If Health is not OK, the recommended actions to take to resolve the health issue.

unused-disks-preview

This basetype is used by add storage when the preview parameter is specified.

Table 123 unused-disks-preview properties

Name	Type	Description
location		Disk's enclosure ID and slot number.
type	string	Disk description. • SAS: Enterprise SAS spinning disk. • SAS MDL: Midline SAS spinning disk. • SSD SAS: SAS solid-state disk.
type-numeric	uint32	Numeric equivalents for type values. • 4: SAS • 8: SSD SAS • 11: SAS MDL

Table 123 unused-disks-preview properties

Name	Type	Description
tier	string	• Archive: The lowest storage tier, which uses midline spinning SAS disks (<10k RPM, high capacity). • Performance: The highest storage tier, which uses SSDs (high speed). • Read Cache: The tier that provides read cache for a storage pool. • Standard: The tier that uses enterprise-class spinning SAS disks (10k/15k RPM, higher capacity).
tier-numeric	uint32	Numeric equivalents for tier values. • 0: N/A • 1: Performance • 2: Standard • 4: Archive • 8: Read Cache
size	string	Disk capacity, formatted to use the current base, precision, and units.
size-numeric	uint64	Unformatted size value in blocks.
rpm	uint32	The speed of a spinning disk, in thousands of revolutions per minute, as specified by the disk vendor. For an SSD, 0 is shown.
sector-format	string	The disk sector format. • 512n: The disk uses 512-byte native sector size. Each logical block and physical block is 512 bytes. • 512e: The disk uses 512-byte emulated sector size. Each logical block is 512 bytes and each physical block is 4096 bytes. Eight logical blocks will be stored sequentially in each physical block. Logical blocks may or may not be aligned with physical block boundaries.
sector-format-numeric	uint32	Numeric equivalents for sector-format values. • 0: 512n • 1: 512e
pi-formatted	string	Not supported.
pi-formatted-numeric	uint32	Not supported.

Table 123 unused-disks-preview properties

Name	Type	Description
`fde-state`	string	The FDE state of the disk. • `Unknown`: The FDE state is unknown. • `Not FDE Capable`: The disk is not FDE-capable. • `Not Secured`: The disk is not secured. • `Secured, Unlocked`: The system is secured and the disk is unlocked. • `Secured, Locked`: The system is secured and the disk is locked to data access, preventing its use. • `FDE Protocol Failure`: A temporary state that can occur while the system is securing the disk.
`fde-state-numeric`	uint32	Numeric equivalents for `fde-state` values. • `0: Not FDE Capable` • `1: Not Secured` • `2: Secured, Unlocked` • `3: Secure, Locked` • `4: FDE Protocol Failure` • `5: Unknown`

unwritable-cache

This basetype is used by show unwritable-cache.

Table 124 unwritable-cache properties

Name	Type	Description
`unwritable-a-percentage`	uint8	The percentage of cache space occupied by unwritable data in controller A.
`unwritable-b-percentage`	uint8	The percentage of cache space occupied by unwritable data in controller B.

users

This basetype is used by show users.

Table 125 users properties

Name	Type	Description
username	string	User name.
roles	string	• monitor: User can view but not change system settings. • manage: User can view and change system settings. • diagnostic: User can view and change system settings.
user-type	string	The user's level of technical expertise: Novice, Standard, Advanced, or Diagnostic. This parameter does not affect access to commands.
user-type-numeric	string	Numeric equivalents for user-type values. • 1: Novice • 2: Standard • 3: Advanced • 4: Diagnostic
user-locale	string	The display language.
user-locale-numeric	string	Numeric equivalents for user-locale values. • 0: English • 3: Spanish • 4: French • 5: German • 6: Italian • 7: Japanese • 8: Korean • 9: Dutch • 11: Chinese-simplified • 12: Chinese-traditional
interface-access-WBI	string	• x: User can use the web-browser interface (the Disk Management Utility). • (blank): User cannot access this interface.
interface-access-CLI	string	• x: User can use the command-line interface. • (blank): User cannot access this interface.
interface-access-FTP	string	• x: User can use the FTP interface. • (blank): User cannot access this interface.
interface-access-SMIS	string	• x: User can use the Storage Management Initiative Specification (SMI-S) interface. • (blank): User cannot access this interface.

Table 125 users properties

Name	Type	Description
`interface-access-SNMP`	string	• `U`: The user can access the SNMPv3 interface and view the MIB. • `T`: The user can access the SNMPv3 interface and receive trap notifications. • (blank): User cannot access this interface.
`storage-size-base`	uint8	The base for entry and display of `storage-space` sizes: • `2`: Sizes are shown as powers of 2, using 1024 as a divisor for each magnitude. • `10`: Sizes are shown as powers of 10, using 1000 as a divisor for each magnitude Operating systems usually show volume size in base 2. Disk drives usually show size in base 10. Memory (RAM and ROM) size is always shown in base 2.
`storage-size-precision`	uint8	The number of decimal places (1–10) for display of storage-space sizes.
`storage-size-units`	string	The unit for display of `storage-space` sizes. • `auto`: Lets the system determine the proper unit for a size. • `MB`: Megabytes. • `GB`: Gigabytes. • `TB`: Terabytes. Based on the precision setting, if the selected unit is too large to meaningfully display a size, the system uses a smaller unit for that size. For example, if units is set to TB, precision is set to 1, and base is set to 10, the size 0.11709 TB is instead shown as 117.1 GB.
`temperature-scale`	string	• `Celsius`: Use the Celsius scale to display temperature values. • `Fahrenheit`: Use the Fahrenheit scale to display temperature values.
`timeout`	uint32	Time in seconds that the session can be idle before it automatically ends. Valid values are 120–43200 seconds (2–720 minutes).
`authentication-type`	string	For an SNMPv3 user, this specifies whether to use a security authentication protocol. Authentication uses the user password. • `none`: No authentication. • `MD5`: MD5 authentication. • `SHA`: SHA-1 authentication.
`privacy-type`	string	For an SNMPv3 user, this specifies whether to use a security encryption protocol. This parameter requires the `privacy-password` property and the `authentication-type` property. • `none`: No encryption. • `DES`: Data Encryption Standard. • `AES`: Advanced Encryption Standard.
`password`	string	User password. For a standard user the password is represented by eight asterisks. For an SNMPv3 user this is the authentication password.

Table 125 users properties

Name	Type	Description
privacy-password	string	Encryption password for an SNMPv3 user whose privacy type is set to DES or AES.
trap-destination	string	For an SNMPv3 user whose interface-access-SNMP property is set to snmptarget, this specifies the IP address of the host that will receive SNMP traps.

vdisk-hist-statistics

This basetype is used by show vdisk-statistics when the historical parameter is specified.

Table 126 vdisk-hist-statistics properties

Name	Type	Description
total-data-transferred	string	Total amount of data read and written since the last sampling time.
total-data-transferred-numeric	uint64	Unformatted total-data-transferred value.
data-read	string	Amount of data read since the last sampling time.
data-read-numeric	uint64	Unformatted data-read value.
data-written	string	Amount of data written since the last sampling time.
data-written-numeric	uint64	Unformatted data-written value.
total-bytes-per-sec	string	Data transfer rate, in bytes per second, since the last sampling time. This is the sum of read-bytes-per-second and write-bytes-per-second.
total-bytes-per-sec-numeric	uint64	Unformatted total-bytes-per-second value.
read-bytes-per-sec	string	Data transfer rate, in bytes per second, for read operations since the last sampling time.
read-bytes-per-sec-numeric	uint64	Unformatted read-bytes-per-second value.
write-bytes-per-sec	string	Data transfer rate, in bytes per second, for write operations since the last sampling time.
write-bytes-per-sec-numeric	uint64	Unformatted write-bytes-per-second value.
sample-time	string	Date and time, in the format *year-month-day hour:minutes:seconds*, when the data sample was taken.
sample-time-numeric	uint32	Unformatted sample-time value.

vdisk-statistics

This basetype is used by show vdisk-statistics when the historical parameter is omitted.

Table 127 vdisk-statistics properties

Name	Type	Description
name	string	The name of the disk group.
serial-number	string	The serial number of the disk group.
bytes-per-second	string	Data transfer rate, in bytes per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.
bytes-per-second-numeric	uint64	Unformatted bytes-per-second value.
iops	uint32	Input/output operations per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.
number-of-reads	uint64	Number of read operations since these statistics were last reset or since the controller was restarted.
number-of-writes	uint64	Number of write operations since these statistics were last reset or since the controller was restarted.
data-read	string	Amount of data read since these statistics were last reset or since the controller was restarted.
data-read-numeric	uint64	Unformatted data-read value.
data-written	string	Amount of data written since these statistics were last reset or since the controller was restarted.
data-written-numeric	uint64	Unformatted data-written value.
avg-rsp-time	uint32	Average response time in microseconds for read and write operations, calculated over the interval since these statistics were last requested or reset.
avg-read-rsp-time	uint32	Average response time in microseconds for all read operations, calculated over the interval since these statistics were last requested or reset.
avg-write-rsp-time	uint32	Average response time in microseconds for all write operations, calculated over the interval since these statistics were last requested or reset.
reset-time	string	Date and time, in the format *year-month-day hour:minutes:seconds*, when these statistics were last reset, either by a user or by a controller restart.
reset-time-numeric	uint32	Unformatted reset-time value.
start-sample-time	string	Date and time, in the format *year-month-day hour:minutes:seconds*, when sampling started for the iops and bytes-per-second values.
start-sample-time-numeric	uint32	Unformatted start-sample-time value.

Table 127 vdisk-statistics properties

Name	Type	Description
stop-sample-time	string	Date and time, in the format *year-month-day hour:minutes:seconds*, when sampling stopped for the iops and bytes-per-second values.
stop-sample-time-numeric	uint32	Unformatted stop-sample-time value.

versions

This basetype is used by show configuration and show versions.

Table 128 versions properties

Name	Type	Description
sc-cpu-type	string	Storage Controller processor type.
bundle-version	string	Firmware bundle version.
bundle-base-version	string	Firmware bundle base version.
build-date	string	Firmware bundle build date.
sc-fw	string	Storage Controller firmware version.
sc-baselevel	string	Storage Controller firmware base level.
sc-memory	string	Storage Controller memory-controller FPGA firmware version.
sc-fu-version	string	Storage Controller FU processor version.
sc-loader	string	Storage Controller loader firmware version.
capi-version	string	Configuration API (CAPI) version.
mc-fw	string	Management Controller firmware version.
mc-loader	string	Management Controller loader firmware version.
mc-base-fw	string	Management Controller firmware base level.
fw-default-platform-brand	string	Default platform brand of the Management Controller firmware.
fw-default-platform-brand-numeric	uint32	Numeric equivalents for fw-default-platform-brand values.
ec-fw	string	Expander Controller firmware version.
pld-rev	string	Complex Programmable Logic Device (CPLD) firmware version.
prm-version	string	CPLD Power Reset Manager (PRM) version.
hw-rev	string	Controller hardware version.
him-rev	string	Host interface module revision.
him-model	string	Host interface module model.

Table 128 versions properties

Name	Type	Description
backplane-type	uint8	Backplane type.
host-channel_ revision	uint8	Host interface hardware (chip) version.
disk-channel_ revision	uint8	Disk interface hardware (chip) version.
mrc-version	string	Memory Reference Code (MRC) version for Storage Controller boot Flash.
ctk-version	string	• *version*: Customization Toolkit (CTK) version applied to the system. • No CTK present: No CTK version has been applied to this system.

virtual-disk-summary

This basetype is used by show vdisk-statistics when the historical parameter is specified.

Table 129 virtual-disk-summary properties

Name	Type	Description
name	string	The name of the disk group.
serial-number	string	The serial number of the disk group.
vdisk-hist-statistics	Embedded; see vdisk-hist-statistics.	

virtual-disks

This basetype is used by show configuration and show vdisks.

Table 130 virtual-disks properties

Name	Type	Description
name	string	The name of the disk group.
blocksize	uint32	The size of a block, in bytes.
size	string	The size of the disk group, formatted to use the current base, precision, and units.
size-numeric	uint64	Unformatted size value in blocks.
freespace	string	Amount of free (available) space in the disk group, formatted to use the current base, precision, and units.
freespace-numeric	uint64	Unformatted freespace value in blocks.
owner	string	Either the preferred owner during normal operation or the partner controller when the preferred owner is offline. • A: Controller A. • B: Controller B.

Table 130 virtual-disks properties

Name	Type	Description
owner-numeric	uint32	Numeric equivalents for owner values. • 0: B • 1: A
preferred-owner	string	Controller that owns the disk group and its volumes during normal operation. • A: Controller A. • B: Controller B.
preferred-owner-numeric	uint32	Numeric equivalents for preferred-owner values. • 0: B • 1: A
raidtype	string	The disk-group RAID level. • NRAID • RAID0 • RAID1 • RAID3 • RAID5 • RAID6 • RAID10 • RAID50 • ADAPT
raidtype-numeric	uint32	Numeric equivalents for raidtype values. • 0: RAID0 • 1: RAID1 • 2: ADAPT • 3: RAID3 • 5: RAID5 • 6: NRAID • 8: RAID50 • 10: RAID10 • 11: RAID6
storage-type	string	• Linear: The disk group acts as a linear pool. • Virtual: The disk group is in a virtual pool.
storage-type-numeric	uint32	Numeric equivalents for storage-type values. • 0: Linear • 1: Virtual

Table 130 virtual-disks properties

Name	Type	Description
diskcount	uint16	Number of disks in the disk group.
sparecount	uint16	Number of spare disks assigned to the disk group.
chunksize	string	• For RAID levels except NRAID, RAID 1, and RAID 50, the configured chunk size for the disk group. • For NRAID and RAID 1, chunk size has no meaning and is therefore shown as not applicable (N/A). • For RAID 50, the disk-group chunk size calculated as: *configured-chunksize* × (*subgroup-members* - 1). For a disk group configured to use 64-KB chunk size and 4-disk subgroups, the value would be 192k (64KB × 3).

volume-groups

This basetype is used by show volume-groups.

Table 131 volume-group properties

Name	Type	Description
durable-id	string	Volume group ID.
group-name	string	The name of the volume group in the format volume-group.*, where * represents all volumes in the group.
serial-number	string	The serial number of the volume group.
type	string	The group type, which is Volume.
type-numeric	uint32	Numeric equivalents for type values.
member-count	uint32	The number of volumes in the volume group.
replication-set-serial	string	The serial number of the replication set.
volumes	Embedded; see volumes.	

volume-group-view

This basetype is used by show maps if volume groups exist.

Table 132 volume-group-view properties

Name	Type	Description
durable-id	string	Volume group ID.
serial-number	string	The serial number of the volume group.
group-name	string	The name of the volume group in the format volume-group.*, where the * represents all volumes in the group.
volume-view-mappings	Embedded; see volume-view-mappings.	

volume-group-view-mappings

This basetype is used by show maps.

Table 133 volume-group-view-mappings properties

Name	Type	Description
durable-id	string	Mapping ID.
parent-id	string	For a mapping between a volume and an initiator, the volume ID — or if the volume is a member of a volume group, the volume-group ID.
mapped-id	string	The ID of the mapping target, such as an initiator.
ports	string	• The controller host ports to which the mapping applies. • Blank if not mapped or mapped as no-access.
access	string	Type of host access to the volume. • read-write: Read and write. • read-only: Read only. • no-access: No access (masked). • not-mapped: Not mapped.
access-numeric	uint32	Numeric equivalents of access values. • 0: not-mapped • 1: no-access • 2: read-only • 3: read-write
initiator-id	string	• For an FC initiator, its WWPN. • For a SAS initiator, its WWPN. • For an iSCSI initiator, its node name (typically the IQN). • all other initiators: The volume's default mapping.
nickname	string	• For a host, its name in the format host-name.*, where the * represents all initiators in the host. • For a host group, its name in the format host-group.*.*, where the first * represents all hosts in the host group and the second * represents all initiators in those hosts. • Blank if not set or for all other initiators.
host-profile	string	• Standard: Default profile. • HP-UX: The host uses Flat Space Addressing. • OpenVMS: The initiator does not allow LUN 0 to be assigned to a mapping.

Table 133 volume-group-view-mappings properties

Name	Type	Description
`host-profile-numeric`	uint32	Numeric equivalents of `host-profile` values. • `0: Standard` • `1: HP-UX` • `2: OpenVMS`
`lun-view`	Embedded; see volume-view-mappings.	

volume-names

This basetype is used by show volume-names.

Table 134 volume-names properties

Name	Type	Description
`volume-name`	string	Volume name.
`serial-number`	string	Volume serial number.

volume-reservations

This basetype is used by show volume-reservations.

Table 135 volume-reservations properties

Name	Type	Description
volume-name	string	The name of the volume.
serial-number	string	The serial number of the volume.
reservation-active	string	• `Free`: The volume is not reserved. • `Reserved`: The volume has been reserved by a host.
reservation-active-numeric	uint32	Numeric equivalents for `reservation-active` values. • `0: Free` • `1: Reserved`
pgr-generation	uint32	The generation of the volume reservation, shown as a hexadecimal value.
host-id	string	• For an FC initiator, its WWPN. • For a SAS initiator, its WWPN. • For an iSCSI initiator, its node name (typically the IQN).
port	string	The controller host-port identifiers.
reserve-key	string	The reservation key, shown as a hexadecimal value.

Table 135 volume-reservations properties

Name	Type	Description
reserve-scope	string	The reservation scope, `Logical Unit`.
reserve-scope-numeric	uint32	Numeric equivalents for `reserve-scope` values. • `0: Logical Unit`

volumes

This basetype is used by show volumes and show volume-groups.

Table 136 volumes properties

Name	Type	Description
`durable-id`	string	Volume ID in the format `V#`, where # starts at 1 and increments for each new volume to uniquely identify it. The value is generated from available data in the current CLI session and may change after a Management Controller restart.
`virtual-disk-name`	string	The name of the disk group or pool that contains the volume.
`storage-pool-name`	string	The name of the disk group or pool that contains the volume.
`volume-name`	string	Volume name.
`size`	string	Volume capacity, formatted to use the current base, precision, and units.
`size-numeric`	uint64	Unformatted `size` value in blocks.
`total-size`	string	The total size of the volume.
`total-size-numeric`	uint64	Unformatted `total-size` value in blocks.
`allocated-size`	string	The amount of space currently allocated to a virtual volume, or the total size of a linear volume.
`allocated-size-numeric`	uint64	Unformatted `allocated-size` value in blocks.
`storage-type`	string	• `Linear`: The volume is in a linear pool. • `Virtual`: The volume is in a virtual pool.
`storage-type-numeric`	uint32	Numeric equivalents for `storage-type` values. • `0: Linear` • `1: Virtual`
`preferred-owner`	string	Controller that owns the volume during normal operation. • `A`: Controller A. • `B`: Controller B.
`preferred-owner-numeric`	uint32	Numeric equivalents for `preferred-owner` values. • `0: B` • `1: A`

Table 136 volumes properties

Name	Type	Description
owner	string	Either the preferred owner during normal operation or the partner controller when the preferred owner is offline. • A: Controller A. • B: Controller B.
owner-numeric	uint32	Numeric equivalents for owner values. • 0: B • 1: A
serial-number	string	Volume serial number.
write-policy	string	• write-back: Write-back caching does not wait for data to be completely written to disk before signaling the host that the write is complete. This is the preferred setting for a fault-tolerant environment because it improves the performance of write operations and throughput. • write-through: Write-through caching significantly impacts performance by waiting for data to be completely written to disk before signaling the host that the write is complete. Use this setting only when operating in an environment with low or no fault tolerance.
write-policy-numeric	uint32	Numeric equivalents for write-policy values. • 0: write-through • 1: write-back
cache-optimization	string	• standard: This controller cache mode of operation is optimized for sequential and random I/O and is the optimization of choice for most workloads. In this mode, the cache is kept coherent with the partner controller. This mode gives you high performance and high redundancy. • no-mirror: In this mode of operation, the controller cache performs the same as the standard mode with the exception that the cache metadata is not mirrored to the partner. While this improves the response time of write I/O, it comes at the cost of redundancy. If this option is used, the user can expect higher write performance but is exposed to data loss if a controller fails.
cache-optimization-numeric	uint32	Numeric equivalents for cache-optimization values. • 0: standard • 2: no-mirror

Table 136 volumes properties

Name	Type	Description
read-ahead-size	string	The volume's read-ahead cache setting. • Disabled: Read-ahead is disabled. • Adaptive: Adaptive read-ahead is enabled, which allows the controller to dynamically calculate the optimum read-ahead size for the current workload. • Stripe: Read-ahead is set to one stripe. The controllers treat NRAID and RAID-1 disk groups internally as if they have a stripe size of 512 KB, even though they are not striped. • 512 KB, 1 MB, 2 MB, 4 MB, 8 MB, 16 MB, or 32 MB: Size selected by a user.
read-ahead-size-numeric	uint32	Numeric equivalents for read-ahead-size values. • -2: Stripe • -1: Adaptive • 0: Disabled • 524288: 512 KB • 1048576: 1 MB • 2097152: 2 MB • 4194304: 4 MB • 8388608: 8 MB • 16777216: 16 MB • 33554432: 32 MB • -2147483648: Maximum
volume-type	string	• base: Base volume • standard: Standard volume. • snapshot: Snapshot volume.
volume-type-numeric	uint32	Numeric equivalents for volume-type values. • 0: standard • 3: snapshot • 15: base
volume-class	string	• standard: Standard volume.
volume-class-numeric	uint32	Numeric equivalents for volume-class values. • 0: standard

Table 136 volumes properties

Name	Type	Description
tier-affinity	string	• No Affinity: This setting uses the highest available performing tiers first and only uses the Archive tier when space is exhausted in the other tiers. Volume data will swap into higher performing tiers based on frequency of access and tier space availability. • Archive: This setting prioritizes the volume data to the least performing tier available. Volume data can move to higher performing tiers based on frequency of access and available space in the tiers. • Performance: This setting prioritizes volume data to the higher performing tiers. If no space is available, lower performing tier space is used. Performance affinity volume data will swap into higher tiers based upon frequency of access or when space is made available.
tier-affinity-numeric	uint32	Numeric equivalents for tier-affinity values. • 0: No Affinity • 1: Archive • 2: Performance
snapshot	string	Shows whether the volume is a snapshot.
snapshot-retention-priority	string	The retention priority for snapshots of the volume. • never-delete: Snapshots will never be deleted. • high: Snapshots may be deleted after all eligible medium-priority snapshots have been deleted. • medium: Snapshots may be deleted after all eligible low-priority snapshots have been deleted. • low: Snapshots may be deleted. Snapshots that are mapped or are not leaves of a volume's snapshot tree are not eligible for automatic deletion.
snapshot-retention-priority-numeric	uint32	Numeric equivalents for retention-priority values. • 0: never-delete • 1: high • 2: medium • 3: low
volume-qualifier	string	• N/A: Not applicable.
volume-qualifier-numeric	uint32	Numeric equivalents for volume-qualifier values. • 0: N/A
blocksize	uint32	The size of a block, in bytes.
blocks	uint64	The number of blocks, whose size is specified by the blocksize property.
capabilities	string	For internal use only.
volume-parent	string	Parent volume serial number. For example, the serial number of a snapshot's master volume.

Table 136 volumes properties

Name	Type	Description
snap-pool	string	Not applicable.
replication-set	string	Not applicable.
attributes	string	Shows whether the volume's disks are single pathed.
virtual-disk-serial	string	Disk group serial number.
volume-description	string	• For HP-UX, a text value (set in-band by a host application) that identifies the volume. • For OpenVMS, a numeric value (set with the create volume or set volume command) that identifies the volume to an OpenVMS host. • Blank by default.
wwn	string	World Wide Name of the volume.
progress	string	For a volume-copy operation, the percent complete (0%–99%).
progress-numeric	uint32	Unformatted progress value.
container-name	string	Name of the disk group or pool that contains the volume.
container-serial	string	Serial number of the disk group or pool that contains the volume.
allowed-storage-tiers	string	Not applicable.
allowed-storage-tiers-numeric	uint32	Not applicable.
threshold-percent-of-pool	string	For internal use only.
reserved-size-in-pages	uint32	For internal use only.
allocate-reserved-pages-first	string	For internal use only.
allocate-reserved-pages-first-numeric	uint32	For internal use only.
zero-init-page-on-allocation	string	For internal use only.
zero-init-page-on-allocation-numeric	uint32	For internal use only.
large-virtual-extents	string	Shows whether the system will try to allocate pages in a sequentially optimized way to reduce I/O latency in SSD applications and improve performance.
large-virtual-extents-numeric	uint32	• 0: Disabled • 1: Enabled

Table 136 volumes properties

Name	Type	Description
raidtype	string	The RAID level of the disk group. • NRAID • RAID0 • RAID1 • RAID3 • RAID5 • RAID6 • RAID10 • RAID50 • ADAPT
raidtype-numeric	uint32	Numeric equivalents for raidtype values. • 0: RAID0 • 1: RAID1 • 2: ADAPT • 3: RAID3 • 5: RAID5 • 6: NRAID • 8: RAID50 • 10: RAID10 • 11: RAID6
pi-format	string	Not applicable.
pi-format-numeric	uint32	Not applicable.
cs-replication-role	string	• Copy Source: The volume is the source for a volume copy operation. • Copy Destination: The volume is the destination for a volume copy operation. • Primary: The volume is the primary volume in a replication set. • Secondary: The volume is the secondary volume in a replication set. • (blank): Not applicable.
cs-copy-dest	string	• Off: Not applicable. • On: The volume is the destination for a volume copy operation.
cs-copy-dest-numeric	uint32	Numeric equivalents for cs-copy-dest values. • 0: Off • 1: On
cs-copy-src	string	• Off: Not applicable. • On: The volume is the source for a volume copy operation.

Table 136 volumes properties

Name	Type	Description
cs-copy-src-numeric	uint32	Numeric equivalents for cs-copy-src values. • 0: Off • 1: On
cs-primary	string	• Off: Not applicable. • On: The volume is the primary volume in a replication set.
cs-primary-numeric	uint32	Numeric equivalents for cs-primary values. • 0: Off • 1: On
cs-secondary	string	• Off: Not applicable. • On: The volume is the secondary volume in a replication set.
cs-secondary-numeric	uint32	Numeric equivalents for cs-secondary values. • 0: Off • 1: On
health	string	• OK • Degraded • Fault • Unknown • N/A
health-numeric	uint32	Numeric equivalents for health values. • 0: OK • 1: Degraded • 2: Fault • 3: Unknown • 4: N/A
health-reason	string	If Health is not OK, the reason for the health state.
health-recommendation	string	If Health is not OK, the recommended actions to take to resolve the health issue.
volume-group	string	If the volume is in a volume group, the name of the group. Otherwise, UNGROUPEDVOLUMES.
group-key	string	If the volume is in a volume group, the durable ID of the volume group. Otherwise, VGU.

volume-statistics

This basetype is used by show volume-statistics.

Table 137 volume-statistics properties

Name	Type	Description
volume-name	string	The name of the volume.
serial-number	string	The serial number of the volume.
bytes-per-second	string	The data transfer rate, in bytes per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.
bytes-per-second-numeric	uint64	Unformatted bytes-per-second value.
iops	uint32	Input/output operations per second, calculated over the interval since these statistics were last requested or reset. This value will be zero if it has not been requested or reset since a controller restart.
number-of-reads	uint64	The number of read operations since these statistics were last reset or since the controller was restarted.
number-of-writes	uint64	The number of write operations since these statistics were last reset or since the controller was restarted.
data-read	string	The amount of data read since these statistics were last reset or since the controller was restarted.
data-read-numeric	uint64	Unformatted data-read value.
data-written	string	The amount of data written since these statistics were last reset or since the controller was restarted.
data-written-numeric	uint64	Unformatted data-written value.
allocated-pages	uint32	The number of pages allocated to the volume.
percent-tier-ssd	uint16	The percentage of volume capacity occupied by data in the Performance tier.
percent-tier-sas	uint16	The percentage of volume capacity occupied by data in the Standard tier.
percent-tier-sata	uint16	The percentage of volume capacity occupied by data in the Archive tier.
percent-allocated-rfc	uint16	The percentage of volume capacity occupied by data in read cache.
pages-alloc-per-minute	uint32	The average number of pages being allocated to the volume each minute.
pages-dealloc-per-minute	uint32	The average number of pages being deallocated from the volume each minute.
shared-pages	uint32	The number of pages that are shared between this volume and any other volumes. This amount of storage will not be deallocated if the volume is deleted.
write-cache-hits	uint64	For the controller that owns the volume, the number of times the block written to is found in cache.

Table 137 volume-statistics properties

Name	Type	Description
write-cache-misses	uint64	For the controller that owns the volume, the number of times the block written to is not found in cache.
read-cache-hits	uint64	For the controller that owns the volume, the number of times the block to be read is found in cache.
read-cache-misses	uint64	For the controller that owns the volume, the number of times the block to be read is not found in cache.
small-destages	uint64	The number of times flush from cache to disk is not a full stripe.
full-stripe-write-destages	uint64	The number of times flush from cache to disk is a full stripe.
read-ahead-operations	uint64	The number of read pre-fetch or anticipatory-read operations.
write-cache-space	uint16	The cache size used on behalf of this volume.
write-cache-percent	uint32	The percentage of cache used on behalf of this volume.
reset-time	string	The date and time, in the format *year-month-day hour:minutes:seconds*, when these statistics were last reset, either by a user or by a controller restart.
reset-time-numeric	uint32	Unformatted reset-time value.
start-sample-time	string	The date and time, in the format *year-month-day hour:minutes:seconds*, when sampling started for the iops and bytes-per-second values.
start-sample-time-numeric	uint32	Unformatted start-sample-time value.
stop-sample-time	string	The date and time, in the format *year-month-day hour:minutes:seconds*, when sampling stopped for the iops and bytes-per-second values.
stop-sample-time-numeric	uint32	Unformatted stop-sample-time value.

volume-view

This basetype is used by show maps.

Table 138 volume-view properties

Name	Type	Description
durable-id	string	Volume ID in the format V#, where # starts at 1 and increments for each new volume to uniquely identify it. The value is generated from available data in the current CLI session and may change after a Management Controller restart.
volume-serial	string	The serial number of the volume.

Table 138 volume-view properties

Name	Type	Description
volume-name	string	Volume name.
volume-view-mappings	Embedded; see volume-view-mappings.	

volume-view-mappings

This basetype is used by show maps.

Table 139 volume-view-mappings properties

Name	Type	Description
durable-id	string	Mapping ID.
parent-id	string	For a mapping between a volume and an initiator, the volume ID—or if the volume is a member of a volume group, the volume-group ID.
mapped-id	string	The ID of the mapping target, such as an initiator.
ports	string	• The controller host ports to which the mapping applies. • Blank if not mapped or mapped as no-access.
lun	string	• The LUN that identifies the volume to a host. • For a volume group, * means multiple LUNs are represented in the group. • Blank if not mapped or mapped as no-access.
access	string	Type of host access to the volume. • read-write: Read and write. • read-only: Read only. • no-access: No access (masked). • not-mapped: Not mapped.
access-numeric	uint32	Numeric equivalents of access values. • 0: not-mapped • 1: no-access • 2: read-only • 3: read-write
identifier	string	• For an FC initiator, its WWPN. • For a SAS initiator, its WWPN. • For an iSCSI initiator, its node name (typically the IQN). • all other initiators: The volume's default mapping.

Table 139 volume-view-mappings properties

Name	Type	Description
nickname	string	• For a host, its name in the format host-name.*, where the * represents all initiators in the host. • For a host group, its name in the format host-group.*.*, where the first * represents all hosts in the host group and the second * represents all initiators in those hosts. • Blank if not set or for all other initiators.
host-profile	string	• Standard: Default profile. • HP-UX: The host uses Flat Space Addressing.
host-profile-numeric	uint32	Numeric equivalents of host-profile values. • 0: Standard • 1: HP-UX

Chapter 5
Settings Changed by Restore Defaults

This chapter summarizes the system settings that result from using the restore defaults command.

Table 140 Settings changed by restore defaults

Setting	Value
System information settings: • System name • System contact • System location • System information	 • `Uninitialized Name` • `Uninitialized Contact` • `Uninitialized Location` • `Uninitialized Info`
Management protocols settings: • CLI/Telnet • CLI/SSH • SLP • FTP • SFTP • SNMP • WBI/HTTP • WBI/HTTPS • SMI-S • Unsecure SMI-S • Debug • In-band SES • Activity Progress Reporting	 • Enabled • Enabled • Enabled • Enabled • Enabled • Enabled • Enabled • Enabled • Disabled • Disabled • Disabled • Disabled • Disabled
Management mode	`v3`

Table 140 Settings changed by restore defaults

Setting	Value
Users	All configured users are deleted and replaced with default user definitions and default settings: • User: `manage`; password: `!manage` **NOTE:** These defaults are only applied to systems running QXS software prior to G280. As of G280, there is no longer a default username and password, which must be entered on first system log in. • User: `monitor`; password: `!monitor` • User: `ftp`; password: `!ftp` • Temperature scale: Celsius • Timeout: 30 minutes
CLI session timeout	30 minutes
Tasks and schedules	(preserved)[1]
Management Controller debug logs	(preserved)[2]
Storage Controller event logs	(preserved)
Time/date and NTP settings	(preserved)[3]
Network IP settings	(preserved)[4]
SNMP settings: • SNMP trap notification level • SNMP trap host IPs • SNMP read community • SNMP write community	 • none • 0.0.0.0 • public • private
SMTP settings: • Email notification • Email notify filter • Email addresses • Email server • Email domain • Email sender • Log destination • Include logs	 • Disabled • (none) • (none) • (none) • (none) • (none) • (none) • Disabled
SSL/SSH certificates	(preserved)[5]
License	(preserved)[6]
Disk group metadata	(preserved)

Table 140 Settings changed by restore defaults

Setting	Value
Host port settings:	
• FC link speed	• Auto
• FC topology	• Point-to-point
Host names and profiles	(preserved)[7]
Drive spin down	Disabled
Advanced settings:	
• Disk group background scrub	• Disabled
• Disk group background scrub interval	• 24 hours
• Partner firmware upgrade	• Enabled
• Utility priority	• High
• SMART	• Enabled
• Dynamic spare configuration	• Disabled
• Chassis polling rate	• 5 seconds
• Host control of caching	• Disabled
• Sync cache mode	• Immediate
• Independent Cache mode	• Disabled
• Missing LUN response	• Not Ready
• Controller failure	• Disabled
• Supercap failure	• Enabled
• CompactFlash failure	• Enabled
• Power supply failure	• Disabled
• Fan failure	• Disabled
• Temperature exceeded	• Disabled
• Partner notify	• Disabled
• Auto write back	• Enabled
• Inactive drive spin down	• Disabled
• Inactive drive spin down delay	• 15 minutes
• Disk background scrub	• Disabled
• Managed logs	• Disabled
• Single controller mode	• Disabled (for a dual-controller system)
• Auto stall recovery	• Enabled
• Restart on CAPI fail	• Disabled
• Large pools	• Disabled
FDE settings	(preserved)

1. Factory default: no tasks or schedules.
2. Factory default: MC logs are cleared.
3. Factory default: NTP is disabled; NTP host IP address is 0.0.0.0; NTP offset is 0.

4. Factory default: IP address mode is manual; controller A IP is 10.0.0.2; controller B IP is 10.0.0.3; subnet mask is 255.255.255.0; gateway IP is 10.0.0.1.
5. Factory default: certificates are initialized.
6. Factory default: installed license is cleared.
7. Factory default: host names and profiles are cleared.

Chapter 6
Glossary

2U12	An chassis that is two rack units in height and can contain 12 disks.
2U24	An chassis that is two rack units in height and can contain 24 disks.
5U84	An chassis that is five rack units in height and can contain 84 disks.
AES	Advanced Encryption Standard.
AFA	All-flash array. A storage system that uses only SSDs, without tiering.
all-flash array	*See* AFA.
allocated page	A page of virtual pool space that has been allocated to a volume to store data.
allocation rate	The rate, in pages per minute, at which a virtual pool is allocating pages to its volumes because they need more space to store data.
ALUA	Asymmetric Logical Unit Access.
array	*See* storage system.
ASC/ASCQ	Additional Sense Code/Additional Sense Code Qualifier. Information on sense data returned by a SCSI device.
automated tiered storage	A virtual-storage feature that automatically uses the appropriate tier of disks to store data based on how frequently the data is accessed. This enables higher-cost, higher-speed disks to be used only for frequently needed data, while infrequently needed data can reside in lower-cost, lower-speed disks.
auto-write-through	*See* AWT.
available disk	A disk that is not a member of a disk group, is not configured as a spare, and is not in the leftover state. It is available to be configured as a part of a disk group or as a spare. *See also* compatible disk, dedicated spare, dynamic spare, global spare.
AWT	Auto-write-through. A setting that specifies when the RAID controller cache mode automatically changes from write-back to write-through.
base volume	A virtual volume that is not a snapshot of any other volume, and is the root of a snapshot tree.
canister	*See* IOM.
CAPI	Configuration Application Programming Interface. A proprietary protocol used for communication between the Storage Controller and the Management Controller in a controller module. CAPI is always enabled.

CHAP	Challenge-Handshake Authentication Protocol.
chassis	The sheet-metal housing of an chassis.
child volume	The snapshot of a parent volume in a snapshot tree. *See* parent volume.
chunk size	The amount of contiguous data that is written to a disk group member before moving to the next member of the disk group.
CIM	Common Information Model. The data model for WBEM. It provides a common definition of management information for systems, networks, applications and services, and allows for vendor extensions.
CIMOM	Common Information Model Object Manager. A component in CIM that handles the interactions between management applications and providers.
CNC	Converged Network Controller. A controller module whose host ports can be set to operate in FC or iSCSI mode, using qualified SFP and cable options. Changing the host-port mode is also known as changing the ports' personality.
compatible disk	A disk that can be used to replace a failed member disk of a disk group because it has at least the same capacity as, and is of the same type (enterprise SAS, for example) as, the disk that failed. *See also* available disk, dedicated spare, dynamic spare, global spare.
controller A (or B)	A short way of referring to controller module A (or B).
controller chassis	An chassis that contains one or two controller modules.
controller module	A FRU that contains the following subsystems and devices: a Storage Controller processor; a Management Controller processor; a SAS expander and Expander Controller processor; management interfaces; cache protected by a supercapacitor pack and flash memory; host, expansion, network, and service ports; and midplane connectivity.
CPLD	Complex programmable logic device.
CQL	CIM Query Language.
CRC	Cyclic Redundancy Check.
CRU	Customer-replaceable unit. A product module that can be ordered as a SKU and replaced in an chassis by customers or by qualified service personnel, without having to send the chassis to a repair facility. *See also* FRU.
CSV	Comma-separated values. A format to store tabular data in plain-text form.
DAS	Direct Attached Storage. A dedicated storage device that connects directly to a host without the use of a switch.
deallocation rate	The rate, in pages per minute, at which a virtual pool is deallocating pages from its volumes because they no longer need the space to store data.
dedicated spare	A disk that is reserved for use by a specific linear disk group to replace a failed disk. *See also* available disk, compatible disk, dynamic spare, global spare.
default mapping	Host-access settings that apply to all initiators that are not explicitly mapped to that volume using different settings. *See also* explicit mapping, masking.
DES	Data Encryption Standard.
DHCP	Dynamic Host Configuration Protocol. A network configuration protocol for hosts on IP networks.

disk group	A group of disks that is configured to use a specific RAID level and provides storage capacity for a pool. *See also* linear disk group, virtual disk group, read cache.
drain	The automatic movement of active volume data from a virtual disk group to other disk-group members within the same pool.
drawer	In a 5U84 chassis, one of two FRUs that each holds 42 disks.
drive chassis	*See* expansion chassis. *See also* EBOD, JBOD.
drive spin down	*See* DSD.
DSD	Drive spin down. A power-saving feature available for non-ADAPT linear disk groups that monitors disk activity in the storage system and spins down inactive spinning disks based on user-selectable policies. Drive spin down is not applicable to disks in virtual pools.
DSP	Digital signal processor.
dual-port disk	A disk that is connected to both controllers so it has two data paths, achieving fault tolerance.
dynamic spare	An available compatible disk that is automatically assigned, if the dynamic spares option is enabled, to replace a failed disk in a disk group with a fault-tolerant RAID level. *See also* available disk, compatible disk, dedicated spare, global spare.
EBOD	Expanded Bunch of Disks. Expansion chassis attached to a controller chassis.
EC	Expander Controller. A processor (located in the SAS expander in each controller module and expansion module) that controls the SAS expander and provides SES functionality. *See also* EMP.
EEPROM	Electrically erasable programmable ROM.
EMP	Enclosure management processor. An Expander Controller subsystem that provides SES data such as temperature, power supply and fan status, and the presence or absence of disks.
chassis	A physical storage device that contains I/O modules, disk drives, and other FRUs. *See also* controller chassis, expansion chassis.
enclosure management processor	*See* EMP.
ESD	Electrostatic discharge.
ESM	Environmental Service Module. *See* IOM.
Expander Controller	*See* EC.
expansion chassis	An chassis that contains one or two expansion modules. Expansion chassis can be connected to a controller chassis to provide additional storage capacity. *See also* EBOD, JBOD.
expansion module	A FRU that contains the following subsystems and devices: a SAS expander and Expander Controller processor; host, expansion, and service ports; and midplane connectivity.
explicit mapping	Access settings for an initiator to a volume that override the volume's default mapping. *See also* default mapping, masking.
failback	*See* recovery.
failover	In an active-active configuration, failover is the act of temporarily transferring ownership of controller resources from an offline controller to its partner controller, which remains operational. The resources include pools, volumes, cache data, host ID information, and LUNs and WWNs. *See also* recovery.

fan module	The fan FRU used in 5U84 chassis. There are five in each chassis, separate from the PSUs.
FC	Fibre Channel.
FC-AL	Fibre Channel Arbitrated Loop. The FC topology in which devices are connected in a one-way loop.
FDE	Full Disk Encryption. A feature that secures all the user data on a storage system. *See also* lock key, passphrase, repurpose, SED.
FPGA	Field-programmable gate array. An integrated circuit designed to be configured after manufacturing.
FRU	field-replaceable unit. A product module that can be replaced in an chassis by qualified service personnel only, without having to send the chassis to a repair facility. Product interfaces use the term "FRU" to refer to both FRUs and CRUs. *See* CRU.
Full Disk Encryption	*See* FDE.
GEM	Generic Enclosure Management. The firmware responsible for managing chassis electronics and environmental parameters. GEM is used by the Expander Controller.
global spare	A compatible disk that is reserved for use by any disk group with a fault-tolerant RAID level to replace a failed disk. *See also* available disk, compatible disk, dedicated spare, dynamic spare.
HBA	Host bus adapter. A device that facilitates I/O processing and physical connectivity between a host and the storage system.
host	A user-defined group of initiators that represents a server.
host group	A user-defined group of hosts for ease of management, such as for mapping operations.
host port	A port on a controller module that interfaces to a host computer, either directly or through a network switch.
initiator	An external port to which the storage system is connected. The external port may be a port in an I/O adapter in a server, or a port in a network switch.
I/O Manager	An SNMP MIB term for a controller module.
I/O module	*See* IOM.
IOM	Input/output module, or I/O module. An IOM can be either a controller module or an expansion module.
IOPS	I/O operations per second.
IQN	iSCSI Qualified Name.
iSCSI	Internet SCSI.
iSNS	Internet Storage Name Service.
JBOD	"Just a bunch of disks." *See* expansion chassis.
LBA	Logical block address. The address used for specifying the location of a block of data.
leftover	The state of a disk that the system has excluded from a disk group because the timestamp in the disk's metadata is older than the timestamp of other disks in the disk group, or because the disk was not detected during a rescan. A leftover disk cannot be used in another disk group until the disk's metadata is cleared. For information and cautions about doing so, see documentation topics about clearing disk metadata.
LFF	Large form factor.

linear	The storage-class designation for logical components such as volumes that do not use paged-storage technology to virtualize data storage. The linear method stores user data in sequential, fully allocated physical blocks, using a fixed (static) mapping between the logical data presented to hosts and the physical storage where it is stored.
linear disk group	For linear storage, a group of disks that is configured to use a specific RAID level. The number of disks that a linear disk group can contain is determined by its RAID level. Any supported RAID level can be used. When a linear disk group is created, a linear pool with the same name is also created to represent the volume-containment properties of the disk group. *See also* linear pool.
linear pool	For linear storage, a container for volumes that is composed of one linear disk group.
LIP	Loop Initialization Primitive. An FC primitive used to determine the loop ID for a controller.
lock key	A system-generated value that manages the encryption and decryption of data on FDE-capable disks. *See also* FDE, passphrase.
loop	*See* FC-AL.
LUN	Logical Unit Number. A number that identifies a mapped volume to a host system.
MAC address	Media Access Control Address. A unique identifier assigned to network interfaces for communication on a network.
Management Controller	*See* MC.
map/mapping	Settings that specify whether a volume is presented as a storage device to a host system, and how the host system can access the volume. Mapping settings include an access type (read-write, read-only, or no access), controller host ports through which initiators may access the volume, and a LUN that identifies the volume to the host system. *See also* default mapping, explicit mapping, masking.
masking	A volume-mapping setting that specifies no access to that volume by hosts. *See also* default mapping, explicit mapping.
MC	Management Controller. A processor (located in a controller module) that is responsible for human-computer interfaces, such as the Disk Management Utility, and computer-computer interfaces, such as SNMP, and interacts with the Storage Controller. *See also* EC, SC.
metadata	Data in the first sectors of a disk that stores disk-, disk-group-, and volume-specific information including disk group membership or spare identification, disk group ownership, volumes and snapshots in the disk group, host mapping of volumes, and results of the last media scrub.
MIB	Management Information Base. A database used for managing the entities in SNMP.
midplane	The printed circuit board to which components connect in the middle of an chassis.
mount	To enable access to a volume from a host OS. *See also* host, map/mapping, volume.
network port	The Ethernet port on a controller module through which its Management Controller is connected to the network.
NTP	Network time protocol.
NV device	Nonvolatile device. The CompactFlash memory card in a controller module.

OID	Object Identifier. In SNMP, an identifier for an object in a MIB.
orphan data	*See* unwritable cache data.
overcommit	A setting that controls whether a virtual pool is allowed to have volumes whose total size exceeds the physical capacity of the pool.
overcommitted	The amount of storage capacity that is allocated to virtual volumes exceeds the physical capacity of the storage system.
page	A range of contiguous LBAs in a virtual disk group.
paged storage	A method of mapping logical host requests to physical storage that maps the requests to virtualized "pages" of storage that are in turn mapped to physical storage. This provides more flexibility for expanding capacity and automatically moving data than the traditional, linear method in which requests are directly mapped to storage devices. Paged storage is also called virtual storage.
parent volume	A virtual volume that has snapshots (can be either a base volume or a base snapshot volume). The parent of a snapshot is its immediate ancestor in the snapshot tree.
partner firmware update	*See* PFU.
passphrase	A user-created password that allows users to manage lock keys in an FDE-capable system. *See also* FDE, lock key.
PCB	Printed circuit board.
PCBA	Printed circuit board assembly.
PCM	Power and cooling module FRU. A power supply module that includes an integrated fan. *See also* PSU.
PDU	Power distribution unit. The rack power-distribution source to which a PCM or PSU connects.
peer connection	The configurable entity defining a peer-to-peer relationship between two systems for the purpose of establishing an asynchronous replication relationship. *See also* peer system.
peer system	A remote storage system that can be accessed by the local system and is a candidate for asynchronous replications. Both systems in a peer connection are considered peer systems to each other, and they both maintain a peer connection with the other. Asynchronous replication of volumes may occur in either direction between peer systems configured in a peer connection. *See also* peer connection.
PFU	Partner firmware update. The automatic update of the partner controller when the user updates firmware on one controller.
PGR	Persistent group reservations.
PHY	One of two hardware components that form a physical link between devices in a SAS network that enables transmission of data.
point-to-point	Fibre Channel Point-to-Point topology in which two ports are directly connected.
pool	*See* linear pool, virtual pool.
POST	Power-on self test. Tests that run immediately after a device is powered on.
primary system	The storage system that contains a replication set's primary volume. *See also* replication set, secondary system.
primary volume	The volume that is the source of data in a replication set and that can be mapped to hosts. The primary volume exists in a primary (linear storage) or pool (virtual storage) in the primary storage system.
PSU	Power supply unit FRU.

quick rebuild	A virtual-storage feature that reduces the time that user data is less than fully fault-tolerant after a disk failure in a disk group. The quick-rebuild process rebuilds only data stripes that contain user data. Data stripes that have not been allocated to user data are rebuilt in the background.
RAID head	*See* controller chassis.
RBOD	"RAID bunch of disks." *See* controller chassis.
read cache	A special disk group, comprised of SSDs, that can be added to a virtual pool for the purpose of speeding up read access to data stored on spinning disks elsewhere in the pool. Read cache is also referred to as read flash cache.
read flash cache	*See* read cache.
recovery	In an active-active configuration, recovery is the act of returning ownership of controller resources to a controller (which was offline) from its partner controller. The resources include volumes, cache data, host ID information, and LUNs and WWNs. *See also* failover.
remote syslog support	*See* syslog.
replication	Asynchronous replication of block-level data from a volume in a primary system to a volume in a secondary system by creating an internal snapshot of the primary volume and copying the snapshot data to the secondary system via Fibre Channel or iSCSI links. The capability to replicate volumes is a licensed feature.
replication set	For virtual replication, a container that houses the infrastructure upon which replications are performed. It defines a relationship between a primary and secondary volume for the purposes of maintaining a remote copy of the primary volume on a peer system. *See* primary volume, secondary volume.
replication snapshot history	As part of handling a replication, the replication set will automatically take a snapshot of the primary and/or secondary volume, thereby creating a history of data that has been replicated over time. This feature can be enabled for a secondary volume or for a primary volume and its secondary volume, but not for a volume group.
repurpose	A method by which all data on a system or disk is erased in an FDE-capable system. Repurposing unsecures the system and disks without needing the correct passphrase. *See also* FDE, passphrase.
RFC	Read flash cache. *See* read cache.
SAS	Serial Attached SCSI.
SBB	Storage Bridge Bay. A specification that standardizes physical, electrical, and chassis-management aspects of storage chassis design.
SC	Storage Controller. A processor (located in a controller module) that is responsible for RAID controller functions. The SC is also referred to as the RAID controller. *See also* EC, MC.
secondary system	The storage system that contains a replication set's secondary volume. *See also* replication set, primary system.
secondary volume	The volume that is the destination for data in a replication set and that is not accessible to hosts. The secondary volume exists in a secondary (linear storage) or pool (virtual storage) in a secondary storage system.
secret	For use with CHAP, a password that is shared between an initiator and a target to enable authentication.

SED	Self-encrypting drive. A disk drive that provides hardware-based data encryption and supports use of the storage system's Full Disk Encryption feature. *See also* FDE.
SEEPROM	Serial electrically erasable programmable ROM. A type of nonvolatile (persistent if power removed) computer memory used as FRU ID devices.
SES	SCSI Enclosure Services. The protocol that allows the initiator to communicate with the chassis using SCSI commands.
SFCB	Small Footprint CIM Broker.
SFF	Small form factor.
SFTP	SSH File Transfer Protocol. A secure secondary interface for installing firmware updates, downloading logs, installing security certificates and keys, and installing a license. All data sent between the client and server will be encrypted.
SHA	Secure Hash Algorithm.
shelf	*See* chassis.
sideplane	A printed circuit board to which components connect longitudinally within an chassis.
SLP	Service Location Protocol. Enables computers and other devices to find services in a local area network without prior configuration.
SMART	Self-Monitoring Analysis and Reporting Technology. A monitoring system for disk drives that monitors reliability indicators for the purpose of anticipating disk failures and reporting those potential failures.
SMI-S	Storage Management Initiative - Specification. The SNIA standard that enables interoperable management of storage networks and storage devices. The interpretation of CIM for storage. It provides a consistent definition and structure of data, using object-oriented techniques. SMI-S is not supported for a system with 5U84 chassis.
snapshot	A point-in-time copy of the data in a source volume that preserves the state of the data as it existed when the snapshot was created. Data associated with a snapshot is recorded in both the source volume and in its associated snap pool. A snapshot can be mapped and written to. The capability to create snapshots is a licensed feature. Snapshots that can be mapped to hosts are counted against the snapshot-license limit, whereas transient and unmappable snapshots are not.
snapshot tree	A group of virtual volumes that are interrelated due to creation of snapshots. Since snapshots can be taken of existing snapshots, volume inter-relationships can be thought of as a "tree" of volumes. A tree can be 254 levels deep. *See also* base volume, child volume, parent volume, source volume.
SNIA	Storage Networking Industry Association. An association regarding storage networking technology and applications.
source volume	A volume that has snapshots. Used as a synonym for parent volume.
SSD	Solid-state drive.
SSH	Secure Shell. A network protocol for secure data communication.
SSL	Secure Sockets Layer. A cryptographic protocol that provides security over the internet.

standard volume	A volume that can be mapped to initiators and presented as a storage device to a host system, but is not enabled for snapshots.
Storage Controller	*See* SC.
storage system	A controller chassis with at least one connected expansion chassis. Product documentation and interfaces use the terms storage system and system interchangeably.
syslog	A protocol for sending event messages across an IP network to a logging server. This feature supports User Datagram Protocol (UDP) but not Transmission Control Protocol (TCP).
thin provisioning	A virtual-storage feature that allows actual storage for a virtual volume to be assigned as data is written, rather than storage being assigned immediately for the eventual size of the volume. This allows the storage administrator to overcommit physical storage, which in turn allows the connected host system to operate as though it has more physical storage available than is actually allocated to it. When physical resources fill up, the storage administrator can add storage capacity on demand.
tier	A homogeneous group of disks, typically of the same capacity and performance level, that comprise one or more virtual disk groups in the same pool. Tiers differ in their performance, capacity, and cost characteristics, which forms the basis for the choices that are made with respect to which data is placed in which tier. The predefined tiers are: • Performance, which uses SSDs (high speed) • Standard, which uses enterprise-class spinning SAS disks (10k/15k RPM, higher capacity) • Archive, which uses midline spinning SAS disks (<10k RPM, high capacity).
tier migration	The automatic movement of blocks of data, associated with a single virtual volume, between tiers based on the access patterns that are detected for the data on that volume.
tray	*See* chassis.
ULP	Unified LUN Presentation. A RAID controller feature that enables a host system to access mapped volumes through any controller host port. ULP incorporates ALUA extensions.
undercommitted	The amount of storage capacity that is allocated to volumes is less than the physical capacity of the storage system.
unmount	To remove access to a volume from a host OS.
unwritable cache data	Cache data that has not been written to disk and is associated with a volume that no longer exists or whose disks are not online. If the data is needed, the volume's disks must be brought online. If the data is not needed it can be cleared, in which case it will be lost and data will differ between the host system and disk. Unwritable cache data is also called orphan data.
UPS	Uninterruptible power supply.
UTC	Coordinated Universal Time.
UTF-8	UCS transformation format - 8-bit. A variable-width encoding that can represent every character in the Unicode character set used for the CLI and Disk Management Utility interfaces.
vdisk	*See* linear disk group.

virtual	The storage-class designation for logical components such as volumes that use paged-storage technology to virtualize data storage. *See* paged storage.
virtual disk group	A group of disks that is configured to use a specific RAID level. The number of disks that a virtual disk group can contain is determined by its RAID level. A virtual disk group can be added to a new or existing virtual pool. *See also* virtual pool.
virtual pool	A container for volumes that is composed of one or more virtual disk groups.
volume	A logical representation of a fixed-size, contiguous span of storage that is presented to host systems for the purpose of storing data.
volume group	A user-defined group of volumes for ease of management, such as for mapping operations.
VPD	Vital Product Data. Data held on an EEPROM in an chassis or FRU that is used by GEM to identify and control the component.
WBEM	Web-Based Enterprise Management.
WBI	Web-browser interface, called Storage Management Console. The primary interface for managing the storage system. A user can enable the use of HTTP, HTTPS for increased security, or both.
WWN	World Wide Name. A globally unique 64-bit number that identifies a device used in storage technology.
WWNN	World Wide Node Name. A globally unique 64-bit number that identifies a device.
WWPN	World Wide Port Name. A globally unique 64-bit number that identifies a port.