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# HPE MSA 1060/2060/2062 CLI Reference Guide

## **Abstract**

This guide provides information about managing an HPE MSA 1060/2060/2062 Storage system by using its command-line interface (CLI).

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# Contents

<b>1 Using the CLI</b> .....	<b>14</b>
Accessing the CLI .....	14
CLI output modes .....	14
Using CLI interactively .....	14
Using a script to access the CLI .....	15
Using XML API output .....	19
Using JSON API output .....	19
Scripting guidelines .....	20
XML API optimization .....	22
Command syntax .....	23
General rules for specifying commands .....	23
Specifying disks .....	23
Specifying disk groups .....	24
Specifying pools .....	24
Specifying volumes .....	24
Specifying volume groups .....	24
Specifying ports .....	24
Specifying initiators and hosts .....	25
Specifying host groups .....	25
User password rules .....	25
Viewing help .....	25
Command completion, editing, and history .....	25
Size representations .....	26
Event log .....	26
Alerts .....	27
<b>2 Categorical list of commands</b> .....	<b>28</b>
Current commands by category .....	28
Removed commands .....	33
<b>3 Alphabetical list of commands</b> .....	<b>34</b>
abort copy .....	35
abort replication .....	36
abort scrub .....	37
activate certificate .....	38
activate firmware .....	39
add disk-group .....	40
add event-subscriber .....	43
add host-group-members .....	45
add host-members .....	46

add ipv6-address .....	47
add spares .....	49
add volume-group-members .....	50
check firmware-upgrade-health .....	51
check update-server .....	53
clear alerts .....	54
clear cache .....	55
clear disk-metadata .....	56
clear dns-parameters .....	58
clear events .....	59
clear expander-status .....	60
clear fde-keys .....	61
clear replication-queue .....	62
clear update-server-proxy .....	63
copy volume .....	64
create certificate-signing-request .....	66
create chap-record .....	68
create host .....	70
create host-group .....	72
create peer-connection .....	73
create remote-system .....	75
create replication-set .....	76
create schedule .....	80
create snapshots .....	82
create task .....	83
create user .....	86
create user-group .....	90
create volume .....	93
create volume-group .....	97
create volume-set .....	98
delete all-snapshots .....	102
delete chap-records .....	103
delete event-subscriber .....	104
delete host-groups .....	105
delete hosts .....	106
delete initiator-nickname .....	107
delete peer-connection .....	108
delete pools .....	109
delete remote-system .....	111
delete replication-set .....	112
delete schedule .....	113
delete snapshot .....	114

delete task .....	115
delete user .....	116
delete user-group .....	117
delete volume-groups .....	118
delete volumes .....	119
dequarantine .....	120
erase disk .....	122
exit .....	124
expand disk-group .....	125
expand volume .....	127
fail .....	128
help .....	129
map volume .....	130
meta .....	132
ping .....	133
query metrics .....	134
query peer-connection .....	137
recover replication-set .....	140
release volume .....	143
remote .....	144
remove certificate .....	145
remove disk-groups .....	146
remove host-group-members .....	148
remove host-members .....	149
remove ipv6-address .....	150
remove spares .....	151
remove volume-group-members .....	152
replicate .....	153
rescan .....	155
reset all-statistics .....	156
reset ciphers .....	157
reset controller-statistics .....	158
reset disk-error-statistics .....	159
reset disk-statistics .....	160
reset dns-management-hostname .....	161
reset host-link .....	162
reset host-port-statistics .....	163
reset pool-statistics .....	164
reset snapshot .....	165
reset volume-statistics .....	166
restart mc .....	167
restart sc .....	168

restore defaults .....	169
resume replication-set .....	170
rollback volume .....	171
scrub disk-groups .....	173
set advanced-settings .....	175
set alert .....	181
set chap-record .....	182
set ciphers .....	184
set cli-parameters .....	186
set controller-date .....	189
set debug-log-parameters .....	191
set disk .....	193
set disk-group .....	195
set disk-parameters .....	196
set dns-management-hostname .....	198
set dns-parameters .....	199
set email-parameters .....	201
set enclosure .....	204
set event-subscriber .....	206
set fde-import-key .....	207
set fde-lock-key .....	208
set fde-state .....	210
set host .....	212
set host-group .....	213
set host-parameters .....	214
set initiator .....	218
set ipv6-network-parameters .....	219
set iscsi-parameters .....	221
set ldap-parameters .....	223
set led .....	225
set network-parameters .....	226
set ntp-parameters .....	228
set password .....	230
set peer-connection .....	231
set pool .....	233
set prompt .....	235
set protocols .....	236
set proxy-server .....	238
set remote-system .....	240
set replication-set .....	241
set schedule .....	244
set snapshot-space .....	246

set snmp-parameters .....	248
set syslog-parameters .....	250
set system .....	252
set task .....	253
set update-server .....	255
set user .....	257
set user-group .....	261
set volume .....	264
set volume-cache-parameters .....	267
set volume-group .....	269
show advanced-settings .....	270
show alert-condition-history .....	274
show alerts .....	276
show audit-log .....	279
show cache-parameters .....	281
show certificates .....	284
show chap-records .....	288
show ciphers .....	289
show cli-parameters .....	290
show configuration .....	292
show controller-date .....	294
show controller-statistics .....	295
show controllers .....	297
show debug-log-parameters .....	301
show disk-group-statistics .....	302
show disk-groups .....	304
show disk-parameters .....	309
show disk-statistics .....	311
show disks .....	316
show dns-management-hostname .....	324
show dns-parameters .....	325
show email-parameters .....	326
show enclosures .....	328
show event-subscriber .....	330
show events .....	332
show expander-status .....	335
show fans .....	338
show fde-state .....	340
show firmware-bundles .....	341
show firmware-update-status .....	343
show frus .....	344
show host-groups .....	348

show host-phy-statistics .....	350
show host-port-statistics .....	351
show initiators .....	353
show inquiry .....	355
show ipv6-addresses .....	356
show ipv6-network-parameters .....	357
show iscsi-parameters .....	358
show ldap-parameters .....	360
show license .....	361
show maps .....	363
show metrics-list .....	366
show network-parameters .....	369
show ntp-status .....	371
show peer-connections .....	372
show pools .....	374
show pool-statistics .....	377
show ports .....	381
show power-supplies .....	385
show protocols .....	387
show provisioning .....	389
show proxy-server .....	392
show redundancy-mode .....	393
show remote-systems .....	395
show replication-sets .....	397
show replication-snapshot-history .....	400
show sas-link-health .....	402
show schedules .....	403
show sensor-status .....	405
show sessions .....	406
show shutdown-status .....	408
show snapshots .....	409
show snapshot-space .....	412
show snmp-parameters .....	414
show syslog-parameters .....	416
show system .....	417
show system-parameters .....	419
show tasks .....	421
show tiers .....	427
show tier-statistics .....	429
show timezones .....	431
show unwritable-cache .....	432
show update-server .....	433



show user-groups .....	434
show users .....	436
show versions .....	438
show volume-copies .....	439
show volume-groups .....	440
show volume-names .....	442
show volume-reservations .....	443
show volume-statistics .....	445
show volumes .....	447
show workload .....	451
shutdown .....	453
start metrics .....	454
stop metrics .....	455
suspend replication-set .....	456
test .....	457
trust .....	459
unfail controller .....	466
unmap volume .....	467
whoami .....	468
<b>4 API basetype properties .....</b>	<b>469</b>
advanced-settings-table .....	469
alerts .....	472
audit-log .....	474
cache-parameter .....	474
cache-settings .....	475
certificates .....	475
chap-records .....	476
ciphers .....	476
cli-parameters .....	477
code-load-readiness .....	478
code-load-readiness-reasons .....	478
communication-ports .....	479
conditions .....	479
controller-cache-parameters .....	480
controller-statistics .....	480
controllers .....	482
copy-volumes .....	485
cs-replicate-tasks .....	486
cs-replication .....	486
cs-replication-set .....	487
current-replication-snapshots .....	489

debug-log-parameters .....	489
disk-groups .....	492
disk-group-statistics .....	497
disk-group-statistics-paged .....	498
disk-hist-statistics .....	498
disk-statistics .....	499
disk-update .....	501
dns-parameters .....	501
drive-parameters .....	502
drive-summary .....	502
drives .....	503
email-parameters .....	509
enclosure-fru .....	510
enclosure-list .....	511
enclosures .....	512
enclosure-sku .....	514
event-subscriber .....	514
events .....	515
eventsLogs .....	515
expander-ports .....	516
expander-versions .....	517
expanders .....	517
fan .....	518
fc-port .....	519
fde-state .....	520
firmware-bundles .....	520
firmware-update .....	521
firmware-versions .....	521
fru-versions .....	522
health-conditions .....	522
heatmaps .....	522
host .....	523
host-group .....	523
host-group-view .....	524
host-port-statistics .....	524
host-view-mappings .....	525
initiator .....	525
initiator-view .....	526
inquiry .....	526
io-modules .....	527
ipv6-addresses .....	528
ipv6-network-parameters .....	529

iscsi-parameters .....	529
iscsi-port .....	530
ldap-parameters .....	531
license .....	532
local-ports .....	533
local-ports-detail .....	533
log-header-table .....	534
logon-user-detail .....	534
metrics-list .....	534
mgmt-hostnames .....	535
midplane-versions .....	536
network-parameters .....	536
ntp-status .....	537
peer-connection-info .....	537
peer-connections .....	538
peer-controllers .....	538
peer-ports .....	539
pool-hist-statistics .....	539
pools .....	540
pool-statistics .....	543
pool-summary .....	544
port .....	544
power-supplies .....	545
product-info .....	547
provisioning .....	547
proxy-server .....	547
psu-versions .....	548
readcache-hist-statistics .....	548
redfish-persistent-data .....	549
redundancy .....	550
remote-ports .....	551
remote-ports-detail .....	552
remote-system .....	552
replication-snapshot-history .....	553
reset-snapshot-tasks .....	554
resettable-statistics .....	554
sas-host-phy-statistics .....	555
sas-port .....	555
sas-status-controller-a .....	555
schedules .....	557
security-communications-protocols .....	558
sensors .....	559

sessions .....	560
show-other-MC-status .....	561
shutdown-status .....	561
snapshots .....	561
snapshot-with-retention-tasks .....	563
snap-space .....	563
snap-tasks .....	564
snmp-parameters .....	564
status .....	565
syslog-parameters .....	565
system .....	566
system-parameters-table .....	567
tasks .....	570
tier-hist-statistics .....	571
tiers .....	572
tier-statistics .....	572
tier-summary .....	573
time-settings-table .....	573
timezones .....	573
unhealthy-component .....	574
unwritable-cache .....	575
update-server .....	575
update-status-process-step .....	576
update-status-summary .....	577
usergroups .....	577
users .....	578
versions .....	580
volume-groups .....	581
volume-names .....	581
volume-reservations .....	582
volume-statistics .....	582
volume-view .....	584
volume-view-mappings .....	584
volumes .....	585
workload .....	588
<b>5 Support and other resources .....</b>	<b>590</b>
Accessing Hewlett Packard Enterprise Support .....	590
Accessing updates .....	590
Remote support .....	591
Customer self repair .....	591
Warranty information .....	591

Regulatory information .....	591
Additional regulatory information .....	591
Documentation feedback .....	592
<b>A Settings changed by restoring defaults .....</b>	<b>593</b>
<b>B API commands .....</b>	<b>598</b>
add certificate .....	598
<b>Glossary .....</b>	<b>600</b>
<b>Index .....</b>	<b>612</b>

# 1 Using the CLI

This chapter introduces the command-line interface (CLI).

## Accessing the CLI

The CLI software embedded in the controller modules enables you to manage and monitor storage system operation. Access the CLI in one of two ways:

- Use secure protocols HTTPS or SSH on a management host that is remotely connected through a LAN to a controller module's network port. Using insecure protocols HTTP and Telnet is also supported but not recommended.
- Use a terminal emulator on a management host that is directly connected to a controller module's management serial port.

For information about accessing the CLI and obtaining IP values for storage system management, see the *HPE MSA 1060/2060/2062 Installation Guide*.

## CLI output modes

The CLI has two output modes:

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

Console mode enables users to interact with the CLI and obtain easily readable information. This mode 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 mode, some commands display confirmation prompts. Regardless of the locale, confirmation prompts only accept English characters, such as `y` for `yes` or `n` for `no`.

API mode enables any external application to interact with the storage system. XML and JSON formats are supported. These 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 mode, commands do *not* use confirmation prompts.

Scripting is not supported using console mode because labels, field sizes, and order of fields may change in future firmware releases. To properly script CLI commands use API mode, 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 mode by using the `set cli-parameters` command.

## Using 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.

---

**!** **IMPORTANT** Interactive mode requires confirmation for commands that can 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 manage@<IP-address>
Password:
```

```
<product>
System Name: Test
System Location: Lab
Version: <version>
# show controller-date
Controller Date: 2020-01-23 11:05:12
Time Zone Offset: -07:00

Success: Command completed successfully. (2020-01-23 11:05:12)
# 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 HTTPS (preferred) or HTTP interface to access the API.

Two login methods are supported:

- HTTPS authentication using a SHA-256 hash to return a session key that is sent for each request. The session key and the user login are valid as long as they are used, with the same inactivity timeout as that of the user whose login credentials were used. The default timeout during user creation is 30 minutes.

To log in to the HTTPS API, the username and password must be joined with an underscore as a separator (<username>\_<password>) and then sent through a SHA-256 hash. The SHA-256 hash is represented in hexadecimal format. This string is appended to the login function for the API, `https://<IP-address>/api/login/hash`. For example:  
`https://10.0.0.2/api/login/<SHA256-hash>`

---

**NOTE** The SHA-256 method is not compatible with LDAP user accounts. For LDAP, use HTTPS basic authentication instead.

---

- HTTPS basic authentication using the `Authorization` header. If this login method is used, the username and password must be joined with a ':' (<username>:<password>) and then encoded in Base64. For example:

```
Authorization: Basic base64-string
Use the following URL for basic authentication:
https://<IP-address>/api/login
```

For both methods, the response returned is in XML and the content contains an `OBJECT` element. Within the `OBJECT` element, a `PROPERTY` element with the name attribute of `response` contains the session key. These API elements are described in [Table 1 on page 19](#).

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

---

**NOTE** The API provides default self-signed certificates for an HTTPS connection. For the certificate to be validated, download it through a browser and then set the following environment variable to point to the certificate:

```
# export HTTPS_CA_FILE=path-to-certificate
```

---

```
# Include required libraries
use LWP::UserAgent;
use XML::LibXML;
```

```

use HTTP::Request::Common;
use IO::Socket::SSL qw( SSL_VERIFY_NONE );
# For SHA-256 Authentication
use Digest::SHA qw(sha256_hex);

use constant use_basic_auth => 1;

my $user = "manage";
my $password = "Abcd_1234";
my $ip = "YourIPAddress";
my $protocol = "https";

# Create a user agent for sending requests
my $user_agent = LWP::UserAgent->new();

# Skip certificate verification
$user_agent->ssl_opts(
    SSL_verify_mode => SSL_VERIFY_NONE,
    verify_hostname => 0
);

my $request;
if( use_basic_auth ) {
    # Login with HTTP basic authentication
    my $auth_url = "$protocol://$ip/api/login/";
    $request = HTTP::Request->new( GET=>$auth_url );
    $request->authorization_basic( $user, $password );
} else {
    # Login with SHA-256 hash
    my $auth_data = "$user\_password";
    my $sha256_hash = sha256_hex( $auth_data );
    my $auth_url = "$protocol://$ip/api/login/$sha256_hash";
    $request = HTTP::Request->new( GET => $auth_url );
}

# Request return data be XML format
$request->header( 'dataType'=>'ipa' );

# Make the request
$response = $user_agent->request( $request );

# Parse the returned XML and retrieve the returned 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;
    }
}

```



```

    }
}

# Using the session key, request the system configuration
$url = "$protocol://$ip/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;

```

The last several lines of the Perl code above show how to get the entire configuration information from the CLI and print the output using the `ipa` option for XML output. The output can easily be redirected to a file for archiving.

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 can be useful for tabular reports obtained directly from the CLI commands.

The following example shows how to construct a Python script to access the XML API via HTTPS.

```

import base64
import sys
import urllib.request
import xml.dom.minidom
import ssl

username = 'manage'
password = 'Abcd_1234'
# For the following, the protocol (HTTP or HTTPS) must be specified; for example,
# https://10.235.221.121
if sys.argv[1]:
    ip = sys.argv[1]
else:
    sys.exit(1)

temp_string = bytes(username + ':' + password, "utf-8")
encodedBytes = base64.b64encode(temp_string)
auth_string = str(encodedBytes, "utf-8")
print("Base64 = " + auth_string + "\n")

url = ip + '/api/login/'
req = urllib.request.Request(url)
req.add_header('Authorization', 'Basic ' + auth_string)

print(req.get_full_url())
print(req.get_header('Authorization'))

# Skip certificate verification
context = ssl._create_unverified_context()
response = urllib.request.urlopen(req, context=context)
xmlDoc = xml.dom.minidom.parseString(response.read())
loginObjs = xmlDoc.getElementsByTagName('OBJECT')
loginProps = xmlDoc.getElementsByTagName('PROPERTY')
sessionKey = ''

```

```

for lProp in loginProps:
    name = lProp.getAttribute('name')
    print("Property = " + name)
    if name == 'response':
        sessionKey = lProp.firstChild.data

print("Session Key = " + sessionKey + "\n" )

url = ip + '/api/show/disks'
req = urllib.request.Request(url)
req.add_header('sessionKey', sessionKey)
req.add_header('dataType', 'console')
response = urllib.request.urlopen(req, context=context)
print(response.read().decode('utf-8'))

```

The following example shows how to construct a Python script to communicate with the JSON API via HTTPS and return the response in JSON format.

```

import sys
import requests
import json
import hashlib
# NOTE: This is to suppress the insecure connection warning for certificate
# verification.
from requests.packages.urllib3.exceptions import InsecureRequestWarning
requests.packages.urllib3.disable_warnings(InsecureRequestWarning)

USE_BASIC_AUTH = 1

url = "https://<YourIPAddress>"
username = "manage"
password = "Abcd_1234"

if USE_BASIC_AUTH:
    # HTTP basic authentication
    headers = {'datatype': 'json'}
    r = requests.get(url + '/api/login', auth=(username, password), headers=headers, verify=False)
else:
    # SHA-256 authentication
    auth_bytes = bytes(username + '_' + password, 'utf-8')
    auth_string = hashlib.sha256(auth_bytes).hexdigest()
    headers = {'datatype': 'json'}
    r = requests.get(url + '/api/login/' + auth_string, headers=headers, verify=False )

# Extract session key from response
response = json.loads(r.content.decode('utf-8'))
sessionKey = response['status'][0]['response']

# Obtain the health of the system
headers = {'sessionKey': sessionKey, 'datatype': 'json'}
r = requests.get(url + '/api/show/system', headers=headers, verify=False)

```

```

print(r.content.decode('utf-8'))
response = json.loads(r.content)
print("Health = " + response['system'][0]['health'])

```

## 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 1 XML API elements**

Elements	Description and attributes
RESPONSE	<p>The RESPONSE element is the top-level element, which contains all data output for the CLI command that was issued. The response includes:</p> <ul style="list-style-type: none"> <li>A number of OBJECT elements, which varies by command.</li> <li>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.</li> </ul> <p>There is only one RESPONSE element per issued command.</p>
OBJECT	<p>In general, an OBJECT element describes a storage system component such as a disk or a volume. An object has these attributes:</p> <ul style="list-style-type: none"> <li><code>basetype</code>. 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.).</li> <li><code>name</code>. The name of the object.</li> <li><code>oid</code>. The unique identifier for the object in the scope of the response.</li> </ul> <p>The OBJECT element can contain PROPERTY elements.</p>
PROPERTY	<p>A PROPERTY element provides detail about the attributes of an OBJECT. A property has these attributes:</p> <ul style="list-style-type: none"> <li><code>name</code>. The unique name for the property within the object.</li> <li><code>type</code>. The type of data represented by the element data.</li> <li><code>key</code>. Indicates whether this property is a key value to identify this object.</li> <li><code>size</code>. Typically the maximum size of the output. Usually only important if the console output is displayed in rows.</li> <li><code>draw</code>. Whether to show or hide this data in console mode.</li> <li><code>sort</code>. The type of sorting that can be applied to this property.</li> <li><code>display-name</code>. The label for this data to show in user interfaces.</li> </ul>
COMP	<p>A COMP (composition) element associates nested objects, such as a task object within a schedule object. A composition element has these attributes:</p> <ul style="list-style-type: none"> <li><code>G</code>. The OID of the group component.</li> <li><code>P</code>. The OID of the part component.</li> </ul> <p>An alternative to using COMP elements is described in <a href="#">"XML API optimization" on page 22</a>.</p>
ASC	<p>The association element provides a simple association description between two objects in the response.</p> <ul style="list-style-type: none"> <li><code>A</code>. First object.</li> <li><code>B</code>. Second object.</li> </ul>

## 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 and 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",
      "meta": "/meta/versions",
      "sc-cpu-type": "Broadwell 2200MHz",
      "bundle-version": "<bundle-version>",
      ...
    },
    {
      "object-name": "controller-b-versions",
      ...
    }
  ],
  "status": [
    {
      "object-name": "status",
      "meta": "/meta/status",
      "response-type": "Success",
      "response-type-numeric": 0,
      "response": "Command completed successfully. (2020-01-29 10:34:38)",
      "return-code": 0,
      "component-id": "",
      "time-stamp": "2020-01-29 10:34:38",
      "time-stamp-numeric": 1580294078
    }
  ]
}
```

---

**NOTE** If the system has warnings or other messages to report, there can be more than one status object returned in this list, so the command status might not appear in the first element of the list.

---


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 HTTPS or HTTP 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 mode 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. (2020-01-29
10:58:27)</PROPERTY>
  <PROPERTY name="return-code" type="sint32">0</PROPERTY>
  <PROPERTY name="component-id" type="string"></PROPERTY>
  <PROPERTY name="time-stamp" type="string">2020-01-29 10:58:27</PROPERTY>
  <PROPERTY name="time-stamp-numeric" type="uint32">1580295507</PROPERTY>
</OBJECT>
```

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

```
"status": [
  {
    "object-name": "status",
    "meta": "/meta/status",
    "response-type": "Success",
    "response-type-numeric": 0,
    "response": "Command completed successfully. (2020-01-29 11:01:10)",
    "return-code": 0,
    "component-id": "",
    "time-stamp": "2020-01-29 11:01:10",
    "time-stamp-numeric": 1580295670
  }
]
```

A script should check the previous command's status before proceeding with the next command. The value of the `status` object's `return-code` property may be:

- 0: The command completed successfully.
- -1000 to -1999: The command completed with a warning.
- Any other value: The command failed.

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 table 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.

**Table 2 Command input and API output format examples**

Context	Example
Command-line interface format	<code>create user JSmith interfaces wbi password Abc#1379</code>
HTTPS interface format	<code>create/user/JSmith/interfaces/wbi/password/Abc#1379</code>

**Table 2 Command input and API output format examples (continued)**

Context	Example
XML API output	<pre>&lt;?xml version="1.0" encoding="UTF-8" standalone="yes"?&gt; &lt;RESPONSE VERSION="L100" REQUEST="create user JSmith interfaces wbi password Abc#1379"&gt;   &lt;OBJECT basetype="status" name="status" oid="1"&gt;     &lt;PROPERTY name="response-type" type="string"&gt;Success&lt;/PROPERTY&gt;     &lt;PROPERTY name="response-type-numeric" type="uint32"&gt;0&lt;/PROPERTY&gt;     &lt;PROPERTY name="response" type="string"&gt;Command completed successfully. (JSmith) - The new user was created. (2020-01-29 11:08:59)&lt;/PROPERTY&gt;     &lt;PROPERTY name="return-code" type="sint32"&gt;0&lt;/PROPERTY&gt;     &lt;PROPERTY name="component-id" type="string"&gt;JSmith&lt;/PROPERTY&gt;     &lt;PROPERTY name="time-stamp" type="string"&gt;2020-01-29 11:08:59&lt;/PROPERTY&gt;     &lt;PROPERTY name="time-stamp-numeric" type="uint32"&gt;1580296139&lt;/PROPERTY&gt;   &lt;/OBJECT&gt; &lt;/RESPONSE&gt;</pre>
JSON API output	<pre>{   "status": [     {       "object-name": "status",       "meta": "/meta/status",       "response-type": "Success",       "response-type-numeric": 0,       "response": "Command completed successfully. (JSmith) - The new user was created. (2020-01-29 11:05:40)",       "return-code": 0,       "component-id": "JSmith",       "time-stamp": "2020-01-29 11:05:40",       "time-stamp-numeric": 1580295940     }   ] }</pre>

## 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. 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_A1</PROPERTY>
    <PROPERTY name="controller" key="true" type="string">A</PROPERTY>
    <PROPERTY name="controller-numeric" key="true" type="uint32">1</PROPERTY>
    <PROPERTY name="port" key="true" type="string">A1</PROPERTY>
    ...
  <OBJECT basetype="fc-port" name="port-details" oid="2" format="rows">
```

```

    <PROPERTY name="configured-topology" type="string">PTP</PROPERTY>
    <PROPERTY name="configured-topology-numeric" type="uint32">1</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 keywords 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 angle brackets (<>) represent variable text, such as user-defined input. Substitute text that is appropriate for the task you want to perform, and do not type the bracket characters. Unless specified otherwise, variable values such as names of users and volumes are case sensitive and have a maximum length in bytes. The system uses UTF-8 which supports: 1 byte per character for English, Dutch, French, German, Italian, and Spanish; 3 bytes per character for Chinese, Japanese, and Korean. For example, a name that can contain 15 bytes can contain 15 characters in English or 5 characters in Chinese.
- 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. If a parameter includes a list of values and any value includes a space, the entire list must be enclosed in double quotes. Unless specified otherwise, if you include leading or trailing spaces with a value 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 whose entirety matches the initial part of an optional parameter's keyword, you must specify the optional parameter before the keyword-less parameter.

For example, the `create user` command has an optional parameter with the keyword `base` and a name parameter with no keyword. To create a user named "base" or "bas" the `base` parameter must precede the name parameter. To create a user named "base1" or "ase" the parameters can be in any order.

### Specifying disks

Disks are specified by enclosure ID and slot number. Enclosure IDs increment from 1. Disk IDs increment from 1 in each enclosure. 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 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

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: `dg1_v1, "Vol #1"`

## Specifying volume groups

You can specify a volume group by its name in the format `<volume-group>.*`, where `*` represents all volumes in the group. Example: `TestVolumes.*`

Volume groups cannot be mapped.

## 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).

The top controller module's ID is A and the bottom controller module's ID is B. Controller IDs are not case sensitive.

Port IDs increment from 1 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).
- A host by name in the format `<hostname>.*`, where `*` represents all initiators in the host. Example: `Mail_Server.*`

## Specifying host groups

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.*.*`

## User password rules

- The value is case sensitive.
- The value can have from 8 to 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 the topic for the `help` command.

## 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 c1` 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 redisplay 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 3 Keyboard shortcuts for command completion, editing, and history**

Task	Shortcut
Complete a partially entered keyword	TAB or CTRL+I
Show command history	F6
Get previous command from history	↑
Get next command from history	↓
Move cursor left	←

**Table 3 Keyboard shortcuts for command completion, editing, and history (continued)**

Task	Shortcut
Move cursor right	→
Delete previous character	BACKSPACE
Delete previous, current, or next character (varies by terminal emulator)	DELETE
Move the cursor to the start of the line	HOME
Move the cursor to the end of the line	END

**NOTE** Keyboard shortcut support varies by terminal emulator.

## 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`. For entry of storage-space sizes, unless a base-2 or base-10 unit is specified, the unit is 512-byte blocks. If your base is set to 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.

**Table 4 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 <sup>2</sup>	MB (megabyte)	1,000 <sup>2</sup>
GiB (gibibyte)	1,024 <sup>3</sup>	GB (gigabyte)	1,000 <sup>3</sup>
TiB (tebibyte)	1,024 <sup>4</sup>	TB (terabyte)	1,000 <sup>4</sup>
PiB (pebibyte)	1,024 <sup>5</sup>	PB (petabyte)	1,000 <sup>5</sup>
EiB (exbibyte)	1,024 <sup>6</sup>	EB (exabyte)	1,000 <sup>6</sup>

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

**Table 5 Decimal (radix) point character by locale**

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

## Event log

A controller enclosure'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 of severity:

- **Informational:** A configuration or state change occurred, or a problem occurred that the system corrected. No action is required.

- **Warning:** A problem occurred that may affect system stability but not data integrity. Evaluate the problem and correct it if necessary.
- **Error:** A failure occurred that may affect data integrity or system stability. Correct the problem as soon as possible.
- **Critical:** A failure occurred that may cause a controller to shut down. Correct the problem *immediately*.
- **Resolved:** A condition that caused an event to be logged has been resolved.

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

## Alerts

The alerts mechanism is a robust storage enclosure health and notification system designed to identify actionable conditions and promote best practices. Alerts enable you to monitor system health and performance issues and to track and acknowledge the resolution of these issues.

Each alert has one of the following levels of severity:

- **Informational:** The system configuration does not match recommendations. No change is required, but for optimal system performance and security, you should resolve the issue.
- **Warning:** A problem occurred that may affect system stability or performance but not data integrity. Evaluate the problem and correct it if necessary.
- **Critical:** A failure occurred that may cause a controller to shut down or could affect data integrity or system stability. Correct the problem *immediately*.
- **Unknown:** The system is unable to determine the state of a component. In some configurations, this situation is normal. In other situations, resolving other system issues should resolve this issue as well.

For information about viewing alerts, see the `show alerts` command.

## 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 6** Commands by category

Category	Commands
CLI and users	create user delete user exit help meta set cli-parameters set password set prompt set user show cli-parameters show sessions show users whoami
LDAP and user groups	create user-group delete user-group set ldap-parameters set user-group show ldap-parameters show user-groups whoami
Disks, disk groups, pools, tiers, and spares	abort scrub add disk-group add spares clear disk-metadata delete pools dequarantine erase disk expand disk-group remove disk-groups remove spares rescan scrub disk-groups set disk-group set pool show disk-groups show disks show pools show tiers trust

**Table 6 Commands by category (continued)**

<b>Category</b>	<b>Commands</b>
Full disk encryption	clear fde-keys set disk set fde-import-key set fde-lock-key set fde-state show fde-state
Volumes, initiators, hosts, and mapping	create volume create volume-set delete initiator-nickname delete volumes expand volume map volume release volume set initiator set volume show initiators show maps show ports show unwritable-cache show volume-names show volume-reservations show volumes unmap volume
Volume groups	add volume-group-members create volume-group delete volume-groups remove volume-group-members set volume-group show volume-groups
Host groups	add host-group-members add host-members create host create host-group delete host-groups delete hosts remove host-group-members remove host-members set host set host-group show host-groups
Snapshots, volume copy, and rollback	abort copy copy volume create snapshots delete all-snapshots delete snapshot reset snapshot rollback volume set snapshot-space show snapshot-space show snapshots show volume-copies

**Table 6 Commands by category (continued)**

<b>Category</b>	<b>Commands</b>
Scheduled tasks	create schedule create task delete schedule delete task set schedule set task show schedules show tasks
Notifications (alerts and events)	clear alerts set alert set email-parameters set snmp-parameters set syslog-parameters show alert-condition-history show alerts show email-parameters show events show snmp-parameters show syslog-parameters test

**Table 6 Commands by category (continued)**

Category	Commands
System configuration and utilities	activate certificate activate firmware add certificate (API command) add ipv6-address check firmware-upgrade-health clear cache clear dns-parameters create certificate-signing-request create chap-record delete chap-records ping remove certificate remove ipv6-address reset dns-management-hostname reset host-link restart mc restart sc set advanced-settings set chap-record set controller-date set disk-parameters set dns-management-hostname set dns-parameters set enclosure set host-parameters set ipv6-network-parameters set iscsi-parameters set network-parameters set ntp-parameters set protocols set system set volume-cache-parameters show advanced-settings show audit-log show cache-parameters show certificates show chap-records show configuration show controller-date show controllers show disk-parameters show dns-management-hostname show dns-parameters show enclosures show expander-status show fans show firmware-bundles show firmware-update-status show frus show inquiry show ipv6-addresses show ipv6-network-parameters show iscsi-parameters

**Table 6 Commands by category (continued)**

Category	Commands
	show license show network-parameters show ntp-status show power-supplies show protocols show provisioning show redundancy-mode show sas-link-health show sensor-status show shutdown-status show system show system-parameters show timezones show versions show workload shutdown
Service utilities	clear events clear expander-status fail restore defaults set debug-log-parameters set led show debug-log-parameters unfail controller
API specific	meta
Remote systems	create remote-system delete remote-system remote set remote-system show remote-systems
Peer connections and replication	abort replication clear replication-queue create peer-connection create replication-set delete peer-connection delete replication-set query peer-connection recover replication-set replicate resume replication-set set peer-connection set replication-set show peer-connections show replication-sets show replication-snapshot-history suspend replication-set



**Table 6 Commands by category (continued)**

Category	Commands
Statistics	reset all-statistics reset controller-statistics reset disk-error-statistics reset disk-statistics reset host-port-statistics reset pool-statistics reset volume-statistics show controller-statistics show disk-group-statistics show disk-statistics show host-phy-statistics show host-port-statistics show pool-statistics show tier-statistics show volume-statistics
Metrics	query metrics show metrics-list start metrics stop metrics
Update server	check update-server clear update-server-proxy set update-server show update-server
Proxy server	set proxy-server show proxy-server
Security	reset ciphers set ciphers show ciphers
Redfish support	add event-subscriber set event-subscriber show event-subscriber

## Removed commands

The following table lists commands that have been removed and specifies commands to use instead, if any. If you have scripts that use removed commands, update the scripts to use the replacement commands instead.

**Table 7 Deprecated commands**

Deprecated command	Replacement command
abort verify	abort scrub
create certificate	add certificate (API command)
show certificate	show certificates
verify disk-groups	scrub disk-groups

## 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:

<b>Description</b>	The command's purpose and notes about its usage
<b>Minimum role</b>	The minimum user role required to use the command
<b>Syntax</b>	The command's syntax
<b>Parameters</b>	Descriptions of the command's parameters
<b>Output</b>	Descriptions of fields shown in console mode
<b>Examples</b>	One or more examples of the command's usage in console mode
<b>Basetypes</b>	References to descriptions of basetype properties shown in API mode
<b>See also</b>	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

standard

## 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.

```
# 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.

This command must be run on the replication set's primary system. For the command to succeed, the replication set state must be either `Running` or `Suspended`. Attempting to abort replication for a replication set whose state is either `Ready` or `Unsynchronized` will fail with an error message.

If you abort a running replication, the replication set returns to the state it had before replication started—either `Ready` or `Unsynchronized`. If you abort a suspended replication, the replication set's state remains `Suspended`, and the aborted replication's `Run Error` property shows the replication has been suspended, even though the replication has actually been aborted and therefore cannot be resumed.

---

**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

standard

## Syntax

```
abort replication
  <replication-set>
```

## Parameters

```
<replication-set>
```

The name or serial number of the replication set in which to abort replication.

## Examples

Abort the active replication 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

standard

## Syntax

```
abort scrub  
[disk-group <disk-groups>]
```

## 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.

## Examples

Abort scrubbing disk group dg1.

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

## See also

```
scrub disk-groups  
show disk-groups  
show volumes
```

# activate certificate

## Description

Makes a previously added certificate active for a specific service.

Certificates are specified by name. Run the `show certificates` command to list all certificates and view certificate names.

---

**NOTE** For a user-supplied certificate, a trusted root certificate must be present, linking any intermediate certificates, in order to establish a valid trust chain of certificates. For a system-generated certificate, no root certificate is provided.

To determine if a root certificate is present, run `show certificates` with the `truststore` parameter.

---

**NOTE** Certificates must be uploaded to the storage system before you can activate them. Certificates can be uploaded by using the API or SFTP.

---

## Minimum role

manage

## Syntax

```
activate certificate
  service web
  <name>
```

## Parameters

service web

The service that the certificate is applied to.

<name>

The name of the certificate to activate. Run the `show certificates` command to list all certificates, where you can view certificate names.

## Examples

Activate a certificate named `CERT_A_12345` for the web service.

```
# activate certificate CERT_A_12345 service web
```

## See also

`add certificate` (API command)  
`create certificate-signing-request`  
`remove certificate`  
`show certificates`

# activate firmware

## Description

Updates the firmware bundle or firmware bundle measurement stored in the controller.

## Minimum role

manage

## Syntax

```
activate firmware  
bundle active|available|measurement
```

## Parameters

```
bundle active|available|measurement
```

Specifies either which stored firmware to activate, or to measure all stored firmware bundles.

- `active`: Re-activates the currently active firmware to retry a firmware update.
- `available`: Activates firmware that has been uploaded to the system.
- `measurement`: For internal use only.

## Examples

Activate a firmware bundle that has been uploaded to the system.

```
# activate firmware bundle available
```

Measure all firmware bundles stored in the controller.

```
# activate firmware bundle measurement
```

## See also

```
show firmware-bundles  
show firmware-update-status  
check firmware-upgrade-health  
show versions
```

# add disk-group

## Description


Creates a disk group using specified disks.

All disks in a disk group must be the same type (SSD, enterprise SAS, or midline SAS).

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).

---


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 pool can contain only one read-cache disk group.

A 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 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 pool should have the same RAID level, capacity, and physical number of disks. This provides 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 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

standard



## Syntax

```
add disk-group
    disks <disks>
        [level raid1|r1|raid5|r5|raid6|r6|raid10|r10|MSA-DP+]
pool a|b
    [spare-capacity <size>[B|KB|MB|GB|TB|KiB|MiB|GiB|TiB] | default]
    type virtual|read-cache
    [<name>]
```

## Parameters

disks <disks>

Specifies the IDs of the disks to include in the group. For disk syntax, see ["Command syntax" on page 23](#).

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

- RAID 1: 2
- RAID 5: 3 to 16
- RAID 6: 4 to 16
- RAID 10: 4 to 16
- MSA-DP+: 12 to 128

RAID 10 requires a minimum of two RAID 1 subgroups each having two disks. The system automatically uses NRAID for a read-cache disk group with a single disk, or RAID 0 for a read-cache disk group with multiple disks.

---

**!** **IMPORTANT** RAID 5 and RAID 6 disk groups, which have parity disks, should be created using the power of 2 best practice to align properly with virtual pages. Failure to follow this method can result in significant degradation of sequential write performance. The power of 2 best practice pertains to HDD disk groups (not SSD disk groups).

RAID 5 disk groups should be created using 3, 5, or 9 disks. RAID 6 disk groups should be created using 4, 6, or 10 disks. For more information, see the Disk group considerations section of the HPE MSA Best practices technical white paper for your MSA system.

---

level raid1|r1|raid5|r5|raid6|r6|raid10|r10|MSA-DP+

Required for a virtual disk group. Prohibited for a read-cache disk group. Specifies the RAID level to apply to the member disks.

pool a|b

Specifies the name of the pool to contain the disk group. If the pool does not already exist, it will be created.

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

Optional. For an MSA-DP+ disk group, this specifies the target spare capacity. Recommended spare capacity is described in the *HPE MSA Storage Arrays Best Practices* white paper.

- <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.

When you run the command with the `spare-capacity` parameter, a confirmation prompt shows the configured spare capacity, the recommended spare capacity, and the predicted available space, and provides guidance on setting the appropriate value.

```
type virtual|read-cache
```

Required. Specifies the type of disk group to create.

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

```
<name>
```

Optional. 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 a name in the format `dg<controller-ID><#>`, or `rc<controller-ID><#>` for a read-cache disk group, where `<#>` starts at 01.

### Examples

Add a 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 MSA-DP+ disk group to pool B.

```
# add disk-group type virtual disks 2.1-12 level MSA-DP+ pool b
```

Add a read-cache disk group to pool B. The resulting group will be named `rcB01`.

```
# 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 event-subscriber

## Description

Configures a new event subscriber for use by the Redfish interface.

Redfish Eventing is a way to passively monitor the state of the system, in addition to SMTP, SNMP, and syslog. It is used by the system to push notifications to interested subscribers. Subscribers must opt into specific message registries in order to receive notifications. These notifications are based primarily on system health.

---

**NOTE** Notifications are sent for system alerts, not system events.

---

## Minimum role

standard

## Syntax

```
add event-subscriber
  [context <string>]
  [delivery-retry-policy SuspendRetries|TerminateAfterRetries]
  destination <IP-or-FQDN>
  protocol Redfish
  [registry-prefix HPEAlerts]
  [resource-type <string>]
  [subscription-type <string>]
```

## Parameters

context <string>

Optional. Sets the context associated with the specified event subscriber.

delivery-retry-policy SuspendRetries|TerminateAfterRetries

Optional. Sets the delivery retry policy of the specified event subscriber:

- SuspendRetries: No retries are attempted.
- TerminateAfterRetries: Up to 3 retries are attempted.

destination <IP-or-FQDN>

Address of the target Redfish event service client.

protocol Redfish

Protocol over which to send the event. Redfish is the only supported value.

registry-prefix HPEAlerts

Optional. The message registry for which the user wants to receive notifications.

- HPEAlerts: The destination will receive notifications when new alerts are generated.

If this parameter is omitted, no notifications are issued.

resource-type <string>

Optional. For future enhancements.

subscription-type <string>

Optional. For future enhancements.

### Examples

Add an event subscriber.

```
# add event-subscriber destination https://my-redfish-listener protocol Redfish context
Test_Context delivery-retry-policy SuspendRetries registry-prefix HPEAlerts
```

### See also

```
delete event-subscriber
set event-subscriber
show event-subscriber
```

# add host-group-members

## Description

Adds hosts to a host group.

A host group can contain a maximum of 128 initiators. A host group can contain from 1 to 128 hosts as long as the sum of all initiators in all hosts in the host group does not exceed 128.

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 as every other host in the host group.

## Minimum role

standard

## 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 as every other initiator in the host.

## Minimum role

standard

## Syntax

```
add host-members
    initiators <initiators>
    <hostname>
```

## 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.

```
<hostname>
```

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-members
show host-groups
show initiators
```

# add ipv6-address

## Description

Adds a static IPv6 address for a controller network port.

A maximum of 8 static IPv6 addresses can be configured, 4 per controller. These addresses can be configured at any time, but can only become active when the `set ipv6-network-parameters` command's `autoconfig` parameter is disabled.

All addresses added to the IPv6 address list should be reachable if `autoconfig` is disabled. They are ignored if `autoconfig` is enabled.

Static addresses are stored on the controller enclosure midplane. Therefore the addresses will persist even if both controller modules are replaced.

## Minimum role

standard

## Syntax

```
add ipv6-address
    [address-label <name>]
    [controller a|b]
    ip-address <IP-address>
    [prefix-length <value>]
```

## Parameters

`address-label <name>`

Optional. Lets you specify a name for how the address is used. 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 specified, each interface needs a unique name within the scope of each controller. For example, controller A can have only one address labeled `vlan1`, and controller B can also have only one address labeled `vlan1`.

`controller a|b`

Optional. Specifies to change controller A or B, only. If this parameter is omitted, changes affect the controller being accessed.

`ip-address <IP-address>`

Specifies the IPv6 address to add. The value may include the standard IPv6 `/prefixLength 1-128` notation; or the `prefixLength` may be omitted if the `prefix-length` parameter is used instead. The address cannot be used elsewhere in the network port configuration.

`prefix-length <value>`

Optional. Specifies the length of the prefix in the IP address. This parameter is valid only if the `ip-address` parameter value does not include `/prefixLength` notation.

## Examples

Add an IPv6 address named `vlan1` to the network port in controller A only.

```
# add ipv6-address controller a address-label vlan1 ip-address
2620:0:350:fc02:2c0:ffff:fe28:8787/64
```

**See also**

remove ipv6-address  
set ipv6-network-parameters  
show ipv6-addresses  
show ipv6-network-parameters



# add spares

## Description

Designates specified available disks to be spares.

All spares are global spares.


A global spare can replace a failed disk of the same type (SSD, enterprise SAS, or midline SAS) and the same or lower capacity in any disk group with a fault-tolerant RAID level other than MSA-DP+. The system supports a maximum of 64 global spares.

However, the system prevents adding global spares if only MSA-DP+ disk groups exist.

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

For information about sparing rules, see the spares topic in the Storage Management 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).

---

## Minimum role

standard

## Syntax

```
add spares  
  <disks>
```

## Parameters

<disks>

The IDs of the disks to designate as spares. For disk syntax, see ["Command syntax" on page 23](#).

## Examples

Designate disk 1.2 as a global spare.

```
# add spares 1.2
```

## See also

```
remove spares  
show disk-groups  
show disks
```

# add volume-group-members

## Description

Adds volumes to a volume group.

To add a volume to a volume group, the volume must be in the same pool. You cannot add a volume to a volume group that is in a replication set.

Volume groups cannot be mapped.

## Minimum role

standard

## Syntax

```
add volume-group-members
    volumes <volumes>
    <volume-group>
```

## Parameters

volumes <volumes>

A comma-separated list of the names or serial numbers of 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 `Vol10002` and `Vol10003` to existing volume group `VolumeGroup1`.

```
# add volume-group-members volumes Vol10002,Vol10003 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 multipathing 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 SMU, SFTP, or FTP to update firmware, see the Storage Management Guide.

## Minimum role

standard

## 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
```

```
At least one controller contains unwritten cache data.
```

```
Data corruption, data loss
```

One or more fans are not functioning.

One or more disk groups are in a quarantined state.

Code load failure

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 firmware-update-status

show power-supplies

show sensor-status

show system

# check update-server

## Description

Checks the status of a configured update server.

This command tests the connection between the storage system and the update server. It contacts the server address and gathers and parses information, but doesn't report any of the firmware information. When it contacts the update server, it refreshes the last update time and connection status.

## Minimum role

monitor

## Syntax

```
check update-server
```

## Output

Success or error message. If no update server is configured, an error message will say the URL is invalid.

## Examples

Check the status of the update server.

```
# check update-server
```

## See also

clear update-server-proxy

set update-server

show disks (with the updates parameter)

show firmware-bundles (with the updates parameter)

show update-server

# clear alerts

## Description

Clears all the alerts from the active list, and forces a fresh analysis of the system for any active alert conditions. For alert conditions that have not yet been resolved, new alerts are reported in an unacknowledged state. Any previously acknowledged alerts that are unresolved must be re-acknowledged.

## Minimum role

standard

## Syntax

```
clear alerts
```

## Examples

Clear all alerts for the system.

```
# clear alerts
```

## See also

```
set alert  
show alert-condition-history  
show alerts
```

# 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 unrecoverable data loss.

---

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

## Minimum role

standard

## 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/UID LED is illuminated amber.

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

standard

## Syntax

```
clear disk-metadata  
  <disks>
```

---

 **CAUTION** Contact technical support before clearing metadata from a disk that is a member of an offline or quarantined disk group, which could result in unrecoverable data loss. Recovery of an offline disk group must be done with help from technical support before metadata is cleared.

---

## Parameters

<disks>

The IDs of the leftover disks from which to clear metadata. For disk syntax, see ["Command syntax" on page 23](#).



**Examples**

Clear metadata from leftover disk 1.1.

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

**See also**

show disks

# clear dns-parameters

## Description

Clears configured DNS settings for each controller module.

## Minimum role

standard

## Syntax

```
clear dns-parameters  
    [controller a|b|both]
```

## Parameters

controller a|b|both

Optional. Specifies whether to change controller A, B, or both. If this parameter is omitted, changes affect the controller being accessed.

## Examples

Clear DNS settings for controller A.

```
# clear dns-parameters controller a
```

## See also

```
set dns-parameters  
set email-parameters  
show dns-parameters  
show email-parameters
```

# 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

standard

## Syntax

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

## Parameters

a|b|both

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

noprompt

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

## 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 enclosures, or for a specific enclosure 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

standard

## Syntax

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

## Parameters

<enclosure-ID>

Optional. The enclosure number. If this parameter is omitted, the command clears the counters and status of all enclosures.

## Examples

Clear the expander status for the enclosure 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, 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

standard

## 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 to secure the data in this system. After the system is power cycled, the disks will be locked.

```
# 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

standard

## 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
```

# clear update-server-proxy

## Description

Clears the username, password, host, and port values configured for the update-server proxy and disables the proxy.

## Minimum role

standard

## Syntax

```
clear update-server-proxy
```

## Examples

Clear the update-server proxy.

```
# clear update-server-proxy
```

## See also

check update-server

set update-server

show update-server

# copy volume

## Description

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

The source volume can be a base volume or a 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 tier-affinity settings and 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.

Creating the copy of the volume may not exceed the high threshold of the pool.

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

standard



## 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 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-signing-request

## Description

Creates a certificate signing request (CSR) to generate a new certificate.

The storage system supports use of unique certificates for secure data communications and to authenticate the identity of the storage system. Use of authentication certificates applies to the HTTPS protocol, which is used by the web server in each controller module.

The CSR contains the information that a certificate authority (CA) would use to create a signed device certificate. This certificate can be uploaded using the `add certificate` API command. The generated CSR is a PEM-encoded string. Along with CSR this command will also produce a private key, which will be stored on the controller and later used for verification of the uploaded signed certificate. The CSR is deleted automatically after the corresponding signed certificate is uploaded. When you run this command again (either with the same parameters or different ones) a new CSR will replace the existing CSR. At any time, only one CSR can exist on the system.

## Minimum role

standard

## Syntax

```
create certificate-signing-request
  [a|b|both]
  subject <subject-string>
  [extensions <extension-string>]
```

## Parameters

a|b|both

Optional. Specifies whether to generate the CSR for controller A, B, or both. If this parameter is omitted, the CSR is generated for the controller being accessed.

subject <subject-string>

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. Input rules:

- Cannot exceed 1024 characters.
- Can include printable UTF-8 characters except semicolon.
- Spaces cannot be included in type names but can be included in type values. If a value contains a space, the entire subject string must be enclosed in double quotes.

Example: `"/C=US/ST=CO/O=My Organization/CN=www.mysite.com"`

extensions <extension-string>

Optional. Adds extension parameters to the CSR if requested by a user. Input rules:

- Cannot exceed 1024 characters.
- Can include printable UTF-8 characters except semicolon.
- If the string contains a space, the entire subject string must be enclosed in double quotes.

Example: `/basicConstraints=CA:FALSE/extendedKeyUsage=clientAuth,serverAuth`

## Examples

Create a CSR for the controller being accessed, only.

```
# create certificate-signing-request subject  
/C=US/ST=CO/L=NewYork/O=MyCompany/CN=www.mycompany.com
```

Create a CSR for both controllers.

```
# create certificate-signing-request both subject "/C=US/ST=New York/L=New York/O=My  
Company/CN=mycompany.com" extension  
/basicConstraints=CA:FALSE/extendedKeyUsage=clientAuth,serverAuth
```

## See also

```
activate certificate  
add certificate (API command)  
restart mc full  
remove certificate  
show certificates
```

# create chap-record

## Description

Creates a Challenge Handshake Authentication Protocol (CHAP) record to authenticate login requests on a system with iSCSI ports.

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 the Storage Management Guide.

---

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

standard

## 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 from 12 to 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 from 12 to 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

standard

## 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 128 hosts.

## Minimum role

standard

## 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 replication.
- Both systems must have iSCSI or FC host ports. Ports at both ends of the connection must use the same protocol.
- Both systems must be connected to the same fabric or network. For FC, at least one FC switch is required between systems (no direct attach).
- All host port addresses in both systems must be unique, even for ports not in use.
- Each system must have a 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 with the `standard` or `manage` role on the remote system.

---

**NOTE** For information on creating a peer connection between a system with HPE MSA 1060/2060/2062 controllers and a system with HPE MSA 1050/2050/2052 controllers, see the Storage Management Guide.

---

You can create a maximum of 4 peer connections per MSA 2060/2062 Storage system or one per MSA 1060 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.

---

**NOTE** HPE recommends that both systems in a peer relationship run the same firmware version. If you want to create a peer connection between a system running newer firmware and a system running older firmware, log in to the newer system and run commands to create and modify peers from that system.

---

## Minimum role

standard

## Syntax

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

## Parameters

`remote-password <password>`

Optional in console mode; required for API mode. 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. IPv4 and IPv6 formats are supported.

`remote-username <username>`

The name of a user in the remote system. This must be a user with the `standard` or `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 remote-system

## Description

Creates a persistent association with a remote storage system.

This allows a local system to track remote systems by their network-port IP addresses and cache their login credentials. The IP address you specify is used to connect to the remote system and obtain information such as the system name and both controllers' IP addresses. You can then use the system name or an IP address in commands that need to interact with the remote system.

## Minimum role

standard

## Syntax

```
create remote-system  
  password <password>  
  username <username>  
  <IP-address>
```

## Parameters

password <password>

The password of the user specified by the username parameter.

username <username>

The name of a user in the remote system. This must be a user having the `standard` or `manage` role to remotely configure or provision that system.

<IP-address>

The network-port IP address of the remote system. The value can be an IPv4 address, IPv6 address, or FQDN.

## Examples

Create a remote system with username `JDoe`, password `Abcd_1234`, and IP address `10.122.1.21`.

```
# create remote-system username JDoe password Abcd_1234 10.122.1.21
```

## See also

```
delete remote-system  
remote  
set remote-system  
show remote-systems
```

# 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.

A maximum of 1 replication set per volume can be created.

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, 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 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

standard

### 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.

`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 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 to 24 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. 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 unmapped snapshot in the snapshot history is deleted. If not specified, the snapshot count defaults to 1 during command execution with `snapshot-history` enabled.

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. 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  
recover replication-set  
replicate  
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

standard

## 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, 2019, runs daily between midnight and 1:00 AM, and runs for the last time in the morning of January 1, 2020.

```
# create schedule schedule-specification "start 2019-03-01 00:01, every 1 days, between 12:00 AM and 1:00 AM, expires 2020-01-01 1:00 AM" task-name Task1 Sched1
```

Create schedule Sched2 that runs Task2 for the first time on March 1, 2019, and on the first weekday of each month, with no expiration.

```
# create schedule schedule-specification "start 2019-03-01 00:01 only first weekday of month" task-name Task2 Sched2
```

Create schedule schedStartScrub that runs task taskStartScrub for the first time on February 11, 2023, runs every Saturday, and never expires.

```
# create schedule schedule-specification "Start 2023-02-11 00:00:00, Only Any Saturday Of Year" task-name taskStartScrub schedStartScrub
```

Create schedule schedStopScrub that runs task taskStopScrub for the first time on February 12, 2023, runs every Sunday, and never expires.

```
# create schedule schedule-specification "Start 2023-02-12 23:59:00, Only Any Sunday Of Year" task-name taskStopScrub schedStopScrub
```

### See also

```
delete schedule
set schedule
show schedules
show tasks
```

# create snapshots

## Description

Creates a snapshot of each specified source volume.

The source volume can be a base volume or a snapshot.

---

**NOTE** When a snapshot is created, the original volume's usage-type setting will be copied to the snapshot. The usage-type setting of the snapshot may be modified independently of the parent volume using the `set volume` command. However, if the volume is rolled back, the parent volume inherits the usage-type value of the snapshot, and if the snapshot is reset, the parent volume's usage-type value is copied to the snapshot.

---

## Minimum role

standard

## Syntax

```
create snapshots
  volumes <volumes>
  <snap-names>
```

## Parameters

`volumes <volumes>`

A comma-separated list of the names or serial numbers of from 1 to 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 pool. 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, which can be a base volume or a snapshot.
- Reset a snapshot, which replaces the data in a standard snapshot with the current data from its parent volume. The snapshot's name, serial number, and mapping are not changed.

---

 **CAUTION** Before scheduling a `ResetSnapshot` task, consider that if the snapshot is attached to a host, the snapshot must be detached before the reset is performed. Leaving it attached can cause data corruption. You should create a scheduled job on the host to detach the snapshot prior to resetting it.

---

- Replicate a replication set's primary volume or volume group to a peer system.
- Start or stop background scrub on disk groups.

Use the `StartScrub` option to start or resume scrub during hours of infrequent activity. When `StartScrub` is executed, the background disk-group scrub utility starts scrubbing the disk group.

Use the `StopScrub` option to stop or pause scrub during hours of frequent activity. When `StopScrub` is executed, the background disk-group scrub utility stops scrubbing the disk group.

For the start or stop background scrub task to run successfully, enable the `background-scrub` and `scrub-schedule` parameters of the `set advanced-settings` command.

## Minimum role

standard

## 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 volume:

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

To create a task to enable or disable spin down:

```
create task
  type EnableDSD|DisableDSD
  <name>
```

To create a task to start or stop background disk-group scrub:

```
create task
  type StartScrub|StopScrub
  <name>
```

## Parameters

`last-snapshot`

Optional. For a `Replicate` task this specifies to replicate the most recent snapshot of the primary volume in a single-volume replication set. At the time the scheduled replication occurs, the snapshot must exist. This snapshot may have been created either manually or by scheduling the snapshot. This option cannot be used for a replication set that contains a volume group.

`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 16. When a new snapshot exceeds this limit, the oldest unmapped snapshot is reset and renamed with the same prefix. The oldest unmapped snapshot is the one whose name has the lowest number (such as 01 as compared with 02). Resetting the oldest unmapped snapshot does not change its creation date/time.

`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 TakeSnapshot|ResetSnapshot|Replicate|EnableDSD|DisableDSD|StartScrub|StopScrub`

The task type:

- `TakeSnapshot`: Creates a snapshot.
- `ResetSnapshot`: Resets the data in a snapshot.
- `Replicate`: Replicates a replication set's primary volume or volume group to a peer system.
- `EnableDSD`: Enables drive spin down.
- `DisableDSD`: Disables drive spin down
- `StartScrub`: Starts the background disk-group scrub.
- `StopScrub`: Stops the background disk-group scrub.

<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 `V1` and retains only the latest four snapshots with the prefix `V1` (for example, `V1_S0001`).

```
# create task type TakeSnapshot source-volume V1 snapshot-prefix V1 retention-count 4 Snap
```

Create task `Reset` that resets snapshot `V1_S0001`.

```
# create task type ResetSnapshot snapshot-volume V1_S0001 Reset
```

Create task `replicateRS1` that replicates 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 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 DisabledDSD taskDSDsuspend
```

Create task `taskStartScrub` to start background disk-group scrub.

```
# create task type StartScrub taskStartScrub
```

Create task `taskStopScrub` to stop background disk-group scrub.

```
# create task type StopScrub taskStopScrub
```

### See also

`create schedule`

`delete task`

`set task`

`show tasks`

`show volumes`

# create user

## Description

Creates a user account.

The system supports 12 local user accounts. You can create a user who can access the SMU, CLI, SFTP, or FTP interface, or an SNMPv3 user who can access the MIB and receive trap notifications. SNMPv3 user accounts support SNMPv3 security features such as authentication and encryption.

In addition to the above local users, members of LDAP groups can also access the CLI. Local users and LDAP users can use the same set of CLI commands. Only LDAP users with the `manage` role can create, modify, and delete both local users and LDAP user groups. For information about enabling access by LDAP users, see `create user-group`.

## 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>]
  [trap-port <port-number>]
  [type novice|standard|advanced|diagnostic]
  [units auto|MB|GB|TB]
  <username>
```

## 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.

- cli: Command-line interface. This is enabled by default.
- wbi: Web-browser interface (the SMU). This is enabled by default.
- ftp: FTP or SFTP interface.
- snmpuser: Allows an SNMPv3 user to view the SNMP MIB and receive SNMP trap notifications. This option requires the trap-host parameter. To use a trap destination port other than the default port, also specify the trap-port parameter.
- none: No interfaces.

A command that specifies snmpuser cannot also specify a non-SNMP interface. To enable or disable interface protocols, 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. Regardless of the locale, confirmation prompts only accept English characters, such as y for yes or n for no.

password <password>

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

- The value is case sensitive.
- The value can have 8 to 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 to 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. Input rules:

- The value is case sensitive.
- The value can have 8 to 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.
- `standard`: User can view and change system settings except: configuring local users; configuring LDAP; performing write operations through FTP or SFTP; performing file uploads from the SMU; using the `restore defaults` command.
- `manage`: User can view and change system settings.
- `diagnostic`: For use by or with direction from technical support.

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 to 43200 seconds (2 to 720 minutes). The default is 1800 seconds (30 minutes).

`trap-host <IP-address>`

Optional. For an SNMPv3 user whose `interfaces` parameter is set to `snmpuser`, this specifies the IP address of the host that will receive SNMP traps. The value can be an IPv4 address or IPv6 address or FQDN.



trap-port <port-number>

Optional. For an SNMPv3 user, this parameter specifies the target port of the host that will receive SNMP traps. The default port is 162.

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 0.11709TB is instead shown as 117.1GB.

<username>

A name for the new user. The name 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 space or: " , < \ :

### Examples

Create user John who will view system information using base 2 in the SMU.

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

Create user `testsnmp` that can view the SNMP MIB and receive SNMP trap notifications, using authentication and encryption.

```
# create user interfaces snmpuser password Abcd_1234 authentication-type SHA privacy-type
AES privacy-password Abcd_5678 trap-host 172.22.4.171 testsnmp
```

### See also

```
delete user
set snmp-parameters
set user
show users
```

# create user-group

## Description

Creates a user group in the storage system to match an LDAP group.

There are two sources of user credentials for the storage system:

- The primary source is local users created by using the `create user` command.
- The secondary source is an LDAP server.

Users logging in using their LDAP credentials must authenticate using these credentials and be members of a group that is authorized to access the storage system. The group will exist on the LDAP server and will be listed under the `Member Of` property for the user account. The same group name must also exist in the storage system, and be created by using the `create user-group` command.

Individual user preferences are not saved in the storage system. Any settings made to the login session are not retained after the session terminates. If the user wants to retain any preferences for the session, these must be saved as part of the user group. Any changes made to a user group will affect all members of that group.

The system supports a maximum of 5 user groups to allow different permissions and user preferences. User group permissions are defined by assigning roles, the same as for local users. User group preference parameters include the storage size base, precision, and units; locale; temperature scale; and timeout.

User groups can be created whether the LDAP feature is enabled or disabled.

Local users and LDAP users can use the same set of CLI commands. Only LDAP users with the `manage` role can create, modify, and delete both local users and LDAP user groups.

---

**!** **IMPORTANT** Running the `restore defaults` command will clear LDAP user groups.

---

For more information about the LDAP feature, see the Storage Management Guide.

## Minimum role

`manage`

## Syntax

```
create user-group
  [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]
  [precision <#>]
  [roles <roles>]
  [storage-size-base 2|10]
  [storage-size-precision <#>]
  [storage-size-units auto|MB|GB|TB]
  [temperature-scale celsius|c|fahrenheit|f]
  [timeout <#>]
```

```
[type LDAP]
[units auto|MB|GB|TB]
<user-group-name>
```

## 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. 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 group can access. Multiple values must be separated by commas and no spaces.

- `cli`: Command-line interface. This is enabled by default.
- `wbi`: Web-browser interface (the SMU). This is enabled by default.
- `ftp`: SFTP interface.
- `none`: No interfaces.

Only secure protocols are supported for the above interfaces. To enable or disable interface protocols, 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. Regardless of the locale, confirmation prompts only accept English characters, such as `y` for yes or `n` for no.

`precision <#>`

Optional. Sets the number of decimal places from 1 to 10 for display of storage-space sizes. The default is 1.

`roles <roles>`

Optional. Specifies the user group role as one or more of the following values:

- `monitor`: User group can view but not change system settings. This is the default.
- `standard`: User group can view and change system settings except: configuring local users; configuring LDAP; performing write operations through SFTP; performing file uploads from the SMU; using the `restore defaults` command.
- `manage`: User group can view and change system settings.
- `diagnostic`: For use by or with direction from technical support.

Multiple values must be separated with a comma (with no spaces). If multiple values are specified, the user group'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).

```
type LDAP
```

Optional. Identifies the user group type.

```
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 `0.11709TB` is instead shown as `117.1GB`.

```
<user-group-name>
```

A name for the new user group, which must match the name used in the LDAP database including capitalization. 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 space or: `"`, `<`, `\`:
- A value that includes a space must be enclosed in double quotes.

### Examples

Create user group `StorageAdmins` with the `manage` role for the CLI and SFTP interfaces.

```
# create user-group type ldap interfaces cli,ftp roles manage StorageAdmins
```

### See also

```
delete user-group  
set ldap-parameters  
set user-group  
show audit-log  
show user-groups
```

# create volume

## Description

Creates a volume in a pool.

You must specify a pool, size, and name for the volume.

You can optionally map the volume to hosts in the same operation. Creating a volume without a LUN results in no mapping. Specifying a LUN and initiator results in explicit mapping. If default mapping is enabled (via the `set advanced-settings` command), specifying the LUN results in a map that applies to all hosts, unless overridden by an explicit mapping between a host and the volume. If default mapping is disabled, only explicit maps, which require both an initiator and a LUN, are allowed. You can later change the mapping by using the `map volume` and `unmap volume` commands. By default, this command will not map the new 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 LUN 0 for a SAS initiator. You can create a maximum of 1024 volumes, but because the supported LUN range is 1-1023 only 1023 volumes can be mapped. However, by reusing LUN numbers so that one volume uses the LUN number to one host and another volume uses the same LUN number to a different host, all volumes can be mapped.

---

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

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

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

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

standard

## Syntax

```
create volume
  [access read-write|rw|read-only|ro|no-access]
  [initiator <initiators>|<hosts>|<host-groups>]
  [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]
```

```
[usage-type database|virtualization|email|files|other]
[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. The default is read-write.

`initiator` <initiators>|<hosts>|<host-groups>

Optional. Specifies a comma-separated list of initiators or hosts or host-groups that can access the volume. If this parameter is specified, the `lun` parameter must also be specified.

`large-virtual-extents` enabled|disabled|on|off

Optional. Sets whether the system will try to allocate pages in a sequentially optimized way to reduce I/O latency 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. If this parameter is specified, the `initiator` parameter must also be specified.

`ovms-uid` <ID>

Optional. For a volume to be accessed by an OpenVMS host, assign a volume ID 1-32767 to identify that volume to that host.

`pool` <pool>

The name or serial number of the pool in which to create the volume.

`ports` <ports>

Optional. The controller ports through which the host can access the volume. For port syntax, see ["Command syntax" on page 23](#). 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 4.2MB (4MiB) will be increased to 4.2MB. A value greater than 4.2MB will be decreased to the nearest 4.2MB boundary. The maximum volume size is 128TiB (140TB).

For an MSA-DP+ disk group, minimum volume size is 8GiB.

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

`snapshot-retention-priority` never-delete|high|medium|low

Optional. 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. 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.

usage-type database|virtualization|email|files|other

Optional. A value that describes the purpose of the volume.

- `database`: The volume is used for database applications.
- `virtualization`: The volume is used as a datastore for a virtual machine.
- `email`: The volume is used primarily to hold email or similar content.
- `files`: The volume is used as a file share.
- `other`: The usage type is not described by the other choices.

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 20GB volume `V1` in pool `A`, and map it with LUN 5 through ports `A1` and `B1` to an initiator.

```
# create volume pool a size 20GB ports a1,b1 lun 5 initiator initiator001 V1
```

Create a 100GB 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 initiator Host2 ports 1 volume-  
group MyGroup tier-affinity performance
```

Create 100GB volume `Vol1` with snapshot retention priority high in pool `B`.

```
# create volume snapshot-retention-priority high pool b size 100GB Vol1
```

Create volume `Vol2` used to be used as a file share.

```
# create volume pool a size 20GB usage-type files Vol2
```

## See also

`set advanced-settings`

```
create volume-set  
delete volumes  
set volume  
show advanced-settings  
show pools  
show ports  
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.

If the volume group will be replicated, it can contain a maximum of 16 volumes.

## Minimum role

standard

## 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 Vol10001 and Vol10002.

```
# create volume-group volumes Vol10001,Vol10002 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 pool.

You must specify a pool, count, size, and base name for the volumes.

You can optionally map the volumes to hosts in the same operation. Creating volumes without a base LUN results in no mapping. Specifying a base LUN and initiator results in explicit mapping. If default mapping is enabled (via the `set advanced-settings` command), specifying the base LUN results in a map that applies to all hosts, unless overridden by an explicit mapping between a host and the volumes. If default mapping is disabled, only explicit maps, which require both an initiator and a LUN, are allowed. You can later change the mapping by using the `map volume` and `unmap volume` commands. By default, this command will not map the new 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.

---

**NOTE** You cannot map LUN 0 for a SAS initiator. You can create a maximum of 1024 volumes, but because the supported LUN range is 1 to 1023 only 1023 volumes can be mapped. However, by reusing LUN numbers so that one volume uses the LUN number to one host and another volume uses the same LUN number to a different host, all volumes can be mapped.

---

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

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

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

standard

## Syntax

```
create volume-set
  [access read-write|rw|read-only|ro|no-access]
  [baselun <base-LUN>]
  basename <base-name>
  count <#>
  [initiator <initiators>|<hosts>|<host-groups>]
  [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]
```

[usage-type database|virtualization|email|files|other]

[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. If this parameter is specified, the initiator parameter must also be specified.

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 pA\_v, if pA\_v0000 and pA\_v0002 exist, the next volumes created will be pA\_v0001 and pA\_v0003.

count <#>

The number of volumes to create, from 1 to 128. Volumes will be created up to the maximum number supported per pool.

initiator <initiators>|<hosts>|<host-groups>

Optional. Specifies a comma-separated list of initiators or hosts or host-groups that can access the volume. If this parameter is specified, the baselun parameter must also be specified.

large-virtual-extents enabled|disabled|on|off

Optional. For a volume, this sets whether the system will try to allocate pages in a sequentially optimized way to reduce I/O latency 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>

The name or serial number of the pool in which to create the volumes.

ports <ports>

Optional. The controller ports through which the host can access the volume. For port syntax, see ["Command syntax" on page 23](#). 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 4.2MB (4MiB) will be increased to 4.2MB. A value greater than 4.2MB will be decreased to the nearest 4.2MB boundary. The maximum volume size is 128TiB (140TB).

For an MSA-DP+ disk group, minimum volume size is 8GiB.

If overcommit is enabled the volume size can exceed the physical capacity of the 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 pool, an error message is displayed and no volumes are created.

`snapshot-retention-priority never-delete|high|medium|low`

Optional. 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. 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.

`usage-type database|virtualization|email|files|other`

Optional. A value that describes the purpose of the volumes.

- `database`: The volume is used for database applications.
- `virtualization`: The volume is used as a datastore for a virtual machine.
- `email`: The volume is used primarily to hold email or similar content.
- `files`: The volume is used as a file share.
- `other`: The usage type is not described by the other choices.

`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, 100GB 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 three 20GB volumes with the base name `pA_v` in pool A, and map them starting with LUN 5 with read-only access through port A1 to three initiators.

```
# create volume-set count 3 size 20GB pool a basename pA_v baselun 5 initiator
initiator001,initiator002,initiator003 access ro ports a1
```

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

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

Create two unmapped volumes with base name DbVols- in pool A to be used for database applications.

```
# create volume-set count 2 size 100GB pool a basename DbVols- usage-type database Vol2
```

**See also**

- create volume
- delete volumes
- map volume
- set volume
- show maps
- show pools
- show volume-groups
- show volumes
- unmap volume

# delete all-snapshots

## Description

Deletes all snapshots associated with a specified source volume.

The source volume can be a base volume or a snapshot.

All data associated with the snapshots is deleted. The snapshot 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

standard

## 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

standard

## 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 event-subscriber

## Description

Deletes an existing event subscriber used by the Redfish interface.

## Minimum role

standard

## Syntax

```
delete event-subscriber  
  <subscriber-ID>
```

## Parameters

<subscriber-ID>

Specifies the subscriber to delete.

## Examples

Delete subscriber event-subscriber-1.

```
# delete event-subscriber event-subscriber-1
```

## See also

```
add event-subscriber  
set event-subscriber  
show event-subscriber
```



# delete host-groups

## Description

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

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

This command has a confirmation prompt in interactive console mode.

## Minimum role

standard

## Syntax

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

## Parameters

delete-hosts

Optional. Specifies to delete all hosts in the host 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 host groups.

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

Delete all host groups and the hosts in those host 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

standard

## 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

standard

## 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

standard

## 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 and provides options for also performing data erasure.

---

 **CAUTION** Deleting a pool deletes all the data it contains.

---

A pool can contain multiple disk groups. For a pool, if the pool contains volumes, the command prompts for confirmation to delete the volumes. If the reply is `yes`, the command unmaps and deletes all volumes in the pool, and then deletes each disk group in the pool and makes all the disks available. If the reply is `no`, the command is canceled.

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.

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

standard

## Syntax

```
delete pools
  [assurance-level secure|sanitize]
  [erase]
  [prompt yes|no]
  <pools>
```

## Parameters


`assurance-level secure|sanitize`

Optional. This parameter specifies the method for the data erasure operation if the `erase` parameter is specified:

- `secure`: Performs data erasure using cryptographic erase based on the Subsystem Security Class method that applies to the system's SED (FDE-capable) drives.
- `sanitize`: Performs data erasure with the `SANITIZE` SCSI command, using the system's SAS interface.

If this parameter is omitted, the system determines the appropriate `assurance-level` based on drive capability and system security status. If the parameter is provided and a failure occurs, the command returns the failed result.

---

 **TIP** Considerations for using the optional data erasure command parameters:

- The `assurance-level sanitize` option works only on an unsecured system.
  - The `assurance-level secure` option works only on drives that support cryptographic erase. For SEDs, the appropriate cryptographic erase command is sent to the drive based on the secured or unsecured state.
- 

`erase`

Optional. This parameter specifies data erasure. If this parameter is omitted, the command does not perform data erasure when deleting the specified pool.

`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.

### Examples

Delete pool A.

```
# delete pools A
```

Delete pool B and perform erasure on a system secured with FDE-capable drives.

```
# delete pools B erase assurance-level secure
```

### See also

`remove disk-groups`

`show pools`

# delete remote-system

## Description

Deletes the persistent association with a remote system.

## Minimum role

standard

## 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.

The value can be an IPv4 address, IPv6 address, or FQDN.

## Examples

Delete remote-system System2.

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

## See also

show remote-systems

# delete replication-set

## Description

Deletes a replication set.

You can run this command on the replication set's primary or secondary system.

When you delete a 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 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

standard

## Syntax

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

## Parameters

local-only

Optional. Use this parameter only 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 or snapshot 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

standard

## 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

standard

## 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

standard

## 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. 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 username 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 user-group

## Description

Deletes an LDAP user group.

The system requires at least one local user with the `manage` role to exist. Deleting a user group does not affect the active user session.

This command has a confirmation prompt in interactive console mode.

## Minimum role

`manage`

## Syntax

```
delete user-group  
    [noprompt]  
    <user-group-name>
```

## Parameters

`noprompt`

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

`<user-group-name>`

The user group to delete. Names are case sensitive.

## Examples

Delete user group `StorageAdmins`.

```
# delete user-group StorageAdmins
```

## See also

`create user-group`

`show user-groups`

# delete volume-groups

## Description

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

---

**NOTE** Before you can delete a volume group that is in a replication set you must delete the replication set.

---

## Minimum role

standard

## 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

`show maps`

`show volume-groups`

# delete volumes

## Description

Deletes specified volumes.

---

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

---

**NOTE** You cannot delete a volume that is in a replication set.

---

This command has a confirmation prompt in interactive console mode.

## Minimum role

standard

## 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.

---

 **CAUTION** This command should only be used by or with direction from technical support.

---

The system will automatically quarantine a disk group having a fault-tolerant RAID level if one or more of its disks becomes inaccessible. If quarantine occurs because of an inaccessible disk, event 172 is logged. The `dequarantine` command is not permitted in this case. Contact technical support, or see the `trust` command in this situation.

The system will automatically quarantine a disk group to prevent invalid data that may exist in the controller from being written to the disk group. If quarantine occurs to prevent writing invalid data, event 485 is logged. Use the `dequarantine` command to manually dequarantine the disk group only as specified by the event's recommended-action text to avoid data corruption or loss.

Recommended actions are described in the *HPE MSA 1060/2060/2062 Event Descriptions Reference Guide*.

---

**NOTE** The only commands allowed for a quarantined disk group are `dequarantine` and `trust`. 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

standard

## Syntax

```
dequarantine
  disk-group <disk-group>
  [recovery]
```

## 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.

```
recovery
```

Optional. Puts the disk group into recovery mode and disables regular dequarantine function until recovery completes. This operation is available only for MSA-DP+ disk groups. This parameter also returns an error if attempted on a disk group that is not quarantined.

---

 **CAUTION** This parameter, as for the main command, should be used only by or with direction from technical support.

---

## Examples

```
Dequarantine disk group dgB01.
# dequarantine disk-group dgB01
```

## See also

```
show disk-groups
```



trust

# erase disk

## Description

Erases data from a single disk drive.

---

 **CAUTION** Erasing a disk drive removes all the data it contains.

---

This command supports certain hard disk drives (HDD), self-encrypting drives (SED), Instant Secure Erase (ISE) drives, and solid-state drives (SSD).

## Minimum role

standard

## Syntax

```
erase disk
  [assurance-level secure|sanitize]
  <disk>
```

## Parameters

```
assurance-level secure|sanitize
```

Optional. This parameter specifies the method used for the data erasure operation:

- `secure`: Performs data erasure using cryptographic erase based on the Subsystem Security Class method that applies to the system's SED (FDE-capable) drives.
- `sanitize`: Performs data erasure with the `SANITIZE` SCSI command, using the system's SAS interface.

If this parameter is omitted, the system determines the appropriate `assurance-level` based on drive capability and system security status. If the parameter is provided and a failure occurs, the command returns the failed result.

---

 **TIP** Considerations for using the optional data erasure command parameters:

- The `assurance-level sanitize` option works only on an unsecured system.
  - The `assurance-level secure` option works only on drives that support cryptographic erase. For SEDs, the appropriate cryptographic erase command is sent to the drive based on the secured or unsecured state.
- 

```
<disk>
```

The ID of the disk targeted for data erasure. For disk syntax, see "[Command syntax](#)" on page 23. If this parameter is omitted, a message states that the disk specifier is missing, and the command exits.

## Examples

Perform erasure on the drive residing in slot 5 of enclosure 1, which is secured with FDE-capable drives.

```
# erase disk 1.5 assurance-level secure
```

Perform erasure on the drive residing in slot 11 of enclosure 2, which is not secured with FDE-capable drives.

```
# erase disk 2.11 assurance-level sanitize
```

## See also

```
show disks
```

```
remove disk-groups  
show disk-groups  
delete pools  
show pools
```

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 disk groups using MSA-DP+.

The new disks must be the same type as disks already in the disk group, and must be in the same tier as the disk group.

The new disks need not have consistent capacity. MSA-DP+ algorithms will attempt to use the maximum possible space on each disk in the group. However, some capacity will be unusable. How much depends on the number of disks in the group and the size difference between the disks:

- Disk groups with few disks (such as 12 disks) won't effectively use the capacity of all the disks if they are different sizes. For example, a group composed of eleven 2TB disks and one 1TB disk will have a usable capacity closer to 12TB than 24TB.
- Disk groups with a large number of disks can handle different size disks with much more effective use of capacity.

---

 **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 is:

RAID level	Expansion capability	Maximum disks
MSA-DP+	Can add up to 68 disks at a time.	128

When disks are added to an MSA-DP+ 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 `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.

---

**NOTE** If you want to make spare capacity changes, do so by using the `set disk-group` command before starting disk-group expansion.

---

 **IMPORTANT** Before starting expansion, see <https://www.hpe.com/support/MSAGen6BestPractices>.

For MSA-DP+ disk groups, expansion 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

standard

## 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 23](#).

```
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
```

Add 10 disks to MSA-DP+ disk group Data3.

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

### See also

```
set disk-group (to set spare capacity before expansion)
```

```
show disk-groups
```

```
show disks
```

# expand volume

## Description

Expands a base volume.

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

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 128TiB (140TB). To see whether overcommit is enabled, use the `show pools` command.

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

## Minimum role

standard

## Syntax

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

## Parameters

```
size <size> [B|KB|MB|GB|TB|KiB|MiB|GiB|TiB]
```

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.

The maximum volume size is 128TiB (140TB).

```
<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 100GB.

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

## See also

```
expand disk-group  
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

standard

## 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

```
show redundancy-mode  
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, 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 volumes to initiators.

This command can be used to modify existing mappings or create new mappings.

When a volume is created, if no mapping settings are specified the volume is not mapped. Otherwise, if default mapping is enabled, those settings become the volume's 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 can create different mappings per initiator. A mapping requires a volume LUN to be specified. If the mapping also specifies an initiator, it is an explicit mapping. If the mapping does not specify an initiator, it is a default mapping. Mappings can also be constrained to a specific port number. Additionally, the map may limit host access to be read-only or read-write. 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 LUN 0 for a SAS initiator. You can create a maximum of 1024 volumes, but because the supported LUN range is 1 to 1023 only 1023 volumes can be mapped. However, by reusing LUN numbers so that one volume uses the LUN number to one host and another volume uses the same LUN number to a different host, all volumes can be mapped.

---

---

**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 attach the volume and will report an error such as "unknown partition table."

---

## Minimum role

standard

## Syntax

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

## 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. no-access causes the volume to be masked from specified initiators. If the access parameter is omitted, access is set to read-write.

initiator <initiators>|<hosts>|<host-groups>

Optional if default mapping is enabled. Required if default mapping is not enabled or if explicit mapping is needed. 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 23](#).

---

**NOTE** If an initiator is specified, at least one LUN must also be specified.

---

lun <LUN>

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`.

ports <ports>

Optional. The controller host ports to use for the mapping. Any unspecified ports become unmapped. For port syntax, see ["Command syntax" on page 23](#). The `ports` parameter is ignored if access is set to `no-access`. If the `ports` parameter is omitted, all ports are mapped.

<volumes>

A comma-separated list of the names or serial numbers of the volumes to map. For volume syntax, see ["Command syntax" on page 23](#).

### 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 `Host1.*`, using ports `A1` and `B1` and LUN `101`.

```
# map volume access rw ports a1,b1 lun 101 initiator Host1.* vol2,vol3
```

Mask volume `vol4` from `Init1` and `Init3`.

```
# map volume vol4 access no-access lun 101 initiator Init1,Init3
```

Map volumes `vol1` and `vol2` to initiators `Init1` and `Init2`, using ports `A1` and `B1` starting with LUN `6`.

```
# map volume ports a1,b1 lun 6 initiator Init1,Init2 vol1,vol2
```

### See also

`show host-groups`

`show initiators`

`show maps`

`show ports`

`show volumes`

`unmap volume`

# meta

## Description

In API mode 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 469](#).

## 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 or FQDN. Ping sends ICMP echo response packets and waits for replies.

## Minimum role

monitor

## Syntax

```
ping  
  [count <count>]  
  <host-address>  
  [packet-size <size>]
```

## Parameters

count <count>

Optional. The number of packets to send. Use a small count because the command cannot be interrupted. The default is 4 packets. This parameter accepts a maximum value of 2,147,483,647.

<host-address>

The network address of the remote host. The value can be an IPv4 address, IPv6 address, or FQDN.

packet-size <size>

Optional. The packet size in bytes. The default value is 56 bytes.

## Examples

Send two packets to the remote computer at 10.134.50.6.

```
# ping 10.134.50.6 count 2
```

# query metrics

## Description

Shows one or more collected data points for a list of metrics.

Before you can view metrics, you must start metric retention by using the `start metrics` command.

## Minimum role

monitor

## Syntax

```
query metrics
  [calculate average|max|min|count|sum]
  [count <number-of-data-samples>|all]
  [database dynamic|historical]
  [filename <filename>.csv]
  [time-range "<date/time-range>"]
  <metrics-list>
```

## Parameters

calculate average|max|min|count|sum

Optional. Instead of listing columns of metric data points, apply a calculation to each column and display a single, summary value for each column.

count <number-of-data-samples>|all

Optional. Specifies the number of data samples to display, from 1 to 5000, or all available samples. Each sample is shown as a separate row in the command output. If this parameter is omitted, 100 samples are shown. If you specify this parameter, do not specify the `time-range` parameter.

Due to memory consumption limits, it is recommended to use the `all` parameter with the `filename` parameter to direct output to a CSV file instead of to the console. If the `filename` parameter is not specified, the `all` parameter might display an error message requiring you to reduce the sample count or the number of requested metrics or both.

database dynamic|historical


Optional. Specifies whether to run the query on current dynamic data or historical data. The default is `dynamic`.

filename <filename>.csv

Optional. Saves metrics to a CSV file that is accessible from either controller module.

To access the file, use SFTP or FTP. Files are created in the `metrics/` folder. Use the `cd` command to change to the `metrics/` folder and the `ls` command to list folder contents. The folder is limited to 20 files and/or 100MB of total space consumed. As the folder fills, the system automatically deletes the oldest files to make space for new files.

---

 **TIP** In your SFTP/FTP client, if entering `get metrics/<filename>.csv` displays an error, try entering `get metrics/<filename>.csv <filename>.csv` instead.

---

time-range "<date/time-range>"

Optional. Specifies the date/time range of historical metrics to query, 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 is used as the end date/time. The system returns 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 is used as the start date/time. If you specify this parameter, do not specify the `count` parameter. If both the `count` and `time-range` parameters are omitted, the most recent 100 data samples are displayed.

Times are saved at a strict cadence of :00, :05, :10 seconds, and so on. To display a single value at a particular time, ensure that the start and end times are identical and match a sample time exactly.

`<metrics-list>`

Specifies a comma-separated list of metrics whose data points you want to display. For each metric use the format `<type>.<field>.<instance>`, where: `<type>` is a type of storage object; `<field>` is a specific measured property of that object; and `<instance>` is the name or serial number of that object. If the instance value contains a space, the entire metric must be enclosed in double quotes. For example: `"volume.read-iops.My Vol1"`. Do not include an instance value for system metrics.

If `database-historical` is specified, you can optionally specify to show maximum, minimum, or average values. Each historical data point is calculated from a range of dynamic data points. The default data point calculation is based on the average of the dynamically sampled data points. However, historical data also retains minimum and maximum values for each calculated historical data point. To show minimum values append `@min`; to show maximum values append `@max`; to explicitly show average values append `@average`. For example: `"volume.read-iops@max.My Vol1"`.

Available metrics and applicable storage objects:

- `total-avg-response-time`: Average response time of an operation in microseconds. Operations include both reads and writes. **Applicable objects:** `controller, host-port, pool, system, volume`.
- `total-bytes-per-second`: Sum of read bytes per second and write bytes per second. **Applicable objects:** `controller, host-port, pool, system, volume`.
- `total-iops`: Sum of read IOPS and write IOPS. **Applicable storage objects:** `controller, host-port, pool, system, volume`.
- `total-max-response-time`: Sum of read maximum response time and write maximum response time. **Applicable objects:** `controller, host-port, pool, system, volume`.
- `total-num-bytes`: Sum of read bytes and write bytes. **Applicable objects:** `controller, host-port, pool, system, volume`.
- `read-io-count`: Number of read I/O operations. **Applicable objects:** `controller, host-port, pool, system, volume`.
- `read-ahead-ops`: Number of times that read ahead pre-fetched data for host reads. **Applicable objects:** `controller, volume`.
- `read-avg-queue-depth`: Average number of pending read operations being serviced since the last sampling time. This value represents periods of activity only and excludes periods of inactivity. **Applicable objects:** `host-port, volume`.
- `read-avg-response-time`: I/O read average response time in microseconds. **Applicable objects:** `controller, host-port, pool, system, volume`.
- `read-bytes-per-second`: Number of bytes read per second. **Applicable storage objects:** `controller, host-port, pool, system, volume`.
- `read-iops`: Number of I/Os per second. **Applicable objects:** `controller, host-port, pool, system, volume`.
- `read-max-response-time`: Maximum I/O read response time in microseconds. **Applicable objects:** `controller, host-port, pool, system, volume`.
- `read-num-bytes`: Number of bytes read since the last time this data point was sampled. **Applicable objects:** `controller, host-port, pool, system, volume`.
- `small-destages`: Number of partial stripe destages. (These tend to be very inefficient compared to full stripe writes.) **Applicable objects:** `controller, volume`.

- `write-io-count`: Number of write I/O operations. Applicable objects: `controller`, `host-port`, `pool`, `system`, `volume`.
- `write-avg-queue-depth`: Average number of pending write operations being serviced since the last sampling time. This value represents periods of activity only and excludes periods of inactivity. Applicable objects: `host-port`, `volume`.
- `write-avg-response-time`: I/O write average response time in microseconds. Applicable objects: `controller`, `host-port`, `pool`, `system`, `volume`.
- `write-bytes-per-second`: Number of bytes written per second. Applicable objects: `controller`, `host-port`, `pool`, `system`, `volume`.
- `write-cache-space`: Current size of write cache in 16KB chunks. Applicable objects: `controller`, `volume`.
- `write-cache-percent`: Percentage of write cache currently being used in tenths of a percent. Applicable objects: `controller`, `volume`.
- `write-full-stripe-destages`: Number of full stripe destages, which are the most efficient destage type. Applicable objects: `controller`, `volume`.
- `write-iops`: Number of I/Os per second. Applicable objects: `controller`, `host-port`, `pool`, `system`, `volume`.
- `write-max-response-time`: Maximum I/O write response time in microseconds. Applicable objects: `controller`, `host-port`, `pool`, `system`, `volume`.
- `write-num-bytes`: Number of bytes written since the last time this data point was sampled. Applicable objects: `controller`, `host-port`, `pool`, `system`, `volume`.

Metrics for the system storage object are synthesized from data captured by controller storage objects.

## Output

Column Key

For each specified metric, the numeric ID of the corresponding column in the displayed data table. Column IDs increment from 01.

Time

The date/time of data points in the same row.

01

The data points for the first specified metric.

<IDs>

The data points for other specified metrics, if any.

## Examples

Show the most recent ten data points for the system's average read response time metric.

```
# query metrics count 10 system.read-avg-response-time
```

## See also

`show metrics-list`

`start metrics`

`stop metrics`



# 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. IPv4 and IPv6 formats are supported.

## Output

Peer connection 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 enclosure midplane.

Vendor Name

The vendor name.

Product ID

The product model identifier.

License information

Shows output of the show license command.

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.

IPv4 Address

Controller network port IPv4 address.

Peer Host Name

Controller network port IP address in the peer system.

IPv6 Address 1-4

Up to four IPv6 addresses configured for use, or Not Configured

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
```

# recover replication-set

## Description

Provides options to recover a replication set after a disaster.

All options work with either a single volume or a volume group.

First you run the command to perform a `failover` operation. After this operation completes, you rerun the command to perform one of the following recovery operations: `failback-restore`, `failback-no-restore` or `reverse`.

---

**△ CAUTION** The `failback-restore` and `reverse` operations are designed to discard the latest updates to the primary volume since the last successful replication and replace it with the secondary volume which you've been updating while in failover state. To mitigate potential problems, take snapshots of both the primary and secondary volumes before performing this recovery operation.

---

### Performing a `failover` operation

Run this operation on the secondary system to move the replication set into "failed over" state. In this state, all scheduled or current replications of the replication set will cease and the secondary volume can be mapped and accessed for use (including rollback to the contents of any manually created or snapshot-history snapshot). Before performing `failover`, create a snapshot of the secondary volume to preserve the contents of the last replication, if snapshot history was not enabled.

### Performing a `failback-restore` operation

This is a two-step operation that can restore the primary system using updates made to the secondary volume while the replication set was failed over to the secondary system.

First, run this operation on the secondary system. This will unmap the primary volume and the secondary volume and put the replication set in a temporary "failback-restore" state that permits a replication to go in the opposite direction: from the secondary volume to the primary volumes. Once the direction has been temporarily reversed, data from the secondary volume is replicated to the primary volume. At this point, data has been restored from the secondary system, but the replication set remains in a temporary state. Host mappings to either primary or secondary volumes are blocked when in this state.

Replication snapshot history is suppressed while a `failback-restore` operation is in progress.

Second, run this operation on the primary system. This will reverse replication back to the normal direction: from the primary volume to the secondary volume. The temporary state imposed by the first step will be removed and the replication set will return to normal operation.

### Performing a `failback-no-restore` operation

This restores the replication set to functioning as it did before the `failover` operation was performed. If the secondary volume was mapped while in "failed over" state, it will be unmapped. The direction of replication will not be changed from the original configuration and it will not automatically start a replication. After this operation completes, any updates to the secondary volume will remain. However, updates to the secondary volume will be discarded when the next replication request is completed.

### Performing a `reverse` operation

This allows the replication set to return to normal operation, but with the replication roles reversed: the original primary volume becomes the secondary volume and the original secondary volume becomes the primary volume. The original primary volume becomes unmapped. The operation preserves any updates that may have been done to the original secondary volume while it was in "failed over" state, but does not automatically move these updates to the original primary volume. The next replication run will move these updates from the new primary volume to the new secondary volume, and will delete any changes made to the secondary (original primary) since the last replication.

## Minimum role

standard

## Syntax

```
recover replication-set  
    operation failover|failback-restore|failback-no-restore|reverse  
    <replication-set-ID>
```

## Parameters

```
operation failover|failback-restore|failback-no-restore|reverse
```

Specifies the operation to perform, as described above.

**failover:** Moves the replication set into the "failed over" state required for performing a subsequent recovery operation. You must run this on the secondary system.

To use this option:

- The replication set can be in any state except "failed over."
- Peer communication can be online or offline.

**failback-restore:** Restores the primary system using updates made to secondary volumes while the replication set was failed over to the secondary system. You must run this first on the secondary system and then on the primary system. The system displays two confirmation prompts when run on the secondary system, and one confirmation prompt when run on the primary system.

To use this option on the secondary system:

- The replication set must be in the "failed over" state.
- Peers must be operational with both systems healthy and communicating.

When this option is run on the secondary system, a "reverse" replication is run.

To use this option on the primary system:

- The replication set must be ready, with the `Failback In Progress` field showing `True`.
- The primary and secondary volumes must be unmapped. (Unmapping occurs when this option runs on the secondary system. Mapping is not possible while `Failback In Progress` is `True`.)
- Replication from secondary volumes back to primary volumes must be complete.

**failback-no-restore:** Restores the replication set to functioning as it did before the failover operation was performed, without using updates made to the secondary volume while the replication set was failed over to the secondary system. You must run this on the secondary system.

To use this option:

- The replication set must be in the "failed over" state.
- Peers must be operational with both systems healthy and communicating.

**reverse:** Restores the replication set to normal operation but with the replication roles reversed. You must run this on the secondary system. The system displays two confirmation prompts.

To use this option:

- The replication set must be in the "failed over" state.
- Peers must be operational with both systems healthy and communicating.

<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

Assume a disaster took the primary system for replication set RS1offline. To move RS1into "failed over" state and make its secondary volume accessible you ran the following command:

```
# recover replication-set operation failover RS1
```

You then mapped the secondary volume and updates to its data started.

Now repairs have been made, the primary system is back online, and peer communication has been re-established. You want to perform a *failback-restore* to update the data on the primary system with the current data on the secondary system. Also, you want to preserve the data state of volumes on the primary systems to avoid risk of data loss. You would do the following:

1. On the primary system, snap local replication set volumes.
2. On the secondary system:
  - a. Snap local replication set volumes.
  - b. Run: `recover replication-set operation failback-restore RS1`
3. On the primary system:
  - a. Confirm that the replication has completed by periodically running: `show replication-sets RS1`
  - b. Run: `recover replication-set operation failback-restore RS1`
  - c. Re-establish primary volume mappings.

### See also

```
create snapshots  
map volume  
show replication-sets
```


# 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

standard

## 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 dg04_v0002
```

## See also

```
show volume-reservations  
show volumes
```

# remote

## Description

Runs a command on a remote system that is associated with the local system.

If the command cannot connect to remote controller module A, it tries to connect to remote controller module B. If it is unsuccessful, the remote command is not run. Output is displayed in console or API mode depending on the local system's setting.

This command will not display prompts to confirm remote actions. Use caution when issuing remote commands to avoid risk of data loss or unavailability.

## Minimum role

standard

## Syntax

```
remote  
  <remote-system>  
  <command>
```

## Parameters

<remote-system>

The name or network-port IP address of the remote system. A name that includes a space must be enclosed in double quotes. An address can be an IPv4 address, IPv6 address, or FQDN.

<command>

The full name of any CLI command that is valid for the remote user's role.

## Examples

Run the `show system` command on remote system `System2`.

```
# remote System2 show system
```

## See also

`show remote-systems`



# remove certificate

## Description

Deletes a user-supplied certificate from the system.

This command removes a user-supplied certificate whether it is active or inactive. You can remove device certificates and trust certificates.

When the certificate being removed is the active certificate for a service:

- If there is a default system-supplied certificate available for the service, the system uses the default certificate.
- If no default system-supplied certificate is available for the service, the console prompts you to activate a certificate for the service. The service might not function as expected until a new certificate is applied.
- In either case, you must restart the Management Controller for the changes to take effect.

When the certificate being removed is *not* the active certificate for a service, the listed items do not apply.

---

**NOTE** You cannot remove a system-generated certificate.

---

## Minimum role

manage

## Syntax

```
remove certificate  
  <name>
```

## Parameters

<name>

The name of the certificate to remove. Use the `show certificates` command to list all certificates, where you can view certificate names. You can only remove certificates labeled as `Customer-supplied`.

## Examples

Remove a certificate named `CERT_A_12345`.

```
# remove certificate CERT_A_12345
```

## See also

```
activate certificate  
add certificate (API command)  
create certificate-signing-request  
show certificates
```

# remove disk-groups

## Description

Removes specified disk groups and provides options for also performing data erasure.

---

**CAUTION** If your system gets into a state where a disk group is quarantined or offline or does not have a corresponding pool, contact technical support.

---

If a specified disk group has a job running, such as media scrub, the command prompts for confirmation to stop the job.

For a disk group, if the group contains no volume data, the group is removed. If the group contains volume data, the command initiates removal and tries to drain (move) all volume data to other groups in the same pool. While data is being drained, the group's status is `VDRAIN`. If the pool does not have enough space to contain the volume data, the command immediately fails with an error. If draining is successful, an event is logged and the group is removed. If draining begins but hosts continue to write new data to the volumes and cause an out-of-space condition, the command fails and an event is 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: 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 (SSD, enterprise SAS, or midline SAS); 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 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 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

standard

## Syntax

```
remove disk-groups
  [assurance-level secure|sanitize]
  [erase]
  [prompt yes|no]
  <disk-groups>
```

## Parameters


`assurance-level secure|sanitize`

Optional. This parameter specifies the method for the data erasure operation if the `erase` parameter is specified:

- `secure`: Performs data erasure using cryptographic erase based on the Subsystem Security Class method that applies to the system's SED (FDE-capable) drives.
- `sanitize`: Performs data erasure with the `SANITIZE` SCSI command, using the system's SAS interface.

If this parameter is omitted, then the system determines the appropriate `assurance-level` based on drive capability and system security status. If the parameter is provided and a failure occurs, the command returns the failed result.

---

 **TIP** Considerations for using the optional data erasure command parameters:

- The `assurance-level sanitize` option works only on an unsecured system.
- The `assurance-level secure` option works only on drives that support cryptographic erase. For SEDs, the appropriate cryptographic erase command is sent to the drive based on the secured or unsecured state.

---

`erase`

Optional. This parameter specifies data erasure. If this parameter is omitted, the command does not perform data erasure when deleting the specified disk group.

`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
```

Remove disk group `dg1` and perform erasure on a system secured with FDE-capable drives.

```
# remove disk-groups dg1 erase assurance-level secure
```

### See also

`delete pools`

`show disk-groups`

# remove host-group-members

## Description

Removes specified hosts from a host group.

You cannot remove all hosts from a host 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

standard

## 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 host 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

standard

## Syntax

```
remove host-members
    initiators <initiators>
    <hostname>
```

## 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.

```
<hostname>
```

The name of the host. A name that includes a space must be enclosed in double quotes.

## Examples

From group FC-host11, which contains three initiators, remove initiators FC-init2 and FC-init3.

```
# remove host-members initiators FC-init2,FC-init3 FC-host11
```

## See also

```
delete hosts
show initiators
```

# remove ipv6-address

## Description

Removes a static IPv6 address from a controller network port.

---

**NOTE** When the set `ipv6-network-parameters` command's `autoconfig` parameter is disabled, you cannot remove the last IPv6 address.

---

## Minimum role

standard

## Syntax

```
remove ipv6-address
  [address-label <name>]
  [controller a|b]
  [index <index>]
  [ip-address <IP-address>]
```

## Parameters

The parameters must be used in one of these ways:

- controller and index
- controller and address-label
- index only
- ip-address only

address-label <name>

Optional. Specifies the name assigned to the address.

controller a|b

Optional. Specifies whether to change controller A or B, only. If this parameter is omitted, changes affect the controller being accessed.

index <index>

Optional. A value from 1 to 4 that specifies the controller's index value for the address.

ip-address <IP-address>

Optional. Specifies the address to remove.

## Examples

Remove the IPv6 address named `vlan1` from controller A.

```
# remove ipv6-address controller a address-label vlan1
```

## See also

```
add ipv6-address
set ipv6-network-parameters
show ipv6-addresses
show ipv6-network-parameters
```

# remove spares

## Description

Removes specified spares.

## Minimum role

standard

## Syntax

```
remove spares  
  <disks>
```

## Parameters

<disks>

The IDs of the spares to remove. For disk syntax, see ["Command syntax" on page 23](#).

## Examples

Remove 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 volume group. At least one volume must remain. The volumes are ungrouped but not deleted.

---

**NOTE** 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

standard

## 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

standard

## 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 enclosures 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 enclosure, this command rebuilds the internal SAS layout information, reassigns enclosure IDs based on controller A's enclosure cabling order, and ensures that the enclosures 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 enclosures in the proper order. Whenever you replace a drive chassis or controller chassis, perform a manual rescan to force fresh discovery of all drive enclosures connected to the controller enclosure.

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.

A manual rescan may be required to discover newly inserted SED (self-encrypting drive) disks in an FDE secured system.

## Minimum role

standard

## 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

standard

## 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 appears 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-statistics
reset host-port-statistics
reset pool-statistics
reset volume-statistics
show controller-statistics
```

# reset ciphers

## Description

Clears user-supplied ciphers and sets the cipher list to the system default.

The command will prompt you to restart both Management Controllers to activate the ciphers. The change will take effect when the restart is complete.

If you change any cipher settings between running the reset ciphers command and restarting the Management Controllers, those changes will be ignored.

## Minimum role

manage

## Syntax

```
reset ciphers
```

## Examples

Reset the cipher list to the system default.

```
# reset ciphers
```

## See also

set ciphers

show ciphers

# 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

standard

## 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 all-statistics  
reset disk-error-statistics  
reset disk-statistics  
reset host-port-statistics  
reset pool-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

standard

## 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 23](#). 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-statistics  
reset host-port-statistics  
reset pool-statistics  
reset volume-statistics  
show disk-statistics  
show disks
```

# 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

standard

## 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 host-port-statistics  
reset pool-statistics  
reset volume-statistics  
show disk-statistics
```



# reset dns-management-hostname

## Description

Resets each controller module's management hostname to the factory default.

The factory default is: <SCSI-vendor-ID><midplane-serial-number><controller-ID>.

## Minimum role

standard

## Syntax

```
reset dns-management-hostname  
    [controller a|b|both]
```

## Parameters

controller a|b|both

Optional. Specifies whether to change controller A, B, or both. If this parameter is omitted, changes affect the controller being accessed.

## Examples

Reset the domain hostname for controller A.

```
# reset dns-management-hostname controller a
```

## See also


```
clear dns-parameters  
set dns-management-hostname  
set dns-parameters  
show dns-management-hostname  
show dns-parameters
```

# 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 cannot reset individual ports; this command resets all ports on the specified controller.

For SAS, you cannot reset individual ports; this command resets all ports on the specified controller.

This command has a confirmation prompt in interactive console mode.

## Minimum role

standard

## 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.

For iSCSI, all ports on the specified controller are reset, regardless of which port number you enter.

For SAS, all ports on the specified controller are reset, regardless of which port number you enter.

## 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

standard

## 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 23](#). 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-statistics  
reset pool-statistics  
reset volume-statistics  
show host-port-statistics  
show ports
```

# reset pool-statistics

## Description

Clears resettable performance statistics for pools, and resets timestamps for those statistics.

## Minimum role

standard

## Syntax

```
reset pool-statistics  
    [<pool>]
```

## Parameters

<pool>

Optional. The name or serial number of the 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-statistics  
reset host-port-statistics  
reset volume-statistics  
show pool-statistics  
show pools
```

# reset snapshot

## Description

Replaces the data in a standard snapshot with the current data from its parent volume.

The snapshot's name, serial number, and mapping 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

standard

## 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 volume-statistics

## Description

Resets performance statistics for all or specified volumes.

## Minimum role

standard

## 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 dg1_v0001.  
# reset volume-statistics dg1_v0001
```

## See also

```
reset all-statistics  
reset controller-statistics  
reset disk-error-statistics  
reset disk-statistics  
reset host-port-statistics  
reset pool-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

standard

## Syntax

```
restart mc  
  [a|b|both]  
  [full]  
  [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. These options complete quickly, performing a "soft" reset that ends application processes and clears some memory.

full

Optional. Performs a full reboot of the specified Management Controller(s), which takes a longer time to complete. Use this option only when specified by a message, documentation, or technical support.

noprompt

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

## Output

Messages are displayed when the controller is shut down, when failover is initiated, and when the controller has restarted.

## Examples

Restart the Management Controller in controller A.

```
# 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.
- 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

standard

## 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 is shut down, when failover is initiated, and when the controller has restarted.

## Examples

Restart the Storage Controller in controller B.

```
# restart sc b
```

Restart both Storage Controllers.

```
# restart sc both
```

## 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.

---

Settings restored by this command are listed in ["Settings changed by restoring defaults" on page 593](#).

---

**⚠ CAUTION** This command restores the default settings to the controllers and then restarts the controllers. 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

```
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

standard

## Syntax

```
resume replication-set  
  <replication-set-ID>
```

## Parameters

<replication-set-ID>

The name or serial number of the replication set for which to resume 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.

Rollback reverts the volume data to its state at an earlier point in time. The volume's name, serial number, and mapping 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** 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 original snapshot read-only and use it for the rollback, and use the child snapshot for read-write access.

---

**NOTE** When a snapshot is created, the original volume's usage-type setting will be copied to the snapshot. The usage-type setting of the snapshot may be modified independently of the parent volume using the `set volume` command. However, if the volume is rolled back, the parent volume inherits the usage-type value of the snapshot.

---

## Minimum role

standard

## 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 manually 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.

This command acts on disks in a disk group but not leftover disks.

The command automatically fixes media errors for all RAID levels, regardless of whether the `fix` parameter is specified or its setting. Media errors occur when the system cannot read one of the copies of mirror data, due to a disk error such as an unrecoverable disk error (URE).

The disk-group scrub task is almost continually active, but has very little impact on I/O activity. You can use a disk group while it is being scrubbed. To check the progress of a disk-group scrub (VRSC) 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

standard

## Syntax

```
scrub disk-groups  
    [fix yes|no]  
    <disk-groups>
```

## Parameters

`fix yes|no`

Optional. Specifies whether to automatically fix redundancy data (parity) issues that are found. The default is `yes`.

- `yes`:
  - For RAID 5, RAID 6, and MSA-DP+: Finds and fixes parity mismatches. For parity errors in RAID 6 and MSA-DP+, the code uses one of the parity blocks as a detector and one as a corrector so if one block has an error, that block is fixed. If more than one block has an error or for RAID 5, parity is updated to make it consistent.
  - For RAID 1 and RAID 10: Finds and fixes mirror mismatches by copying data from one disk to the other.
- `no`:
  - For RAID 5, and RAID 6, and MSA-DP+: Finds but does not fix parity mismatches.
  - For RAID 1 and RAID 10: Finds but does not fix parity mismatches.

`<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 RAID-6 disk group `dg1` to find and automatically fix media errors and parity errors.

```
# scrub disk-groups dg1
```

Start scrubbing RAID-1 disk group `dg1` to find and automatically fix media errors, and find but not fix mirror mismatches.

```
# scrub disk-groups dg1 fix no
```

## See also

`abort scrub` (with the `disk-group` parameter)

```
set advanced-settings  
show disk-groups
```

# set advanced-settings

## Description

Sets advanced system configuration parameters.

## Minimum role

standard

## Syntax

```
set advanced-settings
  [auto-stall-recovery enabled|disabled|on|off]
  [auto-write-back enabled|disabled|on|off]
  [background-scrub enabled|disabled|on|off]
  [controller-failure enabled|disabled|on|off]
  [default-mapping enabled|disabled|on|off]
  [dynamic-spare enabled|disabled|on|off|alternate]
  [emp-poll-rate <rate>]
  [fan-failure enabled|disabled|on|off]
  [host-cache-control 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]
  [scrub-schedule enabled|disabled|on|off]
  [slow-disk-detection enabled|disabled|on|off]
  [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. Disabling this parameter displays a confirmation prompt in console mode.
- `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-scrub` `enabled|disabled|on|off`

Optional. Sets whether disks in disk groups are automatically checked for disk defects to ensure system health.

- `disabled` or `off`: Background disk-group scrub is disabled. Disabling this parameter displays a confirmation prompt in console mode.
- `enabled` or `on`: Background disk-group scrub 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. Disabling this parameter displays a confirmation prompt in console mode.
- `enabled` or `on`: The controller failure trigger is enabled. This is the default.

`default-mapping` `enabled|disabled|on|off`

Optional. Enables or disables the ability to use default mapping.

- `disabled` or `off`: When you create a volume you must map it with a unique LUN to a specific initiator, host, or host group. This is known as *explicit mapping*. This is the default.
- `enabled` or `on`: When you create a volume without explicit mappings, the system will automatically map the volume with a single LUN to all current and future initiators. This is known as *default mapping*.

---

 **CAUTION**

- Using default mapping can be a security risk because mappings can be exposed to new initiators.
  - 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.
- 

`dynamic-spare` `enabled|disabled|on|off|alternate`

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. The dynamic spares feature does not apply to MSA-DP+ disk groups.



- `disabled` or `off`: The dynamic spares feature is disabled. Disabling this parameter displays a confirmation prompt in console mode.
- `enabled` or `on`: The dynamic spares feature is enabled. This is the default.
- `alternate`: The dynamic spares feature is enabled but spare selection is restricted to the enclosure that contains the failed disk.

`emp-poll-rate rate`

Optional. Sets the interval at which the storage system will poll each enclosure'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. Disabling this parameter displays a confirmation prompt in console mode.
- `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`: Hosts can use the SCSI MODE `SELECT` command to change the write-back cache setting. This is the default.
- `enabled` or `on`: Hosts cannot override the storage system's write-back cache setting.

`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).

- `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.
- `illegal`: Sends a reply that there is no LUN and that the request is an illegal request. Sense data returned is sensekey = 5, code = 25h, qualifier = 0. If the system is used in a VMware environment, use this option. This option is the default.

`partner-firmware-upgrade enabled|disabled|on|off`

Optional. Sets whether component firmware versions are monitored and will be automatically updated on the partner controller.

- `disabled` or `off`: Partner firmware upgrade is disabled. Disabling this parameter displays a confirmation prompt in console mode.
- `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 to continue using its current caching mode for better performance.

- `disabled` or `off`: Notification is disabled.
- `enabled` or `on`: Notification is enabled. This is the default. Enabling this parameter displays a confirmation prompt in console mode.

`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. Disabling this parameter displays a confirmation prompt in console mode.
- `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 enabled 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 SMU.

`scrub-schedule enabled|disabled|on|off`

Optional. Sets whether disk-group scrub runs only when scheduled. This option lets you schedule scrub times when the system load is expected to be light.

- `disabled` or `off`: Scheduling background disk-group scrub is not available. This option is the default.
- `enabled` or `on`: Scheduling background disk-group scrub is available.

To use this feature, `background-scrub` must be enabled, and you will need to take additional steps to configure the schedule. See `create task` and `create schedule` for information.

`slow-disk-detection enabled|disabled|on|off`

Optional. Enables or disables the slow-disk detection feature. This feature identifies drives that are performing below expectations compared to their peers. If a slow drive is detected, the system issues a notification to help with debug analysis so you can determine the impact of the drive on the system as a whole.

- `disabled` or `off`: Slow-disk detection is disabled.
- `enabled` or `on`: Slow-disk detection is enabled. This option is the default.

`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 1 minute after a restart and every 5 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. Disabling this parameter displays a confirmation prompt in console mode.
- `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 MSA-DP+ disk groups or to 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 to 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 MSA-DP+ disk groups or to 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. Disabling this parameter displays a confirmation prompt in console mode.
- `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 cache policy will change from write-back to write-through when the temperature exceeds the critical operating range. The actual heat threshold isn't a single fixed number but can be triggered by many different elements within the system, each of which has a different heat threshold.

- `disabled` or `off`: The over-temperature trigger is disabled. This is the default.
- `enabled` or `on`: The over-temperature trigger is enabled. Enabling this parameter displays a confirmation prompt in console mode.

`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

show advanced-settings

# set alert

## Description

Acknowledges specified alerts.

Acknowledging a resolved alert will immediately remove that alert from the active list.

If you acknowledge an unresolved alert, it will remain in the acknowledged list until it is resolved, at which point it will be deleted.

## Minimum role

standard

## Syntax

```
set alert
  acknowledge
  <alert-IDs>
```

## Parameters

acknowledge

Acknowledges the specified alerts.

<alert-IDs>

A comma-separated list of the IDs of alerts to operate on.

## Examples

Acknowledge resolved alert 134.

```
# set alert acknowledge 134
```

## See also

clear alerts

show alert-condition-history

show alerts

# 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 SMU documentation.

---

## Minimum role

standard

## 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 from 12 to 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 from 12 to 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
```

## See also

```
create chap-record
delete chap-records
```

```
show chap-records  
show iscsi-parameters  
show ports
```

# set ciphers

## Description

Configures a cipher list that the storage system can use to securely communicate with hosts through HTTPS.

Transport Layer Security (TLS) is used in every browser worldwide to provide secure HTTP (HTTPS) functionality. TLS 1.3 is the most secure version compared to the previous versions. TLS 1.3 ciphers are set on the system by default.

A cipher suite is a set of algorithms that help secure a network connection that uses TLS. In the TLS handshake, the client communicates the list of cipher suites that it supports to the server. Cipher suites are usually listed from most secure to least secure so that the most secure cipher suite becomes the first choice. The server compares the list of cipher suites that it supports with the list from the client. When the server finds a match, it informs the client and uses the selected cipher suites to establish a secure connection.

The set of algorithms that cipher suites usually contain include: a key exchange algorithm, a bulk encryption algorithm, and a Message Authentication Code (MAC) algorithm. For example, a typical cipher suite is `TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384`, where:

- `TLS` indicates the protocol.
- `ECDHE` signifies the key exchange algorithm.
- `RSA` signifies the authentication algorithm.
- `AES_256_CBC` indicates the bulk encryption algorithm.
- `SHA384` indicates the MAC algorithm.

The choice of cipher suites in the TLS connection explain the difference between having a secure connection and one that can be exploited. In order to avoid certain attacks, you may need to disable specific ciphers or entire cipher suites due to security issues.

Each cipher string can be optionally preceded by `!`, `-`, or `+`:

- If `!` is used then the ciphers are permanently deleted from the list. The ciphers deleted can never reappear in the list even if they are explicitly stated.
- If `-` is used then the ciphers are deleted from the list, but some or all of the ciphers can be added again by later options.
- If `+` is used then the ciphers are moved to the end of the list. This option doesn't add any new ciphers it just moves matching existing ones.

Additionally the cipher string `@STRENGTH` can be used at any point to sort the current cipher list in order of encryption algorithm key length.

The cipher settings apply to both controller modules.


If you change the cipher list, the command will prompt you to restart both Management Controllers to activate the ciphers.

The change will take effect when the restart is complete.

---

**NOTE** IANA cipher format is not supported.

---

 **IMPORTANT** Running the CLI `restore defaults` command will reset the cipher list to the system default.

---

## Minimum role

manage



**Syntax**

```
set ciphers  
list <cipher-string>
```

**Parameters**

```
list <cipher-string>
```

One or more ciphers separated by colons (with no spaces). Wildcard characters are not supported.

**Examples**

Set the cipher list.

```
# set ciphers list ALL:!AES128:!AES256:!SHA256:ECDHE-PSK-CAMELLIA127-SHA256:!ADH:@STRENGTH
```

**See also**

```
reset ciphers  
show ciphers
```

# 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 enclosure'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

monitor

## Syntax

```
set cli-parameters
  [api|api-embed|console|ipa|json|wbi]
  [base 2|10]
  [brief enabled|disabled|on|off]
  [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]
  [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

api|api-embed|console|ipa|json|wbi

Optional. Sets the output mode:

- **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.
- **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.
- **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 SMU.

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 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.

`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. Regardless of the locale, confirmation prompts only accept English characters, such as `y` for `yes` or `n` for `no`.

`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 to 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 to 43200 seconds (2 to 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 0.11709TB is instead shown as 117.1GB.

### 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
```

### 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

standard

## 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 <timezone-offset-or-name>
```

To configure use of NTP:

```
set controller-date
  ntp enabled | disabled | on | off
  ntpaddress <address>
  timezone <timezone-offset-or-name>
```

## Parameters

jan | feb | mar | apr | may | jun | jul | aug | sep | oct | nov | dec

The month.

<day>

The day number (1 to 31).

<hh>:<mm>:<ss>

The hour (0 to 23), the minutes (0 to 59), and the seconds (0 to 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 <address>`

The network address of an available NTP server. The value can be an IPv4 address, IPv6 address, or FQDN.

`timezone <timezone-offset-or-name>`

The system's time zone as either:

- An offset in hours (-12 through +14) and optionally minutes (00 to 59) from Coordinated Universal Time (UTC), in the format `+|-<hh>[:<mm>]`. 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.
- A time zone name shown by the `show timezones` command.

`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
```

Same as above, specifying a time zone name instead of a time zone offset.

```
# set controller-date timestamp 1320273050 timezone Australia/Hobart
```

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`

`show timezones`

# 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

standard

## 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.
- **bkcfig**: 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.
- **dns**: Not supported.
- **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.
- **ioid**: 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** Repurposing a disk is not permitted when the system is in the `Secured`, `Locked` state. Use the `show fde-state` command to view the system FDE security status.

---

**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

standard

## 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 23](#).

## 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
```

## See also

`set fde-lock-key`  
`set fde-state`

show disks (with the fde parameter)

show fde-state

# set disk-group

## Description

Changes parameters for a specified disk group.

## Minimum role

standard

## Syntax

```
set disk-group  
    [name <new-name>]  
    [spare-capacity <size> [B|KB|MB|GB|TB|KiB|MiB|GiB|TiB] | default]  
    <disk-group>
```

## Parameters

name <new-name>

Optional. A new name for the disk group. A name that includes a space must be enclosed in double quotes. The name can include printable UTF-8 characters except: " , < \

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

Optional. For an MSA-DP+ disk group, this specifies the target spare capacity. Recommended spare capacity is described in the *HPE MSA Storage Arrays Best Practices* white paper.

- <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.

When you run the command, a confirmation prompt shows the configured spare capacity, the recommended spare capacity, and the predicted available space, and provides guidance on setting the appropriate value.

<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 disk group dgA01 to vdg.

```
# set disk-group name vdg dgA01
```

## See also

expand disk-group

show disk-groups

# set disk-parameters

## Description

Sets parameters that affect disk operation.

## Minimum role

standard

## 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. Disabling this parameter displays a confirmation prompt in console mode.
- `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.

Disks equipped with Self-Monitoring Analysis and Reporting Technology (SMART) 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 5 minutes thereafter. SMART events are recorded in the event log. Changes to the SMART setting take effect after a rescan or a controller restart.

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 any disk group or pool, only to drives.

---

For spinning disks, the drive spin down feature monitors disk activity within system enclosures and spins down inactive disks, based on user-specified settings. This feature sets spin-down parameters for available disks and global spares. Spin-down settings do not affect leftover disks.

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.

`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 to 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 dns-management-hostname

## Description

Sets a domain hostname for each controller module to identify it for management purposes.

A controller configured to use DHCP addressing will send the management hostname to a DHCP server. The DHCP server will in turn register or update the controller's fully qualified domain name (FQDN) on DNS servers. The FQDN is created by appending the management hostname to the DNS domain string that identifies the controller.

## Minimum role

standard

## Syntax

```
set dns-management-hostname
    [controller a|b]
    name <hostname>
```

## Parameters

controller a|b

Optional. Specifies whether to change controller A or B, only. If this parameter is omitted, changes affect the controller being accessed.

name <hostname>

A hostname to use for a controller. The name must differ for each controller.

- A name can have from 1 to 63 bytes.
- A name is not case sensitive.
- A name must start with a letter and end with a letter or number.
- A name can include letters, numbers, or hyphens; no periods.

Running the `reset dns-management-hostname` command will reset the hostname to its default value.

## Examples

Set the domain hostname for controller A.

```
# set dns-management-hostname controller a name vlan3-ctlra
```

## See also

```
clear dns-parameters
reset dns-management-hostname
set dns-parameters
show dns-management-hostname
show dns-parameters
```

# set dns-parameters

## Description

Configures settings to resolve domain names using the Domain Name Service (DNS).

Configuring the storage system to communicate with a DNS server within your network will allow network changes, such as frequent IP address changes in a DHCP environment, to occur without interrupting notifications sent by the system to users.

After a reachable DNS server is configured on the system, or if DHCP is enabled and a DHCP server is reachable, a DNS server may be automatically acquired. Otherwise, you can configure an SMTP server using a name such as `mysmtpserver.example.com`. Further, you could configure search domain `example.com` and SMTP server `mysmtpserver` and reach the same destination.

You must use this command to configure DNS parameters before you configure email parameters in any environments where DNS will be required to resolve server names.

The priority of DNS servers and search domains is:

- User-supplied, using this command
- DHCPv6
- DHCPv4

## Minimum role

standard

## Syntax

```
set dns-parameters
  [controller a|b|both]
  nameservers <nameserver-IP-list>
  [search-domains <domain-name-list>]
```

## Parameters

`controller a|b|both`

Optional. Specifies whether to change controller A, B, or both. If this parameter is omitted, changes affect the controller being accessed.

`nameservers <nameserver-IP-list>`

An ordered list of up to three name server addresses that are recognized within your network to be queried by the DNS resolver. You can specify a comma-separated list containing from one to three IPv4 or IPv6 addresses. The resolver will query the network in the order prescribed by the list until reaching a valid destination address. Any valid setting is treated as enabling DNS resolution for the system.

`search-domains <domain-name-list>`

Optional. An ordered list of domain names to search when resolving hostnames that are configured in the storage system. You can specify a comma-separated list containing from one to three domain names, with a maximum of 253 characters per domain name. The resolver will query the network in the order prescribed by the list until finding a match.

## Examples

Configure the system to query the name server at IP address 8.8.8.8, or at 8.8.6.6 if 8.8.8.8 is unsuccessful or unreachable, to resolve any SMTP server name with a domain of `site1.com`, followed by `site2.com`, and finally by `site3.com`.

```
# set dns-parameters nameservers 8.8.8.8,8.8.6.6 search-domains
site1.com,site2.com,site3.com
```

**See also**

```
clear dns-parameters  
reset dns-management-hostname  
set dns-management-hostname  
set email-parameters  
show dns-parameters  
show dns-management-hostname  
show email-parameters
```



# set email-parameters

## Description

Sets SMTP notification parameters for events and managed logs.

## Minimum role

standard

## Syntax

```
set email-parameters
  [alert-notification-level all|none]
  domain <domain>
  email-list <email-addresses>
  [include-logs enabled|disabled|on|off]
  [notification-level crit|error|warn|resolved|info|none]
  [persistent-alerts enabled|disabled|on|off]
  [port <port-number>]
  security-protocol tls|ssl|none
  [sender <sender>]
  [sender-password <password>]
  server <address>
```

## Parameters

alert-notification-level all|none

Optional. Sets whether the system should send notifications of alerts.

- all: Sends notifications for all alerts. This is the default.
- none: Disables email notification of alerts.

If no notification level is specified, the previous notification level will remain.

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 must follow these rules:

- Can have a maximum of 253 characters.
- The value cannot include a space or: \ " , ; < > ( )
- Must be in the form: <name>.<TLD> where:
  - <name> can include multiple subdomains separated by periods ( . ).
  - <TLD> is a valid top-level domain (TLD).
  - Both are required.
  - Neither can begin or end with a hyphen (-) or a period ( . ).

For example: MyDomain.com. If the domain name is not valid, some email servers will not process the message.

---

**NOTE** Alternatively, you can specify the domain by using a valid IP address enclosed in square brackets, [ ]. If the brackets are omitted, email notifications fail to send.

---

`email-list <email-addresses>`

Enter from one to four comma-separated email addresses for recipients of event notifications. Each email address must use the format `<user-name>@<domain-name>` and 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`

Optional. 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 of events. This is the default. If this option is specified, no other parameters are required and their current values are not changed. Email notification of alerts will still occur if the `alert-notification-level` parameter is set to `all`.

If no notification level is specified, the previous notification level will remain.

`persistent-alerts enabled|disabled|on|off`

Optional. Sets whether system health alerts are sent weekly on Sunday at 12:01 AM to configured email addresses. The text of the email message contains the output of the `show alerts unresolved` command. This option is enabled by default.

`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. Valid port numbers are 1 to 65535.

`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 username specified by the `sender` parameter. The sender password can have a maximum of 32 bytes. The value can include alphanumeric characters and: `^_+ : , . @`

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 <address>
```

The network address of the SMTP mail server to use for the email messages. The value can be an IPv4 address, IPv6 address, or FQDN. If DNS is configured, this parameter may specify a server name. The value can have a maximum of 255 bytes.

### 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

```
set dns-parameters
show dns-parameters
show email-parameters
test (with the email parameter)
```

# set enclosure

## Description

Sets an enclosure's name, location, rack number, and rack position.

Set these parameters to values that help you identify and locate the enclosure. These values are used when user interfaces show enclosure-related data, such as in output of the `show enclosures` command and in event-log entries related to enclosures.

## Minimum role

standard

## 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 enclosure. 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>

Optional. The location of the enclosure. 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>

Optional. The number of the rack containing the enclosure, from 0 to 255.

rack-position <rack-position>

Optional. The enclosure's position in the rack, from 0 to 255.

<enclosure-number>

The enclosure ID.

## Examples

Set parameters for enclosure 1.

```
# set enclosure 1 name Storage-5 location Lab rack-number 9 rack-position 3
```

**See also**

`show enclosures`

# set event-subscriber

## Description

Sets the context and delivery retry policy parameters for an event subscriber used by the Redfish interface.

## Minimum role

standard

## Syntax

```
set event-subscriber
  [context <string>]
  [delivery-retry-policy SuspendRetries|TerminateAfterRetries]
  <subscriber-ID>
```

## Parameters

context <string>

Optional. Sets the context associated with the specified event subscriber.

delivery-retry-policy SuspendRetries|TerminateAfterRetries

Optional. Sets the delivery retry policy of the specified event subscriber:

- SuspendRetries: No retries are attempted.
- TerminateAfterRetries: Up to 3 retries are attempted.

<subscriber-ID>

The event subscriber to modify.

## Examples

Change the context and delivery retry policy for event-subscriber-1.

```
# set event-subscriber context Thunder delivery-retry-policy TerminateAfterRetries event-
subscriber-1
```

## See also

add event-subscriber

delete event-subscriber

show event-subscriber

# 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

standard

## 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 to 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--01/10/2019"
```

Please re-enter the import passphrase to confirm: **"Customer lock--01/10/2019"**

## 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.

You cannot set the lock key if any disks are failed or unusable. Use the `show disks` command to check whether any disks have `Usage` value `FAILED` or `UNUSABLE`. In order to set the lock key, all failed disks must be removed from the system. For disks in the `UNUSABLE` state due to a key mismatch, use the `set fde-import-key` to unlock these disks and bring them into the system before issuing the `set fde-lock-key` command.

If any disks are in leftover state (`Usage` value `LEFTOVR`), the command will proceed and identify the disks that remain in that state.

## Minimum role

standard

## 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` parameter. 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 to 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--01/10/2019"
```



**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. The security level can follow Federal Information Processing Standards (FIPS) or FDE, based on the capability of the disks. Use `show disks` to see what the disks support.

Alternatively, the system can be repurposed, where each disk is secure erased.

## Minimum role

standard

## 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`

Optional. The system and all its disks are secured, using the specified FDE system passphrase, which must have been previously configured.

- If the system disks are all FDE-capable, all disks are secured at the FDE level.
- If the system disks are all FIPS-capable, all disks are secured at the FIPS level.
- If the system disks are a mixture of FIPS and FDE, each disk is secured at its hardware-supported security level. FIPS disks are FIPS secured. FDE disks are FDE secured. This configuration is not recommended.

`passphrase <value>`

Optional. A value that matches the previously configured passphrase. Values that include a space must be enclosed in double quotes.

## Examples

Secure the system using FDE.

```
# set fde-state secure passphrase "Customer lock--01/10/2019"
```

A lost passphrase will result in unrecoverable data loss. Please re-enter the passphrase to confirm: **"Customer lock--01/10/2019"**

**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.

---

**NOTE** If your storage configuration has virtual pools greater than 2PB, use host-side driver settings to increase the host I/O timeout interval (Block Device Timeout) to 80 seconds.

---

## Minimum role

standard

## Syntax

```
set host
  [name <new-name>]
  [profile standard|hp-ux|openvms]
  <hostname>
```

## 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.

---

<hostname>

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

standard

## 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 MSA 1060 SAS: Host ports can be configured to use fan-out SAS cables or standard SAS cables.

For MSA 2060 SAS: No parameters can be set.

For MSA 1060: FC host ports support use of qualified 16Gb/s SFPs. iSCSI controllers use 10GBase-T ports and RJ-45 connectors. 1Gb/s and 10Gb/s speeds are supported with Cat-6 cables.

For MSA 2060: FC ports support use of qualified 16Gb/s SFPs. You can set FC ports to auto-negotiate the link speed or to use a specific link speed. iSCSI controllers with SFP28 ports support both 10Gb/s and 25Gb/s optical SFPs and Direct Attached Copper (DAC) cables, iSCSI controllers with 10GBase-T RJ-45 ports support 1Gb/s and 10Gb/s speeds using CAT-6 cables.

---

**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

standard

## Syntax

To set FC port parameters:

```
set host-parameters
  [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
  [default-router <address>]
  [gateway <address>]
  [ip <address>]
  [iscsi-ip-version ipv4|ipv6]
  [netmask <address>]
  [noprompt]
  [ports <ports>|all]
  [prompt yes|no|expert]
```

To set MSA 1060 SAS port parameters:

```
set host-parameters
  [fan-out enabled|disabled|on|off]
  [noprompt]
  [prompt yes|no|expert]
```

## Parameters

`default-router <address>`

Optional. For iSCSI IPv6 only, the default router for the port IP address. This parameter requires the `ports` parameter.

`fan-out enabled|disabled|on|off`

Optional. Specifies the cable type used to connect MSA 1060 SAS controller modules to SAS hosts. All connected controller host ports must use the same cable type. This setting will persist through controller resets and power cycles.

- `enabled` or `on`: Fan-out cable. A fan-out SAS cable can connect one port on each of two SAS hosts to one controller host port, using two dedicated PHY lanes per port. This is the default.
- `disabled` or `off`: Standard cable. A standard SAS cable can connect one port on a SAS host to one controller host port, using four PHY lanes per port.

---

### **IMPORTANT**

- Changing the `fan-out` setting will change the logical numbering of controller host ports, which will cause port IDs in mappings between volumes and initiators to be incorrect. Therefore, before changing the `fan-out` setting, unmap all mappings that specify port IDs. After you have changed the `fan-out` setting and connected the appropriate cables, you can re-create the mappings.
- Using fan-out cables instead of standard cables will double the number of hosts that can be attached to a single system. Use of fan-out cables will halve the maximum bandwidth available to each host, but overall bandwidth available to all hosts is unchanged.

---

`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 16Gb/s link speed or greater.
- `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.

`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 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.

If you specify this parameter, also specify the `ip` parameter.

`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 23.

The `ports` parameter does not apply to HPE MSA 1060 SAS controllers when the `fan-out` parameter is enabled. The `fan-out` setting applies to all ports.

`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 Gb/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. This parameter requires the `ports` parameter.

## Examples

On a system with FC ports, set the link speed to 8Gb/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
```

On an HPE 1060 SAS system, specify to use fan-out cables for all host ports on each controller.

```
# set host-parameters fan-out enabled
```

**See also**

```
restart mc  
restart sc  
set iscsi-parameters  
show ports
```

# set initiator

## Description

Sets the name of an initiator and optionally its profile.

## Minimum role

standard

## 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 standard.

```
# set initiator id iqn.1991-05.com.microsoft:myhost.domain nickname iSCSI-port1 profile
standard
```

## See also

show initiators

# set ipv6-network-parameters

## Description

Sets IPv6 parameters for the network port in each controller module.

## Minimum role

standard

## Syntax

```
set ipv6-network-parameters
  [autoconfig enabled|disabled|on|off]
  [controller a|b|both]
  [gateway <gateway>]
  [reset-link]
```

At minimum, autoconfig or gateway must be specified.

## Parameters

autoconfig enabled|disabled|on|off

Optional.

- **enabled** or **on**: Specifies to use an automated method (either DHCPv6 or SLAAC, as defined by the network configuration) to automatically configure the address. If a DHCPv6 address is available, DHCPv6 will provide an interface address. If DHCPv6 cannot provide an address, the SLAAC address will be the single interface address. This is the default.
- **disabled** or **off**: Specifies to use manual mode. This mode uses static IPv6 addresses set with the `add ipv6-address` command. To use manual mode, at least one and up to four IPv6 addresses must already be set.

---

**NOTE** Enabling `autoconfig` will deactivate any static IPv6 addresses, which will no longer be reachable. The static IPv6 addresses will otherwise remain in the configuration, but will not be bound to any interface unless `autoconfig` is subsequently disabled.

---

controller a|b|both

Optional. Specifies whether to change controller A, B, or both. If this parameter is omitted, changes affect the local controller only.

gateway <gateway>

Optional. Specifies a gateway IP address for the port. The value must be a valid IPv6 address. The value cannot include a prefix or `/prefixLength` notation. The address cannot be used elsewhere in the network port configuration. All addresses share a single gateway.

reset-link

Optional. Returns network port addressing to the default settings. This parameter runs only on the local controller and cannot run with any other parameter. Allow up to two minutes for the operation to complete.

## Examples

For controller A, enable autoconfig and set the gateway address.

```
# set ipv6-network-parameters autoconfig enabled controller a gateway
001:0db8:85a3:0000:0000:8a2e:0370:1111
```

**See also**


add ipv6-address  
remove ipv6-address  
set network-parameters  
show ipv6-addresses  
show ipv6-network-parameters

# set iscsi-parameters

## Description

Changes system-wide parameters for iSCSI host ports in each controller module.

---

 **CAUTION** Applying new parameters may disrupt access from connected hosts.

---

## Minimum role

standard

## 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-frames 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-frames 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
```

Optional. Sets the host port link speed.

- `auto`: Auto-negotiates the proper speed. This is the default.
- `1gbps`: Forces the speed to 1Gb/s, overriding a downshift that can occur during auto-negotiation with 1Gb/s HBAs. This setting does not apply to 10Gb/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 ldap-parameters

## Description

Configures the LDAP server parameters required to authenticate and authorize LDAP users.

All insecure protocols and services must be disabled before the LDAP feature can be enabled. Only secure protocols can be enabled while LDAP is enabled.

---

**NOTE** The command does not query specified LDAP servers to ensure that they can be reached. If the server cannot be reached, the user verification will fail.

---

---

**NOTE** Running the `restore defaults` command will clear the LDAP configuration and other settings. For more information about restoring defaults, see ["Settings changed by restoring defaults" on page 593](#).

---

For more information about the LDAP feature, see the *HPE MSA 1060/2060/2062 Storage Management Guide*.

## Minimum role

manage

## Syntax

```
set ldap-parameters
  [alt-port <port-number>]
  [alt-server <server-address>]
  ldap enabled|disabled|on|off
  [port <port-number>]
  [server <server-address>]
  [user-search-base <search-string>]
```

## Parameters

alt-port <port-number>

Optional. Specifies the port to use for communication with the alternate LDAP server. The value can be any valid port 1 to 65535. The standard ports are 389 and 636. The default is 636.

alt-server <server-address>

Optional. Specifies the network address of the alternate LDAP server. The value can be an IPv4 address, IPv6 address, or FQDN. This server will listen on the port specified by the `alt-port` parameter. The `alt-server` and `server` parameters cannot be set to the same value.

ldap enabled|disabled|on|off

Enables or disables use of LDAP. Disabled by default. If you enable this parameter you must specify the `server`, `port`, and `user-search-base` parameters.

port <port-number>

Optional. Specifies the port to use for communication with the primary LDAP server. The value can be any valid port 1 to 65535. The standard ports are 389 and 636. The default is 636.

`server <server-address>`

Required if the `ldap` parameter is enabled; otherwise optional. Specifies the network address of the primary LDAP server. The value can be an IPv4 address, IPv6 address, or FQDN. This server will listen on the port specified by the `port` parameter. The `server` and `alt-server` parameters cannot be set to the same value.

`user-search-base <search-string>`

Required if the `ldap` parameter is enabled; otherwise optional. Specifies where to start searching for users in the LDAP directory tree. The search string can include the following attributes, separated by commas:

- `cn=<common-name>`
- `ou=<organizational-unit>`
- `o=<organization>`
- `c=<country>`
- `dc=<domain>`

For more information about LDAP name format, see: [https://msdn.microsoft.com/en-us/library/aa366101\(v=vs.85\).aspx](https://msdn.microsoft.com/en-us/library/aa366101(v=vs.85).aspx)

### Examples

Configure the client to connect to the primary LDAP server, and to an alternate LDAP server in case the primary connection fails. The `user-search-base` setting defines the domain and organizational unit.

```
# set ldap-parameters ldap enabled server 10.235.217.52 port 389 alt-server 10.235.217.51  
alt-port 636 user-search-base ou=colo,dc=bigco2,dc=com,dc=local
```

Disable LDAP.

```
# set ldap-parameters ldap off
```

### See also

`show ldap-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

standard

## Syntax

To set a disk LED:

```
set led
  disk <ID>
  enable|disable|on|off
```

To set the LEDs for an enclosure 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 enclosure parameter. Specifies the I/O module to locate. This affects the identification LED on the I/O module and on the enclosure.

disk <ID>

Specifies the disk to locate. For disk syntax, see ["Command syntax" on page 23](#). This overrides the fault LED on the disk.

enable|disable|on|off

Specifies to turn the LED on or off.

enclosure <ID>

Specifies the enclosure to locate. This affects the identification LED on the enclosure and on each I/O module.

## Examples

Identify disk 5 in enclosure 1.

```
# set led disk 1.5 on
```

Stop identifying enclosure 1.

```
# set led enclosure 1 off
```

Identify controller B in enclosure 1.

```
# set led enclosure 1 controller b on
```

# set network-parameters

## Description

Sets parameters for the network port in each controller module.

You can manually set static IPv4 or IPv6 values for a network port, or you can specify that IP values should be set automatically for a network port through communication with a Dynamic Host Configuration Protocol (DHCP) server.

The addressing mode can be set differently on each controller.

IPv4 and IPv6 can be used concurrently. This command can be used to configure use of IPv4. To configure use of IPv6, use the `set ipv6-network-parameters` command.

DHCP is enabled by default. 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 A IP address: 10.0.0.2
- Controller B IP address: 10.0.0.3
- IP subnet mask: 255.255.0.0
- Gateway IP address: 10.0.0.1

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

standard

## Syntax

```
set network-parameters
  [controller a|b|both]
  [dhcp]
  [gateway <gateway>]
  [ip <address>]
  [netmask <netmask>]
  [ping-broadcast enabled|disabled|on|off]
  [reset-link]
```

## Parameters

`controller a|b|both`

Optional. For IP-related parameters, this specifies whether to change controller A, B, or both. If this parameter is omitted and both controllers are set to use DHCP or are set to use `ping-broadcast`, changes affect both controllers. Otherwise, if this parameter is omitted and the `ip` parameter, `netmask` parameter, or `gateway` parameter is set, changes affect the controller being accessed.

`dhcp`

Optional. Specifies to use DHCP to set network-port IP values for both controllers, unless one controller is specified by using the controller parameter.

`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 enabled by default.

```
reset-link
```

Optional. Returns network port addressing to the default settings. This parameter runs only on the local controller and cannot run with any other parameter. Allow up to two minutes for the operation to complete.

### Examples

Manually set network-port IP values for each controller (disabling DHCP for both controllers, if it was enabled) using IPv4 addressing. Then enable DHCP for controller A without affecting controller B.

```
# set network-parameters ip 192.168.0.10 netmask 255.255.255.0 gateway 192.168.0.1  
controller a  
# set network-parameters ip 192.168.0.11 netmask 255.255.255.0 gateway 192.168.0.1  
controller b  
# set network-parameters dhcp controller a
```

### See also

```
set ipv6-network-parameters  
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

standard

## Syntax

```
set ntp-parameters
  [ntp enabled|disabled|on|off]
  [ntpaddress <address>]
  [timezone <timezone-offset-or-name>]
```

## 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 <address>`

Optional. The network address of an available NTP server. The value can be an IPv4 address, IPv6 address, or FQDN.

`timezone <timezone-offset-or-name>`

Optional. The system's time zone as either:

- An offset in hours (-12 through +14) and optionally minutes (00 to 59) from Coordinated Universal Time (UTC), in the format `+|-<hh>[:<mm>]`. 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.
- A time zone name shown by the `show timezones` command.

## 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
```

Set the system to use the time zone for Puerto Rico.

```
# set ntp-parameters timezone America/Puerto_Rico
```

## See also

`set controller-date`

```
show controller-date  
show ntp-status  
show timezones
```

# 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 from 8 to 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.

<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 user LabAdmin.

```
# set password LabAdmin
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 `standard` or `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.

---

**NOTE** If you want to modify a peer connection between a system running newer firmware and a system running older firmware, log in to the newer system and run the `set peer-connection` command from that system.

---

## Minimum role

`standard`

## 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 mode; required for API mode. 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. IPv4 and IPv6 formats are supported. 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 `standard` or `manage` role to remotely configure or provision that system. The user must be a local user on the remote system, not an LDAP user.

`<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 pool.

Each 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 as the available capacity of the pool minus 400GiB — or, if that result is below the mid threshold, then mid threshold capacity plus 1%.

- When the low threshold is exceeded, the system generates an alert and event 462 to notify the administrator. This value must be less than or equal to the middle threshold value. The default is 50%. If the pool is not overcommitted, the alert and event have Informational severity. If the pool is overcommitted, the alert has Warning severity and the event has Informational severity.
- When the middle threshold is exceeded, the system generates an alert and event 462 to notify the administrator to reduce storage usage or add capacity to the pool. The middle threshold value must be between the low threshold and high threshold values. The default is 75%. If the pool is not overcommitted, the alert and event have Informational severity. If the pool is overcommitted, the alert has Warning severity and the event has Informational severity.
- When the automatically calculated high threshold is exceeded, the system generates an alert and event 462 to alert the administrator to immediately reduce storage usage or add capacity to the pool. If the pool is not overcommitted, the alert and event have Informational severity. If the pool is overcommitted, the alert and event have Warning severity and the system uses write-through cache mode until virtual pool usage drops back below this threshold.
- When pool usage falls back below any threshold, event 463 is logged with Informational severity.

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 SMU, as described in help for the Storage panel.

## Minimum role

standard

## 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 or equal to the middle-threshold value and must be a whole number. The default low-threshold value is 50%.

`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 and must be a whole number. The default middle-threshold value is 75%.

`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 enclosures to the system. If the pool is overcommitted and all of the physical capacity is used, all of the volumes in the pool become read-only. 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 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

monitor

## 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 mode, if you enable an insecure protocol the command will prompt for confirmation.

## Minimum role

standard

## Syntax

```
set protocols
  [debug enabled|disabled|on|off]
  [debug-response <response-message>]
  [ftp enabled|disabled|on|off]
  [http enabled|disabled|on|off]
  [https enabled|disabled|on|off]
  [sftp enabled|disabled|on|off]
  [sftp-port <port>]
  [slp enabled|disabled|on|off]
  [snmp enabled|disabled|on|off]
  [ssh enabled|disabled|on|off]
  [ssh-port <port>]
  [telnet enabled|disabled|on|off]
```

## Parameters

`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. Enabling the service debug protocol allows remote connection, through incoming ports only, by HPE or HPE's authorized representatives for troubleshooting. Disabling the service debug protocol removes this access. You cannot enable this mechanism if LDAP is enabled.

For security, attempting to enable this parameter causes the controller to create a challenge message. The challenge message includes the controller serial number and a challenge string. You can obtain the challenge response message from technical support. The response message is a password string that expires 5 minutes after it is generated and can be used only one time. Use the `debug-response` parameter to submit the response message to the controller, which enables the debug protocol. The debug protocol remains enabled for 15 minutes to allow you to log in to a debug port. Login sessions started during that time will remain open indefinitely until logout or a system restart.

---

**NOTE** Properly shut down the debug console by entering the command `set protocols debug disabled`. Do not just close the console directly or by using the `exit` command.

---

`debug-response <response-message>`

Optional. Submits the content of the debug authorization response message, received after successful use of the `debug` parameter, to the controller to enable the debug protocol.

```
ftp enabled|disabled|on|off
```

Optional. Enables or disables File Transfer Protocol (FTP), an interface for installing firmware updates, installing security certificates and keys, installing a license, and downloading logs. This is disabled by default. Using SFTP is preferred. You cannot enable this mechanism if LDAP is enabled.

```
http enabled|disabled|on|off
```

Optional. Enables or disables the standard SMU web server. This is disabled by default. You cannot enable this mechanism if LDAP is enabled.

```
https enabled|disabled|on|off
```

Optional. Enables or disables the secure SMU web server. This is enabled by default.

```
sftp enabled|disabled|on|off
```

Optional. Enables or disables SSH File Transfer Protocol (SFTP), a secure 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 option 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. Valid port numbers are 1 to 65535. 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.

```
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 disabled by default.

```
ssh enabled|disabled|on|off
```

Optional. Enables or disables the secure shell CLI. This is enabled by default.

```
ssh-port <port>
```

Optional. Specifies the port number to use for SSH. Valid port numbers are 1 to 65535. The default is 22.

```
telnet enabled|disabled|on|off
```

Optional. Enables or disables the standard CLI. This is disabled by default. You cannot enable this mechanism if LDAP is enabled.

## Examples

Disable insecure HTTP connections and enable FTP.

```
# set protocols http disabled ftp enabled
```

Enable Telnet, which is an insecure protocol.

```
# set protocols telnet enabled
```

Enable SFTP and set it to use port 2020.

```
# set protocols sftp enabled sftp-port 2020
```

## See also

```
set cli-parameters
```

```
show protocols
```

# set proxy-server

## Description

Enables or disables use of a proxy server.

The proxy server is a shared configuration option for all storage system features that require a proxy for external network communication. For environments that are behind a firewall and do not have direct access to the Internet, you can configure a proxy server to act as an intermediary between the storage system and the external URL, for example to receive the manifest. Only HTTP is supported to the proxy server, though the proxy itself can support HTTPS traffic to the final endpoint.

## Minimum role

manage

## Syntax

```
set proxy-server
  [clear]
  [host <address>]
  [password <password>]
  [port <port-number>]
  [state enabled|disabled]
  [username <username>]
```

## Parameters

clear

Optional. Clears all settings for the proxy server and disables it.

host <address>

Optional. Specifies the network address for the proxy server. The value can be an IPv4 address, IPv6 address, or FQDN.

password <password>

Optional. Specifies the password for the user specified by the `username` parameter, if required by the proxy server. Input rules:

- The value is case sensitive.
- The value can include printable UTF-8 characters except a space or: " ' , < > \
- For other restrictions, see the proxy server's documentation.

port <port-number>

Optional. Specifies one or more port numbers on the proxy server. The allowed port numbers are 1 to 65535.

state enabled|disabled

Optional. Enables or disables the proxy server.

username <username>

Optional. Specifies the username to access the proxy server, if required by the proxy server.. Input rules:

- The value is case sensitive.
- The value can include printable UTF-8 characters except a space or: " , < \ :
- For other restrictions, see the proxy server's documentation.

**Examples**

Set the username, password, host, and port to access the proxy server, and enable it.

```
# set proxy-server username testusername password 12345678 host 12.456.78.9 port 26 state
enabled
```

Clear proxy server settings and disable it.

```
# set proxy-server clear
```

**See also**

```
show proxy-server
```

# set remote-system

## Description

Changes remote-system credentials stored in the local system.

Do this when the user name or password to access a remote system has been changed in that system.

## Minimum role

standard

## Syntax

```
set remote-system
  password <password>
  username <username>
  <IP-address>
```

## Parameters

password <password>

Optional. The new password to access the remote system. The value is displayed in clear text.

username <username>

Optional. The new username to access the remote system.

<IP-address>

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

An address can be an IPv4 address, IPv6 address, or FQDN.

## Examples

Set the password `Abcd_1234` for remote system `System2`.

```
# set remote-system password Abcd_1234 System2
```

## See also

```
create remote-system
delete remote-system
remote
show remote-systems
```



# 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

standard

## 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 to 24 bytes.
- The value cannot include a space or: `\, < > ' "`

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. 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.

Regarding replication schedules: If a replication is running and the time comes for that replication to start again, the new replication request will be discarded or queued as specified by the replication set's queue policy setting. In either case, the replication will be counted against the schedule's count constraint (if set).

## Minimum role

standard

## 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 2019-01-01 00:01 every 1 days expires 2019-12-31 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 percentage 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

standard

## 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

standard

## Syntax

```
set snmp-parameters
  [add-trap-host <address>]
  [alert-notification-level all|none]
  [del-trap-host <address>]
  [enable crit|error|warn|resolved|info|none]
  [persistent-alerts enabled|disabled|on|off]
  [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. The value can be an IPv4 address, IPv6 address, or FQDN. Three trap hosts can be set.

`alert-notification-level all|none`

Optional. Enables or disables SNMP notification of alerts.

- `all`: The system will send SNMP notifications for alerts. This setting is the default.
- `none`: The system will not send SNMP notifications for alerts.

If this parameter is omitted, the previous notification level remains.

`del-trap-host <address>`

Optional. Specifies the network address of a destination host to delete. The value can be an IPv4 address, IPv6 address, or FQDN.

`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 to 402 are sent regardless of the notification setting.



`persistent-alerts` `enabled|disabled|on|off`

Optional. Sets whether weekly alerts about system health issues will be sent to configured email addresses until corrective action has been taken and the system health value has returned to OK. Alerts are sent weekly on Sunday at 12:01 AM. SNMP traps for all unresolved alerts are reissued to the trap host list. This option is enabled by default.

`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-host-list>`

Optional. Replaces the current list of trap destinations. Each value can be an IPv4 address, IPv6 address, or FQDN.

`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.

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

standard

## Syntax

```
set syslog-parameters
  [alert-notification-level all|none]
  [host <address>]
  [host-ip <address>]
  [host-port <port-number>]
  [notification-level crit|error|warn|resolved|info|none]
  [persistent-alerts enabled|disabled|on|off]
```

## Parameters

`alert-notification-level all|none`

Optional. Enables or disables syslog notification of alerts.

- `all`: The system will send syslog notifications for alerts. This is the default.
- `none`: The system will not send syslog notifications for alerts.

If this parameter is omitted, the previous notification level will remain.

`host <address>`

Optional. The network address for the host. The value can be an IPv4 address, IPv6 address, or FQDN. If `notification-level` is other than `none`, the `host` parameter must be specified.

`host-ip <address>`

Deprecated. Use the `host` parameter instead.

`host-port <port-number>`

Optional. A specific port number on the host. The allowed port numbers are 1 to 65535.

`notification-level crit|error|warn|resolved|info|none`

Optional. 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`, the `host` parameter must be specified.

`persistent-alerts enabled|disabled|on|off`

Optional. Sets whether system health alerts are sent weekly on Sunday at 12:01 AM to configured email addresses. Syslog messages for all unresolved alerts are reissued to the specified host. This option is enabled by default.

#### **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 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 SMU, 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

standard

## 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` 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

standard

## Syntax

```
set task
  [last-snapshot enabled|disabled|on|off]
  [replication-set <replication-set-ID>]
  [retention-count <#>]
  [snapshot-prefix <prefix>]
  <name>
```

## Parameters

`last-snapshot` `enabled|disabled|on|off`

Optional. For a `Replicate` task this specifies to replicate the most recent snapshot of the primary volume. At the time the scheduled replication occurs, the snapshot must exist. This snapshot may have been created either manually or by a host-initiated snapshot creation. If `last-snapshot` is specified and no snapshot exists for the volume when the scheduled replication begins, the system generates an error and the replication fails.

`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 16. When a new snapshot exceeds this limit, the oldest snapshot is reset and renamed with the same prefix. The oldest snapshot is the one whose name has the lowest number (such as 01 as compared with 02). Resetting the oldest snapshot does not change its creation date/time. 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 DG1v1 retention-count 2 Snap
```

### See also

```
create task  
delete task  
set schedule  
show schedules  
show tasks
```

# set update-server

## Description

Configures an update server and a proxy, if required.

You can configure access to an update server to receive notifications that firmware updates for the system or its components are available. The URL points to a manifest file that documents supported upgrade paths. By default, the URL for the update server is <https://www.hpe.com/support/MSAmanifest>. If a valid upgrade path is found in the manifest, it will be displayed as an available update.

In order to retrieve the update notifications, a connection to a URL is required to retrieve the information. For environments that are hidden behind a firewall and do not have direct access to the external Internet, you can configure a proxy server to act as an intermediary between the storage system and the external update server. Only HTTP is supported to the proxy server, though the proxy itself can support HTTPS traffic to the final endpoint. The proxy is not used for any other outbound communication.

At minimum, you must specify the hostname or IP-address of the proxy and a port number if any.

If required by the proxy, you can also specify a username and password. To clear the username and password configured for the proxy, use the `clear update-server-proxy proxy` command.

## Minimum role

standard

## Syntax

```
set update-server
  [proxy enabled|disabled|on|off]
  [proxy-host <hostname>|<IP-address>]
  [proxy-password <password>]
  [proxy-port <port-number>]
  [proxy-username <username>]
  [url default|<remote-server-URL>]
```

## Parameters

`proxy enabled|disabled|on|off]`

Optional. Enables or disables the proxy.

`proxy-host <hostname>|<IP-address>`

Optional. Specifies the proxy's hostname or IP-address.

`proxy-password <password>`

Optional. Specifies the password to access the proxy, if required by the proxy.

`proxy-port <port-number>`

Optional. Specifies the proxy's port number, if any.

`proxy-username <username>`

Optional. Specifies the username to access the proxy, if required by the proxy.

`url default|<remote-server-URL>`

Optional. Specifies to use the default HPE update server URL or a third-party update server URL.

## Examples

Configure an update server proxy.

```
# set update-server proxy enabled proxy-host UpdateServerProxy
```

**See also**

```
check update-server
```

```
clear update-server-proxy
```

```
show update-server
```



# set user

## Description

Changes preferences for a specified user for the session or permanently.

The system requires at least one user with the `manage` role to exist.

A user with the `manage` role can change any parameter except `name`. A user with the `standard` or `monitor` role can change any parameter for that user except `name`, `roles`, and `interfaces`.

---

**NOTE** If preference changes are made to the active user, those changes take effect for the current session. Otherwise, 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>]
  [trap-port <port-number>]
  [type novice|standard|advanced|diagnostic]
  [units auto|MB|GB|TB]
  <username>
```

## 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 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. 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.

- cli: Command-line interface. This is enabled by default.
- wbi: Web-browser interface (the SMU). This is enabled by default.
- ftp: FTP and SFTP interface. To remove FTP access, disable FTP by using the `set protocols` command.
- snmpuser: Allows an SNMPv3 user to view the SNMP MIB and receive SNMP trap notifications. This option requires the `trap-host` parameter. To use a trap destination port other than the default port, also specify the `trap-port` parameter.
- none: No interfaces.

A command that specifies `snmpuser` cannot also specify a non-SNMP interface. 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. Regardless of the locale, confirmation prompts only accept English characters, such as `y` for yes or `n` for no.

password <password>

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

- The value is case sensitive.
- The value can have 8 to 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 to 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. Input rules:

- The value is case sensitive.
- The value can have from 8 to 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.
- `standard`: User can view and change system settings except: configuring local users; configuring LDAP; performing write operations through FTP or SFTP; performing file uploads from the SMU; using the `restore defaults` command.
- `manage`: User can view and change system settings.
- `diagnostic`: For use by or with direction from technical support.

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 to 43200 seconds (2 to 720 minutes). The default is 1800 seconds (30 minutes).

trap-host <IP-address>

Optional. For an SNMPv3 user, this specifies the network address of the host that will receive SNMP traps. The value can be an IPv4 address or IPv6 address or FQDN.

trap-port <port-number>

Optional. For an SNMPv3 user, this parameter specifies the target port of the host that will receive SNMP traps. The default port is 162.

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 0.11709TB is instead shown as 117.1GB.

<username>

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 testsnmp.

```
# set user testsnmp authentication-type SHA password
```

### See also

set password

show users

# set user-group

## Description

Changes the settings for an LDAP user group.

A user-group member with the `standard` or `manage` role can change any parameter except name. A member with the `monitor` role can change any parameter for that user except name, roles, and interfaces.

User group changes take effect when a member of the group subsequently logs in after changes have been made to the settings of an LDAP user group.

## Minimum role

monitor

## Syntax

```
set user-group
  [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]
  [precision <#>]
  [roles <roles>]
  [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]
  <user-group-name>
```

## 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. 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 group can access. Multiple values must be separated by commas and no spaces.

- `cli`: Command-line interface. This is enabled by default.
- `wbi`: Web-browser interface (the SMU). This is enabled by default.

- `ftp`: SFTP interface.
- `none`: No interfaces.

Only secure protocols are supported for the above interfaces. To enable or disable interface protocols, 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. Regardless of the locale, confirmation prompts only accept English characters, such as `y` for yes or `n` for no.

`precision` `<#>`

Optional. Sets the number of decimal places (1 to 10) for display of storage-space sizes. The default is 1.

`roles` `<roles>`

Optional. Specifies the user group role as one or more of the following values:

- `monitor`: User group can view but not change system settings. This is the default.
- `standard`: User group can view and change system settings except: configuring local users; configuring LDAP; performing write operations through SFTP; performing file uploads from the SMU; using the `restore defaults` command.
- `manage`: User group can view and change system settings.
- `diagnostic`: For use by or with direction from technical support.

Multiple values must be separated with a comma (with no spaces). If multiple values are specified, the user group'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 to 43200 seconds (2 to 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 `0.11709TB` is instead shown as `117.1GB`.

`<user-group-name>`

Specifies the user group to change. A name that includes a space must be enclosed in double quotes.

### Examples

Change user group `StorageAdmins` to have the `manage` role for the CLI and SMU interfaces.

```
# set user-group interfaces cli,wbi roles manage StorageAdmins
```

### See also


```
create user-group  
delete user-group  
set ldap-parameters  
show audit-log  
show user-groups
```

# set volume

## Description

Changes parameters for a volume.

---

 **CAUTION** Applying new parameters may disrupt access from connected hosts.

---

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** Changing the retention priority for a volume does not change the retention priority for existing child snapshots.

---

## Minimum role

standard

## 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]
  [usage-type database|virtualization|email|files|other]
  <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 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 from 1 to 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. 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. 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.

`usage-type` `database|virtualization|email|files|other`

Optional. A value that describes the purpose of the volume.

- `database`: The volume is used for database applications.
- `virtualization`: The volume is used as a datastore for a virtual machine.
- `email`: The volume is used primarily to hold email or similar content.
- `files`: The volume is used as a file share.
- `other`: The usage type is not described by the other choices.

---

**NOTE** When a snapshot is created, the original volume's usage-type setting will be copied to the snapshot. The usage-type setting of the snapshot may be modified independently of the parent volume using the `set volume` command. However, if the volume is rolled back, the parent volume inherits the usage-type value of the snapshot.

---

<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
```

Change the usage type for Vol2.

```
# set volume usage-type email Vol2
```

### See also

`show maps`

`show volumes`

# set volume-cache-parameters


## Description

Sets cache options for a specified volume.

---

**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

standard

## Syntax

```
set volume-cache-parameters
  [optimization standard|cache-hit]
  [read-ahead-size disabled|adaptive|stripe|512KB|1MB|2MB|4MB|8MB|16MB|32MB]
  [write-policy write-back|write-through|wb|wt]
  <volume>
```

## Parameters

optimization standard|cache-hit

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.
- **cache-hit**: This controller cache mode of operation is optimized for workloads that are localized—that is, a substantial percentage of all accesses are hits in the controller's cache. In this mode, the cache is kept coherent with the partner controller.

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 512KB, 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.

### 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

standard

## 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

Shows whether disks in disk groups are automatically checked for disk defects to ensure system health.

- **Disabled:** Background disk-group scrub is disabled.
- **Enabled:** Background disk-group scrub is enabled.

### 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 an available compatible disk to reconstruct a degraded disk group if no compatible spare is present. The dynamic spares feature does not apply to MSA-DP+ disk groups.

- **Disabled:** The dynamic spares feature is disabled.
- **Enabled:** The dynamic spares feature is enabled.
- **Alternate:** The dynamic spares feature is enabled but spare selection is restricted to the enclosure that contains the failed disk.

#### Enclosure Polling Rate

Shows the interval in seconds at which the storage system will poll each enclosure'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:** Hosts can use the SCSI `MODE SELECT` command to change the write-back cache setting. This is the default.
- **Enabled:** Hosts cannot override the storage system's write-back cache setting.

#### 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.

#### 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.

#### 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.

#### 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.

#### 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 SMU.



### Default Mapping

Shows whether the ability to use default mapping is enabled or disabled.

- **Disabled:** Default mapping is disabled. When you create a volume you must map it with a unique LUN to a specific initiator, host, or host group. This is known as *explicit mapping*.
- **Enabled:** Default mapping is enabled. When you create a volume without explicit mappings, the system will automatically map the volume with a single LUN to all current and future initiators. This is known as *default mapping*. This can be a security risk because mappings can be exposed to new initiators.

### Slow Disk Detection

Shows whether slow-disk detection is enabled or disabled. This feature identifies drives that are performing below expectations compared to their peers. If a slow drive is detected, the system issues a notification to help with debug analysis so you can determine the impact of the drive on the system as a whole.

- **Disabled:** Slow-disk detection is disabled.
- **Enabled:** Slow-disk detection is enabled.

### Scrub Schedule

Shows whether disk-group scrub runs only when scheduled.

- **Disabled:** Scheduling background disk-group scrub is not available. This option is the default.
- **Enabled:** Scheduling background disk-group scrub is available.

### Examples

Show advanced system-configuration settings.

```
# show advanced-settings
```

### Basetypes

```
advanced-settings-table  
status
```

### See also

```
set advanced-settings
```

# show alert-condition-history

## Description

Shows the history of the alert conditions that have generated alerts.

The most recent 3000 alert conditions are maintained in this log history, regardless of whether they are resolved or unresolved.

## Minimum role

monitor

## Syntax

```
show alert-condition-history
  [component <component-name>|<component-type>]
  [id <condition-sequence-number>]
  [last <number-of-conditions>]
```

## Parameters

component <component-name>|<component-type>

Optional. Shows alert conditions for a specific component name or type.

- A valid name is any value shown by the `Component` property.
- A valid type is any of the following values: `controller`, `disk`, `enclosure`, `expander`, `fan`, `fan_control_module`, `fan_module`, `firmware_info`, `host_port`, `iom`, `mgmt_port`, `midplane`, `peer_connections`, `power_supply`, `sas_port`, `sensor`, `slot`, `storage_pool`, `super_cap`, `system`.

id <condition-sequence-number>

Optional. Shows a specific condition by its `Index` value.

last <number-of-conditions>

Optional. Shows the specified number of most recent alert conditions.

## Output

Component

The component name.

Index

The alert condition sequence number.

Resolved

Shows whether the alert is resolved.

Time Detected

The date and time when the alert condition was detected.

Time Resolved

If `Resolved` is `Yes`, the date and time when the alert condition was resolved.

Reason

A message describing the alert condition.

**Examples**

Show last three alert conditions that generated alerts.

```
# show alert-condition-history last 3
```

Show the alert condition having sequence number 356.

```
# show alert-condition-history id 356
```

Show alert conditions for a specific component.

```
# show alert-condition-history component mgmtport_a
```

**Basetypes**

conditions

status

**See also**

clear alerts

set alert

show alerts

# show alerts

## Description

Shows information about the active alerts on the storage system.

---

**NOTE** The system presents a maximum of 512 alerts that are either unresolved, or resolved but unacknowledged. If further alerts are detected, resolved alerts are deleted to generate active alerts. If all 512 alerts are active, no new alerts are generated.

---

## Minimum role

monitor

## Syntax

```
show alerts
  [component <component-name>|<component-type>]
  [unresolved|resolved|acknowledged|unacknowledged]
  [detail]
```

## Parameters

component <component-name>|<component-type>

Optional. Shows active alerts for a specific component name or type.

- A valid name is any value shown by the `Component` property in the command output.
- A valid type is any of the following values: controller, disk, enclosure, expander, fan, fan\_control\_module, fan\_module, firmware\_info, host\_port, iom, mgmt\_port, midplane, peer\_connections, power\_supply, sas\_port, sensor, slot, storage\_pool, super\_cap, system.

unresolved|resolved|acknowledged|unacknowledged

Optional. Shows only alerts with the specified status.

detail

Optional. Shows the time each active alert was detected and resolved.

## Output

ID

The alert sequence number.

Component

The component name.

Severity

- **INFORMATIONAL:** The system configuration does not match recommendations. No change is required, but for optimal system performance and security, you should resolve the issue.
- **WARNING:** A problem occurred that may affect system stability or performance but not data integrity. Evaluate the problem and correct it if necessary.
- **CRITICAL:** A failure occurred that may cause a controller to shut down or could affect data integrity or system stability. Correct the problem *immediately*.

- UNKNOWN: The system is unable to determine the state of a component. In some configurations, this situation is normal. In other situations, resolving other system issues should resolve this issue as well.

Resolved

Shows whether the alert is resolved.

Acknowledged

Shows whether the alert has been acknowledged.

Time Detected

Shown by the detail parameter. The most recent date and time when the alert condition was detected.

Time Resolved

Shown by the detail parameter. If Resolved is Yes, the date and time when the alert condition was resolved.

Reason

A message describing the alert condition.

Recommended Action

The recommended action to take to resolve the alert condition.

## Examples

Show active alerts.

```
# show alerts
```

Show active alerts for a specific component.

```
# show alerts component controller_a
```

Show resolved alerts for sensor components.

```
# show alerts resolved component sensor
```

```
ID Component          Severity      Resolved Acknowledged Reason
Recommended Action
```

```
-----
8  sensor_temp_iom_1.A.1  INFORMATIONAL Yes      No      The controller that contains
this subcomponent is not operational.
```

```
- See the health information for the controller module that contains this component.
```

```
...
```

Show detailed information about unresolved alerts.

```
# show alerts unresolved detail
```

```
ID Component          Severity      Resolved Acknowledged Time Detected
Time Resolved
Reason
Recommended Action
```

```
-----
16 System              INFORMATIONAL No      No      2020-03-20 17:50:55
N/A
```

```
The system was unable to connect or parse information from the update server.
```

```
- Check the connection with the update server. Verify the information for the URL, proxy,
and DNS settings.
```

```
...
```

## Basetypes

alerts

status

**See also**

clear alerts

set alert

show alert-condition-history

# show audit-log

## Description

Shows audit log data.

All user login and logout attempts and operations performed through the CLI, SMU, and FTP/SFTP interface are recorded in the audit log. Failed login attempts are also recorded.

The audit log will contain the timestamp, username, and command that was run as well as the status code returned by that command. The audit log contains a subset of the data that is stored in controller logs. The audit log will not contain specific value changes, such as old and new settings.

Audit logs record host IP information for all interfaces. Audit logs also record snmpset commands.

Each controller maintains its own audit log. Each audit log can contain up to 2MB of data, after which it will wrap.

Audit log data will persist after restarting the Storage Controller or running the `restore defaults` command. Audit logs are not associated with the managed logs feature. Audit logs will be cleared during factory refurbishment.

Audit log data is not mirrored to the partner controller. In a failover scenario, the failed controller's audit log cannot be retrieved until the failed controller is recovered. When the failed controller comes back online its audit log should be accessible.

## Minimum role

monitor

## Syntax

```
show audit-log  
    [a|b|both]  
    [last <number-of-entries>]
```

## Parameters

a|b|both

Optional. Specifies to show the audit log for controller A, B, or both. If this parameter is omitted, the audit log is shown for the current controller.

last <number-of-entries>

Optional. Shows the specified number of most recent entries. If this parameter is omitted, all events are shown.

## Output

All audit log entries for the specified controller(s) are listed in chronological order by date and time. An entry may contain the following fields:

- Date and time
- Facility ID and name (for internal use)
- Process
- C: Controller ID
- UID: Username
- GID: Group name
- SID: Session ID
- A: Action

- SSID: MC subsystem ID
- RC: Return code
- M: Message

The group name is logged only for LDAP users. The group name and session ID are logged only when authentication is successful and a session has been created. The subsystem ID and return code are for diagnostic purposes.

### **Examples**

Show the audit log for controller B only.

```
# show audit-log b
```

### **Basetypes**

```
audit-log  
status
```

### **See also**

```
show user-groups
```



# 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:

- **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.
- **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.

Cache Block Size

Shows the system's cache block size.

### 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 fan 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.

## Cache Flush

- **Enabled:** If the controller loses power, it will automatically write cache data to the memory 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.
- **cache-hit:** This controller cache mode of operation is optimized for workloads that are localized—that is, a substantial percentage of all accesses are hits in the controller's cache. In this mode, the cache is kept coherent with the partner controller.

### 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 512KB, 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 (if a volume is specified)

status

**See also**

set volume-cache-parameters

show volumes

# show certificates

## Description

Displays a list of available device certificates that have been added to the storage system.

The command shows information about device certificates by default, or you can use parameters to filter the output. Use the `truststore` parameter to see information about root and intermediate certificates in the trust store.

## Minimum role

manage

## Syntax

```
show certificates
  [controller a|b|both]
  [detail]
  [name <name>]
  [pem]
  [service web]
  [truststore]
```

## Parameters

`controller a|b|both`

Optional. Shows certificates on the specified controller. The default value is `both`.

`detail`

Optional. Provides list-view information about each certificate, including additional information not shown in the table view.

`name <name>`

Optional. Provides information only about the certificate specified by name. The name provided must be a valid name of a certificate on the system.

`pem`

Optional. Displays certificate data in PEM format. The `pem` and `detail` parameters cannot be specified together.

`service web`

Optional. Limits display of certificates to the indicated service.

`truststore`

Optional. Displays all certificates in the trust store.

## Output

### Output without the `truststore` parameter

Certificate Name

The name of the certificate, either system-generated or user-supplied when the certificate is added to the system.

Certificate Type

Shows the certificate type: `Device-Cert`

Controller

Displays the controller on which the certificate is installed.

WEB

Displays an `x` if the certificate is currently active for the web service.

Active Services

Shown by the `detail` parameter. Displays the service that is actively using the certificate, if any.

Identity

Shown by the `detail` parameter. The identity provided when the certificate was added to the system.

Valid From

Shows the certificate start date.

Valid Till

Shows the certificate expiration date.

Issued To

The name or organization the certificate was granted to.

Issued By

The organization or entity that granted the certificate.

State

Shown if the `detail` parameter is omitted. The current status of the certificate:

- Available
- Unavailable

---

**NOTE** By default, the command displays certificates on both controllers. If the partner controller is down or not communicating, certificates from the partner are shown as `Unavailable`.

---

Certificate Status

Shows the source of the certificate:

- `Customer-supplied`: The certificate was uploaded by the end user.
- `System-generated`: The certificate was generated by the system.
- `Unknown status`: The origin of the certificate cannot be determined.

Default Services

Displays any service associated with the certificate by default.

---

**NOTE** A default service applies only to system-generated certificates and can be set only during manufacturing. If a default certificate is available for a service and a customer-supplied certificate for that service has been removed or not added, the system uses the default certificate.

---

Certificate Text

Shown by the `detail` parameter. Displays the certificate content as text.

#### Output with the `truststore` parameter

Certificate Name

The name of the certificate, either system-generated or user-supplied when the certificate is uploaded to the system.

Certificate Type

Shows the certificate type: `Trust-Cert`

Controller

Displays the controller on which the certificate is installed.

Valid From

Shows the certificate start date.

Valid Till

Shows the certificate expiration date.

Issued To

The name or organization the certificate was granted to.

Issued By

The organization or entity that granted the certificate.

State

Shown if the `detail` parameter is omitted. The current status of the certificate:

- Available
- Unavailable

---

**NOTE** By default, the command displays certificates on both controllers. If the partner controller is down or not communicating, certificates from the partner are shown as `Unavailable`.

---

Certificate Status

Shows the source of the certificate:

- `Customer-supplied`: The certificate was uploaded by the end user.
- `System-generated`: The certificate was generated by the system.
- `Unknown status`: The origin of the certificate cannot be determined.

Certificate Text

Shown by the `detail` parameter. Displays the certificate content as text.

### Examples

Show all device certificates.

```
# show certificates
```

Show certificate details for a certificate specified by name.

```
# show certificates detail name bobCert_12345
```

Display all certificates in the trust store.

```
# show certificates truststore
```

Display trust store certificates on controller A.

```
# show certificates truststore controller A
```

### Basetypes

certificates

status

### See also

activate certificate

add certificate (API command)

create certificate-signing-request

remove 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: standard. 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 ciphers

## Description

Shows the ciphers that the system is using to securely communicate with hosts.

## Minimum role

manage

## Syntax

```
show ciphers
```

## Output

- Active cipher list
- User-supplied cipher list (set with the `set ciphers` command)
- Default cipher list

## Examples

Show the cipher list.

```
# show ciphers
```

## Basetypes

```
ciphers  
status
```

## See also

```
reset ciphers  
set ciphers
```

# 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 to 43200 seconds (2 to 720 minutes).

### Output Format

- **Console:** Supports interactive use of the CLI by displaying easily readable output. This mode 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 SMU.

### 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 mode, which is intended for scripting, disable paging.

### Locale

The display language.

### Precision

The number of decimal places (1 to 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 `0.11709TB` is instead shown as `117.1GB`.

### Temperature Scale

- **Fahrenheit:** Temperatures are shown in degrees Fahrenheit.
- **Celsius:** Temperatures are shown in degrees Celsius.

### Examples

Show current CLI settings.

```
# show cli-parameters
```

### Basetypes

```
cli-parameters
status
```

### See also

```
set cli-parameters
```

# 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`
- Configured DNS settings from `show dns-parameters`
- The DNS management hostname for each controller from `show dns-management-hostname`
- Controller firmware and hardware version information from `show versions` with the `detail` and `frus` parameters
- Host and expansion port information from `show ports`
- Disk information from `show disks`
- Disk-slot information from `show disks` with the `encl` parameter
- Disk-group information from `show disk-groups`
- Pool information from `show pools`
- Enclosure information from `show enclosures`
- Field-replaceable unit (FRU) information from `show frus`

## Examples

Show information about the system configuration.

```
# show configuration
```

## Basetypes

```
system  
controllers  
dns-parameters  
mgmt-hostnames  
versions  
fru-versions  
port  
drives  
enclosure-list  
disk-groups  
pools  
enclosures
```

enclosure-sku  
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> (UTC), reported by the controller being accessed.

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 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 469](#).

## 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 controllers

## Description

Shows information about each controller module.

## Minimum role

monitor

## Syntax

```
show controllers
```

## Output

Controller ID

Controller module ID: A or B.

Serial Number

- Serial number.
- Not Available: The controller module is down or not installed.

Hardware Version

Hardware version.

CPLD Version

Complex Programmable Logic Device firmware version.

MAC Address

Network port MAC address.

WWNN

Storage system World Wide Node Name (WWNN).

IP Address

Network port IP address.

IP Subnet Mask

Network port IP subnet mask.

IP Gateway

Network port gateway IPv4 address.

IP6 Link Local

The link-local IPv6 address.

IP6 Link Local GW

The network port gateway IPv6 address.

Autoconfig

- enabled: Uses an IPv6 address computed by SLAAC and an address assigned by a DHCPv6 server, depending on the network configuration.
- disabled: Uses static IPv6 addresses set with the `add ipv6-address` command.

DHCPv6

The IP address assigned by a DHCPv6 server.

#### SLAAC IP Address

The IP address computed by SLAAC.

#### IP6 Auto Gateway

The IPv6 address of a gateway system (auto-discovered, not configured).

#### IP6 Address (1-4)

From one to four manually set IPv6 addresses. Only shown when the controller is set to manual IPv6 addressing.

#### IP6 Gateway (1-4)

From one to four manually set network-port gateway IPv6 addresses. Only shown when the controller is set to manual IPv6 addressing.

#### Disks

Number of disks in the storage system.

#### Virtual Pools

Number of pools in the storage system.

#### Disk Groups

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 enclosure.

#### 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
- Unknown
- N/A

## Health Reason

If Health is not OK, a message describes the reason for the health state.

## Health Recommendation

If Health is not OK, a message describes recommended actions to resolve the issue.

## Position

Position of the controller in the enclosure:

- **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:

- **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.
- **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:** Both controllers are operational.
- **Operational but not redundant:** In active-active mode, one controller is operational and the other is offline.
- **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 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-group-statistics

## Description

Shows live performance statistics for disk groups.

The command shows 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.

Statistics shown only in API output are described in ["API basetype properties" on page 469](#).

## Minimum role

monitor

## Syntax

```
show disk-group-statistics  
    [disk-group <disk-group>]
```

## 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.

## 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 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 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 disk group. The number of 4MB pages that have been automatically reclaimed and deallocated because they are empty (they contain only zeroes for data).

### 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  
show disk-groups  
show disk-statistics
```

# 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

Name

The name of the disk group.

Blocksize

Shown by the `detail` parameter. The size of a block, in bytes.

Size

The capacity of the disk group, formatted to use the current base, precision, and units.

Free

The amount of free space in the disk group, formatted to use the current base, precision, and units.

Pool

The name of the pool that contains the disk group.

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).
- **Archive:** The disk group is in the lowest storage tier, which uses midline spinning SAS disks (<10K RPM, high capacity).
- **Read Cache:** The disk group uses SSDs, which provide high-speed read cache for a storage pool.

% of Pool

The percentage of pool capacity that the disk group occupies.



Own

Either the preferred owner during normal operation or the partner controller when the preferred owner is offline.

Current Owner

Shown by the `detail` parameter. See `Own`.

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.

Disks

The number of disks in the disk group.

Spares

Shown by the `detail` parameter. For a disk group, 0.

Chk

- For RAID levels except NRAID and RAID 1, the chunk size for the disk group.
- For NRAID and RAID 1, not applicable (N/A).

Chunk Size

Shown by the `detail` parameter. See `Chk`.

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.
- **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.
- **QTUN:** Quarantined unsupported. The disk group contains data in a format that is not supported by this system. For example, this system does not support linear disk groups.
- **STOP:** The disk group is stopped.
- **UNKN:** Unknown.
- **UP:** Up. The disk group is online and does not have fault-tolerant attributes.

### Current Job

- DRSC: A disk is being scrubbed.
- INIT: The disk group is initializing.
- PRERCON: At least one disk in the disk group is being preemptively reconstructed.
- QDAR: The MSA-DP+ disk group is being recovered.
- RBAL: The MSA-DP+ disk group is being rebalanced.
- RCON: At least one disk in the disk group is being reconstructed.
- VDRAIN: The disk group is being removed and its data is being drained to another disk group.
- VPREP: The disk group is being prepared for use in a pool.
- VRECV: The disk group is being recovered to restore its membership in the 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% to 99%: Percent complete of running job
- Blank if no job is running (job has completed)

### Current Job Completion

Shown by the detail parameter. See Job%.

### Serial Number

Shown by the detail parameter. The serial number of the disk group.

### 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.

### Active Drive Spin Down Delay

Shown by the detail parameter. For spinning disks in a 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.

### 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`.

Stripe Width

Not supported.

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-MSA-DP+ disk group, N/A.

Actual Spare Capacity

Shown by the detail parameter.

- For an MSA-DP+ disk group, the actual spare capacity in GiB.
- For a non-MSA-DP+ disk group, N/A.

Critical Disk Capacity

Shown by the detail parameter. For an MSA-DP+ 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.)

Degraded Disk Capacity

Shown by the detail parameter. For an MSA-DP+ 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.)

Linear Volume Partition Boundary

Shown by the detail parameter. Not applicable.

Metadata Size

Shown by the detail parameter. The amount of metadata the disk group is currently using.

Health

- OK
- Degraded
- Fault
- Unknown
- N/A

Reason

If Health is not OK, a message describes the reason for the health state.

Health Reason

Shown by the detail parameter. See Reason.

Action

If Health is not OK, a message describes recommended actions to resolve the issue.

Health Recommendation

Shown by the `detail` parameter. See `Action`.

### Examples

Show information about all disk groups.

```
# show disk-groups
```

Show information about disk group `dg0002`.

```
# show disk-groups dg0002
```

Show additional information about disk group `dg0002`.

```
# show disk-groups dg0002 detail
```

### Basetypes

```
disk-groups
```

```
status
```

### See also

```
show disks
```

```
show pools
```

# 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 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 469](#).

## 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 for live statistics. Required for historical statistics. 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 23](#).

## Output

### Live output

Location

The disk location in the format <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 output with the `error-stats` parameter

Location

The disk location in the format `<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 output

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 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 enclosure and disk number. In API formats, output is not sorted because it is expected to be manipulated by a host application.

---

If a disk is undergoing an erase operation, the command reports the disk as `UNUSABLE`, with a health condition of `Degraded`. The `Jobs` field shows `ERASE`.

## Minimum role

monitor

## Syntax

To show information about disks:

```
show disks
  [disk-group <disk-groups>] | [<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
```

To check for available disk firmware updates:

```
show disks updates
```

## Parameters

detail

Optional. This parameter shows additional detail about the disk.

If a disk is undergoing an erase operation, the output detail shows the `ERASE` job and related information: `disk Usage` is `UNUSABLE`; `Health` is set to `Degraded`; `Health Reason` and `Health Recommendation` are described.

```
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.

usage available|failed|leftover|pool|spares|unusable

Optional. 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.
- spares: Disks whose usage is GLOBAL 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.

updates

Optional. Contacts the update server to check whether a firmware update is available. If an update is available, the command shows information about the current firmware revision of each disk and upgrade information. You cannot use this parameter with any other parameter.

<disks>

Optional. A comma-separated list of the IDs or serial numbers of disks about which to show information. For disk syntax, see ["Command syntax" on page 23](#).

## Output

### Output without the updates parameter

Properties are described in alphabetical order.

Assurance Level

Shown by the detail parameter. The method configured to be used for data erasure.

- Secure: Performs data erasure using cryptographic erase based on the Subsystem Security Class method that applies to the system's SED (FDE-capable) drives.
- Sanitize: Performs data erasure with the SANITIZE SCSI command, using the system's SAS interface.
- Unsupported: The disk doesn't support assurance level options.

Copyback State

Shown by the detail parameter.

- N/A: Not applicable.

Current Job

Shown by the detail parameter. See Jobs, below.

Current Revision

Shown by the updates parameter. The firmware revision installed on the disk.

Data Transferred

Shown by the perf parameter. The total number of bytes transferred.

Description

Shown by default or by the `detail` or `encl` or `perf` parameter.

- SAS: Enterprise SAS spinning disk.
- SSD SAS: SAS solid-state disk.
- SAS MDL: Midline SAS spinning disk.

Disk Group

Shown by default or by the `detail` parameter. The name of the disk group that contains 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 enclosure where the disk is located.

FDE State

Shown by the `detail` or `encl` 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, FIPS: The system is secured to the FIPS standard and the disk is unlocked.
- 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.

FIPS Capable

Shows whether the disk can be secured with Federal Information Processing Standards (FIPS).

Health

Shown by default or by the `detail` or `encl` or `perf` parameter.

- OK
- Degraded
- Fault
- Unknown
- N/A

Health Reason

Shown by the `detail` parameter. If Health is not OK, a message describes the reason for the health state.

Health Recommendation

Shown by the `detail` parameter. If Health is not OK, a message describes recommended actions to resolve the 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.
- ERASE: The disk is being erased.

- **EXPD:** The disk group is being expanded.
- **INIT:** The disk group is being initialized.
- **PRERCON:** The disk is being used in a preemptive reconstruct operation.
- **RBAL:** The MSA-DP+ disk group is being rebalanced.
- **RCON:** The disk is being used in a reconstruct operation.
- **REFT:** The MSA-DP+ disk group's fault-tolerant stripes are being rebalanced.
- **VDRAIN:** The disk group is being removed and its data is being drained to another disk group.
- **VPREP:** The disk group is being prepared for use in a pool.
- **VRECV:** The disk group is being recovered to restore its membership in the 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:

- **Online:** The disk is operating normally.
- **Rebuild:** The disk's disk group is being reconstructed.
- **Fault:** The disk has a fault.
- **Pred Fail:** The disk has a predictive failure.
- **ID:** The disk's identification LED is illuminated.
- 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 `encl` parameter. The current lock key ID.

#### Model

Shown by the `detail` or `encl` or `updates` 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 `encl` 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 `encl` or `perf` or `temp` 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.

#### Sector Format

Shown by the `detail` parameter. See `Sec Fmt` above.

#### 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 `encl` 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 enclosure 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 `encl` 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% to 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.

#### Supports Unmap

Shown by the `detail` parameter. Shows whether the disk supports the SCSI `UNMAP` command.

#### 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).
- `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 Gb/s. A footnote indicates that it is normal behavior for the rate to vary.

Some 6Gb/s disks might not consistently support a 6Gb/s transfer rate. If this happens, the controller automatically adjusts transfers to those disks to 3Gb/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
- `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.
- `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.
  - The disk is from an unsupported vendor.
  - The disk is being erased.
- `VIRTUAL POOL`: The disk is a member of a disk group in a pool.

Vendor

Shown by default and by any parameter except `temp`. The vendor of the disk.

#### Output with the `updates` parameter

Shows the following information if a new firmware revision is available.

Location

Vendor

Model

Current Revision

New Revision

Build Date

SHA256 Checksum

Upgrade Requirement

Link

Description

#### 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 encl
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
Check for available disk firmware updates:
# show disks updates
```

**Basetypes**

```
disk-update
drives
enclosure-list
status
```

**See also**

```
show disk-groups
```

# show dns-management-hostname

## Description

Shows the management hostname for each controller module.

If DNS server functionality is operational and reachable by the controller's nslookup service, the FQDN for each controller is also shown. If nslookup output is not available, the domain name will be blank.

## Minimum role

monitor

## Syntax

```
show dns-management-hostname
```

## Output

Controller

The controller ID: A or B.

DNS management-hostname

The controller's management hostname.

Domain Name (DNS)

The controller's FQDN, if available.

## Examples

Show the management hostname for each controller module.

```
# show dns-management-hostname
```

## Basetypes

mgmt-hostnames

status

## See also

```
clear dns-parameters
```

```
set dns-management-hostname
```

```
reset dns-management-hostname
```

```
set dns-parameters
```

```
show dns-parameters
```

# show dns-parameters

## Description

Shows configured DNS settings for each controller module.

## Minimum role

monitor

## Syntax

```
show dns-parameters  
    [controller a|b|both]
```

## Parameters

controller a|b|both

Optional. Specifies whether to show addresses for controller A, controller B, or both. If this parameter is omitted, information is shown for both controllers.

## Output

Controller

The controller ID: A or B.

Name Servers

Configured name server IP address values.

Search Domains

Configured domain name values.

## Examples

Show the system's DNS settings.

```
# show dns-parameters
```

## Basetypes

dns-parameters

status

## See also

clear dns-parameters

set dns-parameters

set email-parameters

show email-parameters

# 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 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 or domain name 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.

Alert Notification

Shows the filter for which alert notifications will be sent:

- all: Sends notifications for all alerts.
- none: Disables email notification for alerts.

## Event Notification

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.

## Persistent Alerts

Shows whether system health alerts will be sent weekly on Sunday at 12:01 AM to configured email addresses.

## 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 dns-parameters  
set email-parameters  
show dns-parameters
```

# show enclosures

## Description

Shows information about the enclosures 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 enclosure WWN.

Name

The enclosure name.

Location

The enclosure location, or blank if not set.

Rack

The number of the rack that contains the enclosure.

Pos

The position of the enclosure in the rack.

Vendor

The enclosure vendor.

Model

The enclosure model.

Top Level Assembly Part Number

The enclosure TLA part number, if present.

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 enclosure midplane's rack-unit height, maximum number of disks, maximum data rate to disks (Gb/s), and hardware version.

Health

- OK
- Degraded
- Fault
- Unknown
- N/A



Reason

If Health is not OK, a message describes the reason for the health state.

Action

If Health is not OK, a message describes recommended actions to resolve the issue.

### **Examples**

Show information about all enclosures in the system.

```
# show enclosures
```

### **Basetypes**

enclosures

status

### **See also**

set enclosure

show sensor-status

# show event-subscriber

## Description

Shows event subscribers used by the Redfish interface.

## Minimum role

monitor

## Syntax

```
show event-subscriber
    [<subscriber-ID>]
```

## Parameters

<subscriber-ID>

Optional. Shows information for a specific event subscriber. If an invalid event subscriber is specified, the command shows an empty table instead. If this parameter is omitted, information is shown for all subscribers.

## Output

Destination

The subscription destination.

Protocol

The subscription protocol: Redfish.

Context

The subscription context.

Subscription Type

The subscription type.

Subscription ID

The subscriber ID generated by the system when the subscriber is added.

Registry Prefix

The registry prefix.

Resource Type

The resource type.

Delivery Retry Policy

The delivery retry policy.

Controller

The controller on which the subscriber was added: A or B. This has no effect on which controller issues notifications.

## Examples

Show all subscribers.

```
# show event-subscriber
```

Show information for event-subscriber-1.

```
# show event-subscriber event-subscriber-1
```

## Basetypes

event-subscriber

status

**See also**

add event-subscriber  
delete event-subscriber  
set event-subscriber

# 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 *HPE MSA 1060/2060/2062 Event Descriptions Reference Guide*.

## Minimum role

monitor

## Syntax

```
show events
  [a|b|both|error]
  [detail]
  [from <timestamp>]
  [from-event <event-ID>]
  [last <number-of-events>]
  [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, 043020235900 represents April 30 2020 at 11:59:00 PM. 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 <number-of-events>`

Optional. Shows the specified number of most recent 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, `043020235900` represents April 30 2020 at 11:59:00 PM. 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: `[3]`
- 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:
  - `INFORMATIONAL`: A configuration or state change occurred, or a problem occurred that the system corrected. No action is required.
  - `WARNING`: A problem occurred that may affect system stability but not data integrity. Evaluate the problem and correct it if necessary.
  - `ERROR`: A failure occurred that may affect data integrity or system stability. Correct the problem as soon as possible.
  - `CRITICAL`: A failure occurred that may cause a controller to shut down. Correct the problem *immediately*.
  - `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 2020 at 11:59:00 PM through May 2 2020 at 11:59:00 AM.

```
# show events from 043020235900 to 050220115900
```

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 from-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 enclosure, 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  
    [stats]
```

## Parameters

stats

Optional. Shows PHY error statistics.

## Output

Encl

The enclosure that contains the SAS 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

- Drive: Drive slot PHY.
- SC-P: Storage Controller primary PHY.
- SC-A: Storage Controller alternate 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.

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 enclosure.
- **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 PHYs when the partner I/O module is not installed. Appears for Drive, SC, or Ingress PHYs when a connection problem exists such as a broken connector.
- **Firmware reboot:** PHY disabled because of a firmware reboot.
- **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.

#### Change Cnt

Shown by the `stats` parameter. The 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 Viol

Shown by the `stats` parameter. The number of times the PHY received an unrecognized or unexpected signal.

#### Disparity

Shown by the `stats` parameter. 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.

#### CRC Errors

Shown by the `stats` parameter. 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

Shown by the `stats` parameter. The number of times the lane between two expanders experienced a communication error.



Lost DWORD

Shown by the `stats` parameter. The number of times the PHY has lost doubleword synchronization and restarted the Link Reset sequence.

InvlD DWORD

Shown by the `stats` parameter. The number of invalid doublewords that have been received by the PHY, not including those received during Link Reset sequences.

ResErrCnt

Shown by the `stats` parameter. The number of times the expander performed a reset of error counters.

Flag Bits

Shown by the `stats` parameter. PHY status bits, for internal use.

## Examples

Show expander status for each enclosure.

```
# show expander-status
Encl  Ctlr  Phy  Type          Status          Elem Status
      Disabled      Reason
-----
1     A    0   Drive        Enabled - Healthy  OK
      Enabled
...
1     A    16  Drive        Enabled - Degraded Not Used
      Enabled      Disk removed
...
```

## Basetypes

```
sas-status-controller-a
status
```

## See also

```
clear expander-status
```

# show fans

## Description

Shows information about each fan in the storage system.

## Minimum role

monitor

## Syntax

```
show fans
```

## Output

Name

The fan name.

Location

The fan location in the enclosure.

Status

- Up
- Error
- Off
- Missing

Speed

The fan speed (revolutions per minute).

Position

The fan position, as viewed from the back of the enclosure:

- Left
- Right
- Top
- Bottom

Serial Number

The fan serial number, if available.

Part Number

The fan part number, if available.

Firmware Version

The firmware revision of the fan FRU, if available.

Hardware Version

The hardware revision of the fan FRU, if available.

Health

- OK
- Degraded

- Fault
- Unknown
- N/A

Reason

If Health is not OK, a message describes the reason for the health state.

Action

If Health is not OK, a message describes recommended actions to resolve the 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

- Secured. The system is secured with a passphrase using FDE.
- Secured FIPS. The system is secured with a passphrase to the FIPS standard.
- Secured, Lock Ready. The system is 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.
- Unsecured. The system is not secured with a passphrase.

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 firmware-bundles

## Description

Displays the active firmware bundle and an available firmware bundle stored in the system's controller modules.

The available bundle is either the previous active bundle or a bundle loaded by a user.

The active and available firmware bundles will be synchronized between partner controller modules.

## Minimum role

monitor

## Syntax

```
show firmware-bundles  
    [updates]
```

## Parameters

updates

Optional. Contacts the update server to check whether a firmware update is available. If an update is available, the command shows information about the current firmware revision in each controller module and upgrade information.

## Output

### Without a parameter

Bundle Version

Version name of the firmware bundle.

Build Date

Build date of the firmware bundle.

Status

Status of the firmware bundle. Status could be one of the following:

- **Active:** Indicates that the firmware is actively running on the controller.
- **Available:** Indicates that the firmware is installed on the controller, and is available to be activated.
- **Invalid:** Indicates that the firmware is invalid due to compatibility or signature failure or was not activated in a previous activation attempt.
- **Inactive:** Indicates an inactive bundle.

Health

Health of the firmware bundle. Health could be one of the following:

- **OK:** Indicates that this firmware is actively running on the controller.
- **Degraded:** Indicates that this firmware is incomplete or not in sync with the partner controller.
- **Failed:** Indicates that firmware is corrupted or incompatible or some components failed to load correctly.

Reason

If Health is not OK, a message describes the reason for the health state..

Action

If Health is not OK, a message describes recommended actions to resolve the issue..

### With the `updates` parameter

Shows the following information if a new firmware revision is available.

Current Revision

New Revision

Build Date

SHA256 Checksum

Upgrade Requirement

Link

Description

### Examples

Show firmware bundles.

```
# show firmware-bundles
```

### Basetypes

firmware-bundles

status

### See also

`activate firmware`

`show firmware-update-status`

`show versions`

# show firmware-update-status

## Description

Displays the current status of any firmware update on the system.

## Minimum role

monitor

## Syntax

```
show firmware-update-status
```

## Output

Summary information including the type of activity, start time, completion time, estimated time to completion, percent completed, completion status, bundle version, and details about each process step.

## Examples

Show firmware update status on the system.

```
# show firmware-update-status
```

## Basetypes

```
update-status-summary  
status
```

## See also

```
activate firmware  
show firmware-bundles
```

# show frus

## Description

Shows SKU and FRU (field-replaceable unit) information for the storage system.  
Some information is for use by service technicians.

## Minimum role

monitor

## Syntax

```
show frus
    [secrets]
```

## Parameters

secrets

Optional. Shows additional information about the midplane.

## Output

### Output without the `secrets` parameter

#### SKU fields:

Part Number

The system part number.

Serial Number

The system serial number (also shown by Configuration SN, below).

Revision

The system revision level.

Enclosure ID

The enclosure ID.

#### FRU fields:

Name

- CHASSIS\_MIDPLANE: Chassis and midplane circuit board
- RAID\_IOM: Controller module
- BOD\_IOM: Expansion module
- POWER\_SUPPLY: Power supply module
- FAN: Fan module

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 enclosure.

- MID-PLANE SLOT: Chassis midplane.
- UPPER IOM SLOT: Controller module or expansion module A.
- LOWER IOM SLOT: Controller module or expansion module B.
- 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.
- LEFT FAN SLOT: Fan module on the left, as viewed from the back.
- RIGHT FAN SLOT: Fan module on the right, as viewed from the back.
- CONTROLLER A: Controller module A.
- CONTROLLER B: Controller module B.

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 enclosure number.

#### Output with the `secrets` parameter

FRU ID OUI

Organizationally Unique Identifier of the midplane.

- `<value>`: The OUI.
- `unassigned`: No OUI assigned.

FRU ID Revision Level

Revision level of the midplane.

- `<value>`: The FRU ID revision level.
- `unassigned`: No FRU ID revision level assigned.

Supplier Part Number

Part number assigned to the midplane by the supplier.

- `<value>`: The supplier part number.
- `unassigned`: No supplier part number assigned.

Supplier Serial Number

Serial number assigned to the midplane by the supplier.

- `<value>`: The supplier serial number.
- `unassigned`: No supplier serial number assigned.

Top Level Assembly Part Number

Part number assigned to the top level assembly.

- `<value>`: The top-level assembly part number.
- `unassigned`: No top-level assembly part number assigned.

Top Level Assembly Serial Number

Serial number assigned to the top level assembly.

- `<value>`: The top-level assembly serial number.
- `unassigned`: No top-level assembly serial number assigned.

OEM Part Number

Part number assigned to the midplane by HPE.

- `<value>`: The part number.
- `unassigned`: No part number assigned.

OEM Serial Number

Serial number assigned to the midplane by HPE.

- `<value>`: The serial number.
- `unassigned`: No serial number assigned.

SCSI Vendor ID

Vendor name returned by the SCSI INQUIRY command.

- <value>: The SCSI vendor ID.
- unassigned: No SCSI vendor ID assigned.

SCSI Product ID

Product identifier returned by the SCSI INQUIRY command.

- <value>: The SCSI product ID.
- unassigned: No SCSI product ID assigned.

### Examples

Show information about all FRUs in the system.

```
# show frus
```

Show additional information about the midplane:

```
# show frus secrets
```

### Basetypes

```
enclosure-sku
```

```
enclosure-fru
```

```
enclosure-fru-secrets
```

```
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 hostname.

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.

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 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 enclosure. Each controller in an enclosure 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 to 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 469](#).

## 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 23](#). 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 read operations, calculated over the interval since these statistics were last requested or reset.

Write Resp Time

The average response time in microseconds for 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 a SCSI `INQUIRY` command or a SCSI `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 host groups 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 group 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 values and source

## Examples

Show inquiry data for controller modules in the system.

```
# show inquiry
```

## Basetypes

```
inquiry  
status
```

## See also

```
show versions
```

# show ipv6-addresses

## Description

Shows static IPv6 addresses assigned to each controller's network port.

## Minimum role

monitor

## Syntax

```
show ipv6-addresses  
    [controller a|b|both]
```

## Parameters

controller a|b|both

Optional. Specifies whether to show addresses for controller A, controller B, or both. If this parameter is omitted, information is shown for both controllers.

## Output

Ctrl

The controller ID: A or B.

Index

The controller's index value for the address. The index is automatically assigned when adding a static IPv6 address.

Label

The name assigned to the address, or blank if the address is unnamed.

IPv6 Address

The IPv6 address with prefix length.

## Examples

Show static IPv6 addresses assigned to controller A.

```
# show ipv6-addresses controller a
```

## Basetypes

```
ipv6-addresses  
status
```

## See also

```
add ipv6-address  
remove ipv6-address  
set ipv6-network-parameters  
show ipv6-network-parameters
```

# show ipv6-network-parameters

## Description

Shows the IPv6 settings and health of each controller module's network port.

## Minimum role

monitor

## Syntax

```
show ipv6-network-parameters  
[controller a|b|both]
```

## Parameters

controller a|b|both

Optional. Specifies whether to show addresses for controller A, controller B, or both. If this parameter is omitted, information is shown for both controllers.

## Output

Autoconfig

- **enabled:** Uses an IPv6 address computed by SLAAC and an address assigned by a DHCPv6 server, depending on the network configuration.
- **disabled:** Uses static IPv6 addresses set with the `add ipv6-address` command.

Gateway

The network port gateway IPv6 address.

Link-Local Address

The link-local IPv6 address.

DHCPv6

Shown if Autoconfig is enabled. The IP address assigned by a DHCPv6 server.

SLAAC IP Address

Shown if Autoconfig is enabled. The IP address computed by SLAAC.

IPv6 Address (1-4)

Shown if Autoconfig is disabled. Shows from one to four manually set IPv6 addresses.

IPv6 Label (1-4)

Shown if Autoconfig is disabled. Shows the user-defined name, if set, for each manual IPv6 address.

## Examples

Show IPv6 network parameters for each controller module.

```
# show ipv6-network-parameters
```

## Basetypes

```
ipv6-network-parameters  
status
```

## See also

```
set ipv6-network-parameters
```

# show iscsi-parameters

## Description

Shows system-wide parameters for iSCSI host ports in each controller module.

## 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 1Gb/s, overriding a downshift that can occur during auto-negotiation with 1Gb/s HBAs. This setting does not apply to 10Gb/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 ldap-parameters

## Description

Shows LDAP settings.

## Minimum role

monitor

## Syntax

```
show ldap-parameters
```

## Output

LDAP protocol

Shows whether LDAP support is enabled or disabled.

User Search Base

Attributes that define where to start searching for users in the LDAP directory tree.

LDAP Server

The IP address or domain name of the primary LDAP server.

LDAP Server Port

The port number to use for communication with the primary LDAP server.

Alternate LDAP Server

The address of the alternate LDAP server.

Alternate LDAP Server Port

The port number to use for communication with the alternate LDAP server.

## Examples

Show LDAP settings.

```
# show ldap-parameters
```

## Basetypes

ldap-parameters

status

## See also

```
set ldap-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, or 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.

Virtualization

Shows whether the capability to create and manage pools is enabled or disabled.

Virtualization Expires

Never. License 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 doesn't expire.

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 peer system is enabled or disabled.

Replication Expires

Never. License doesn't expire.

VSS

Shows whether the VSS (Volume Shadow Copy Service) Hardware Provider is enabled or disabled.

VSS Expires

Never. Always enabled and doesn't expire.

### Examples

Show information about the installed license.

```
# show license
```

### Basetypes

license

status

# show maps

## Description

Shows information about mappings between volumes and initiators.

If no parameter is specified, this command shows explicit mappings and default mappings for all mapped volumes. Volumes that are not mapped are not shown.

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. 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 volumes 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 of the host.

You can specify:

- A host by name in the format <hostname>.\*, 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.\*.\*

Do not include both host-type and volume items in a list. A name that includes a space must be enclosed in double quotes.

## Output

### Without the initiator parameter

Serial Number

The serial number of the volume.

Name

The name of the volume.

#### Ports

- The controller host ports to which the mapping applies.
- Blank if not mapped or mapped as no-access.

#### LUN

- The 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: Read and write.
- read-only: Read only.
- no-access: No access (masked).
- not-mapped: Not mapped.

#### Identifier

- 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

- For a host, its name in the format <hostname>. \*, 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.

#### 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.

#### With the initiator parameter

##### ID

For an FC initiator, its WWPN. For a SAS initiator, its WWPN. For an iSCSI initiator, its node name (typically the IQN).

##### Name

See the section above.

##### Profile

See the section above.

##### Volume

The name of the volume.

##### Serial Number

See the section above.

LUN

See the section above.

Access

See the section above.

Ports

See the section above.

### Examples

Show mappings for all volumes.

```
# show maps
```

Show mapping information for all initiators.

```
# show maps initiator
```

### Basetypes

volume-view

host-group-view (with the initiator parameter)

status

### See also

show host-groups

show initiators

show volumes

# show metrics-list

## Description

Shows a list of all available types of metrics in the system.

If no parameters are specified, shows all the available types of metrics for each type of storage object that has metric fields defined.

Available metrics and applicable storage objects:

- `total-avg-response-time`: Average response time of an operation in microseconds. Operations include both reads and writes. Applicable objects: `controller`, `host-port`, `pool`, `system`, `volume`.
- `total-bytes-per-second`: Sum of read bytes per second and write bytes per second. Applicable objects: `controller`, `host-port`, `pool`, `system`, `volume`.
- `total-iops`: Sum of read IOPS and write IOPS. Applicable storage objects: `controller`, `host-port`, `pool`, `system`, `volume`.
- `total-max-response-time`: Sum of read maximum response time and write maximum response time. Applicable objects: `controller`, `host-port`, `pool`, `system`, `volume`.
- `total-num-bytes`: Sum of read bytes and write bytes. Applicable objects: `controller`, `host-port`, `pool`, `system`, `volume`.
- `read-io-count`: Number of read I/O operations. Applicable objects: `controller`, `host-port`, `pool`, `system`, `volume`.
- `read-ahead-ops`: Number of times that read ahead pre-fetched data for host reads. Applicable objects: `controller`, `volume`.
- `read-avg-queue-depth`: Average number of pending read operations being serviced since the last sampling time. This value represents periods of activity only and excludes periods of inactivity. Applicable objects: `host-port`, `volume`.
- `read-avg-response-time`: I/O read average response time in microseconds. Applicable objects: `controller`, `host-port`, `pool`, `system`, `volume`.
- `read-bytes-per-second`: Number of bytes read per second. Applicable storage objects: `controller`, `host-port`, `pool`, `system`, `volume`.
- `read-iops`: Number of I/Os per second. Applicable objects: `controller`, `host-port`, `pool`, `system`, `volume`.
- `read-max-response-time`: Maximum I/O read response time in microseconds. Applicable objects: `controller`, `host-port`, `pool`, `system`, `volume`.
- `read-num-bytes`: Number of bytes read since the last time this data point was sampled. Applicable objects: `controller`, `host-port`, `pool`, `system`, `volume`.
- `small-destages`: Number of partial stripe destages. (These tend to be very inefficient compared to full stripe writes.) Applicable objects: `controller`, `volume`.
- `write-io-count`: Number of write I/O operations. Applicable objects: `controller`, `host-port`, `pool`, `system`, `volume`.
- `write-avg-queue-depth`: Average number of pending write operations being serviced since the last sampling time. This value represents periods of activity only and excludes periods of inactivity. Applicable objects: `host-port`, `volume`.
- `write-avg-response-time`: I/O write average response time in microseconds. Applicable objects: `controller`, `host-port`, `pool`, `system`, `volume`.

- `write-bytes-per-second`: Number of bytes written per second. Applicable objects: `controller`, `host-port`, `pool`, `system`, `volume`.
- `write-cache-space`: Current size of write cache in 16KB chunks. Applicable objects: `controller`, `volume`.
- `write-cache-percent`: Percentage of write cache currently being used in tenths of a percent. Applicable objects: `controller`, `volume`.
- `write-full-stripe-destages`: Number of full stripe destages, which are the most efficient destage type. Applicable objects: `controller`, `volume`.
- `write-iops`: Number of I/Os per second. Applicable objects: `controller`, `host-port`, `pool`, `system`, `volume`.
- `write-max-response-time`: Maximum I/O write response time in microseconds. Applicable objects: `controller`, `host-port`, `pool`, `system`, `volume`.
- `write-num-bytes`: Number of bytes written since the last time this data point was sampled. Applicable objects: `controller`, `host-port`, `pool`, `system`, `volume`.

Metrics for the system storage object are synthesized from data captured by controller storage objects.

### Minimum role

`monitor`

### Syntax

```
show metrics-list
    [database all|dynamic|historical]
    [pattern <string>]
    [range]
    [started]
    [type controller|host-port|pool|system|volume]
```

### Parameters

`database all|dynamic|historical`

Optional. Specifies to show all metrics or only dynamic metrics or historical metrics. If this parameter is omitted, all metrics are shown.

`pattern <string>`

Optional. Shows metrics 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, `Vol1??` 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.

`range`

Optional. Shows the start time and end time of available data points.

`type controller|host-port|pool|system|volume`

Optional. Filters the list to include only metrics available for the specified type of storage object.

`started`

Optional. Filters the list to include only those metrics that have been started by using the `start metrics` command.

## Output

Name

The metric name in the format `<type>.<field-name>.<instance>`, where `<type>` is a storage object, `<field-name>` is a specific measured property of that object, and `<instance>` is the name or serial number of that object. For example: `controller.total-iops.A`.

If `database historical` is specified, the command shows average, maximum, and minimum entries for each calculated historical data point. These values are appended with an '@' symbol to the metric name. For example: `controller.total-iops@Average.A`, `controller.total-iops@Max.A`, `controller.total-iops@Min.A`.

Started

Shows whether metric retention has been started.

Start Time

Shown by the `range` parameter. Shows the time when metric retention started.

End Time

Shown by the `range` parameter. Shows the time when metric retention ended.

## Basetypes

```
metrics-list
status
```

## Examples

Show all metrics that have been started.

```
# show metrics-list started
```

Show the range of start and end times for historical controller metrics.

```
# show metrics-list range database dynamic type controller
```

## See also

```
query metrics
start metrics
stop metrics
```



# 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

- 10mbps: The network port link speed is set to 10Mb/s.
- 100mbps: The network port link speed is set to 100Mb/s.
- 1000mbps: The network port link speed is set to 1000Mb/s.

Duplex Mode

- half: The network port duplex mode is set to half duplex.
- full: The network port duplex mode is set to full duplex.

Auto Negotiation

- Disabled: Either the network port has not been set, or it has been unset because the controller module was removed from its enclosure, or the port is connected to a switch and is set to use the link speed and duplex mode shown by the Link Speed and Duplex Mode fields.
- Enabled: The network port is set to auto-negotiate a link speed (up to the maximum speed shown by the Link Speed field) and duplex mode with a connected Ethernet switch.

Health

The health of the network connection.

- OK
- Degraded
- Fault
- Unknown
- N/A

Health Reason

If Health is not OK, a message describes the reason for the health state.

Health Recommendation

If Health is not OK, a message describes recommended actions to resolve the issue..

Ping Broadcast

- Enabled: The system will respond to a broadcast ping.
- Disabled: The system will not respond to a broadcast ping.

### 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 network address of the current NTP server if NTP is enabled.
- The network address of the last-set NTP server 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, a message describes the reason for the health state.

Health Recommendation

If Health is not OK, a message describes recommended actions to resolve the 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 pools.

---

**NOTE** For a 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  
    [<pool>]
```

## Parameters

<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.

Blocksize

The size of a block, in bytes.

Total Size

The total capacity of the pool.

Avail

The available capacity in the pool.

Snap Size

The pool capacity used by snapshots.

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. The default is 50%.

#### 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. The default is 75%.

#### High Thresh

The high threshold for page allocation as a percentage of pool capacity. The threshold value is automatically calculated as the available capacity of the pool minus 400GiB — or if that result is below the mid threshold, then mid threshold capacity plus 1%.

When the high 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
- Unknown
- N/A

#### Reason

If Health is not OK, a message describes the reason for the health state.

#### Action

If Health is not OK, a message describes recommended actions to resolve the issue.

### Examples

Show information about all pools.

```
# show pools
```

### Basetypes

```
pools  
status
```

**See also**

delete pools  
set pool  
show pool-statistics



# show pool-statistics

## Description

Shows live or historical performance statistics for 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 469](#).

## 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 historical performance metrics. If you specify this parameter you must also specify the `historical` parameter. If the `all` parameter is omitted, the default set of performance metrics is 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 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.

## Output

### Live

Name

The name of the pool.

Pages Allocated per Min

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

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 Unmapped per Minute

The number of 4MB 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

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

Shown by the `all` parameter. Average response time in microseconds for all read operations, calculated over the interval since these statistics were last requested or reset.

Write Resp Time

Shown by the `all` parameter. Average response time in microseconds for all write operations, calculated over the interval since these statistics were last requested or reset.

### Historical

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 4MB pages allocated to volumes in the pool.

Sample Time

The 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 4MB 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 4MB 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 4MB pages that are automatically reclaimed and deallocated because they are empty (they contain only zeroes for data).

#### RC Copies

The number of 4MB 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

The 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 2020-06-01 4:40 PM end 2020-06-01 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 each controller.

## Minimum role

monitor

## Syntax

```
show ports  
    [detail]  
    [<port>]
```

## Parameters

detail

Optional. This parameter shows additional detail about the port status, including SFP information.

<port>

Optional. Shows information about the specified port only. Specify a controller ID and port number (see Examples). If this input is omitted, information is shown for all ports.

## 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 Fibre Channel 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 Gb/s.
- Blank if not applicable.

#### Speed (C)

- Configured host-port link speed in Gb/s. Not shown for SAS.
- FC: auto, 16Gb, 8Gb, or 4Gb
- iSCSI: auto
- Blank if not applicable

#### Health

- OK
- Degraded
- Fault
- Unknown
- N/A

#### Reason

If Health is not OK, a message describes the reason for the health state.

#### Action

If Health is not OK, a message describes recommended actions to resolve the 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. If the `Ports/Conn` setting does not match the type of cable connected to the port, event 569 will report two lanes in the port are disabled. This field can be used to identify those lanes.

#### 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`.

Related FC data fields are displayed if the `detail` parameter is specified, including SFP status, part number, configured speed, actual speed, and supported link speeds for the qualified SFP option used in each port.

#### 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.

#### Ports/Conn

MSA 1060 SAS controller module only. The number of virtual host ports per controller host-port connector. This reflects whether the system is set to use fan-out SAS cables or standard SAS cables.

- `1`: The system is set to use standard SAS cables.
- `2`: The system is set to use fan-out SAS cables.

#### 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
```

Show information about a single host port in a specific controller module.

```
# show ports A1
```

**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 enclosure that contains the power supply.

Id

The power supply position, shown as an index value that starts at 1 and increments from left to right as viewed from the back of the enclosure

Serial Number

The serial number of the power supply, if available.

Part Number

The power supply part number, if available.

Name

The power supply identifier and location.

Firmware Version

The firmware revision of the power supply.

Health

- OK
- Degraded
- Fault
- Unknown
- N/A

Reason

If Health is not OK, a message describes the reason for the health state.

Action

If Health is not OK, a message describes recommended actions to resolve the issue..

## Examples

Show information about each power supply in each enclosure.

```
# show power-supplies
```

## Basetypes

power-supplies

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 SMU web server is enabled or disabled.

Secure Web Browser Interface (HTTPS)

Shows whether the secure SMU 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.

Service Location Protocol (SLP)

Shows whether the SLP interface is enabled or disabled.

File Transfer Protocol (FTP)

Shows whether the insecure interface for installing firmware updates, installing security certificates and keys, installing a license, and downloading logs is enabled or disabled.

Secure File Transfer Protocol (SFTP)

Shows whether the secure 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 (Debug)

Shows whether the Telnet debug port is enabled or disabled. When the service debug protocol is enabled, remote connection is allowed, through incoming ports only, by HPE or HPE's authorized representatives for troubleshooting. Disabling the service debug protocol removes this access.

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  
status

**See also**

set protocols

# show provisioning

## Description

Shows information about how the system is provisioned.

This command shows the associations between controllers, disks, 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  
  [luns <LUNs> | pool <pools> | ports <ports> | volumes <volumes>]  
  [no-mapping]  
  [unhealthy]
```

## Parameters

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 23](#). This command does not support the use of hyphens to indicate a range of ports.

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 pools whose health is not OK. If this parameter is omitted, provisioning information is shown for all pools.

## Output

### Volume information

Volume

- Volume name.
- Blank if the pool does not have a volume.

WWN

- Volume World Wide Name.
- Blank if the pool does not have a volume.

Ctlr

Owning controller of the pool.

Disks

Shorthand list of the disks within a pool.

Pool

Pool name.

Health

Health of the associated pool:

- OK
- Degraded
- Fault
- Unknown
- N/A

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.

## Identifier

- 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.

## 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 all unhealthy disk groups.

```
# show provisioning unhealthy
```

## Basetypes

```
provisioning
```

```
status
```

## See also

```
show disk-groups
```

```
show disks
```

```
show maps
```

```
show pools
```

# show proxy-server

## Description

Shows proxy server settings.

## Minimum role

monitor

## Syntax

```
show proxy-server
```

## Output

Host

The proxy server address.

Ports

Proxy server port numbers, if set.

Proxy State

The proxy state, either `Enabled` or `Disabled`.

User

The username to access the proxy server, if set.

## Examples

Show proxy server settings.

```
# show proxy-server
```

## Basetypes

proxy-server

status

## See also

```
set proxy-server
```



# 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:

- **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.
- **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:** Both controllers are operational.
- **Operational but not redundant:** In active-active mode, one controller is operational and the other is offline.
- **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:** The partner Management Controller is responding normally.
- **Not Operational:** The local Management Controller has established communication with the partner Management Controller, but the partner is not responding because it's not currently in active-active or failed-over state.
- **Not Communicating:** The partner Management Controller is not ready to communicate.
- **Unknown:** The operational status of the partner Management Controller cannot be determined.

System Ready

Shows whether the system is ready for running a script.

- Ready: The system is ready.
- Not Ready: The system is not ready.

Local Controller Ready

Shows the local controller's contribution towards System Ready.

- Ready: The local controller is ready.
- Storage Controller is Not Ready: The Storage Controller is not ready.
- Management Controller is Not Ready: The Management Controller is not ready.
- Activity is currently in progress: A partner firmware update, firmware installation, or log retrieval is in progress. Wait for that operation to complete and try again.

Local Controller Reason

The explanation for Local Controller Ready.

Other Controller Ready

Shows the partner controller's contribution towards System Ready.

- Ready: The partner controller is ready.
- Storage Controller is Not Ready: The Storage Controller is not ready.
- Management Controller is Not Ready: The Management Controller is not ready.
- Activity is currently in progress: A partner firmware update, firmware installation, or log retrieval is in progress. Wait for that operation to complete and try again.

Other Controller Reason

The explanation for Other Controller Ready.

### Examples

Show the redundancy status of the system.

```
# show redundancy-mode
```

### Basetypes

```
redundancy  
status
```

# show remote-systems

## Description

Shows information about remote systems associated with the local system.

## 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. A name that includes a space must be enclosed in double quotes. An address can be an IPv4 address, IPv6 address, or FQDN.

## 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 `standard` or `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.

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 ["API basetype properties" on page 469](#).

## 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.
- **Failed Over:** The replication set's secondary system has allowed direct access to the secondary volume or volume group because the primary system is not operational. In this state no replications will occur, even if the primary system becomes operational and communication is restored.
- **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.

### Failback In Progress

- **True:** A failback-restore process for this replication set has started and is in progress.
- **False:** The failback-restore process is complete on both systems.

### 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 percent 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
```

```
recover 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

Name

The replication set name.

Snapshot History

- **disabled:** 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.

Snapshot 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

The expansion port name.

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
- Unknown
- N/A

Reason

If Health is not OK, a message describes the reason for the health state.

Action

If Health is not OK, a message describes recommended actions to resolve the issue.

## Examples

Show the condition of SAS expansion-port connections in each enclosure.

```
# show sas-link-health
```

## Basetypes

expander-ports

status

# show schedules

## Description

Shows information about task schedules.

## Minimum role

monitor

## Syntax

```
show schedules
  [detail]
  [<schedule-name>]
```

## Parameters

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.

Last Initiated Time

Shown by the `detail` parameter. The date and time, in the format <year>-<month>-<day> <hour>:<minutes>:<seconds> (UTC), when the schedule was last 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 has occurred.

Tasks

Shown by the `detail` parameter. Information about tasks and task details as shown by the `show tasks` command.

### 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 enclosure.

Information shown includes temperature, voltage, and current for applicable components, and voltage, charge, capacitance, and resistance for the controller module supercapacitor pack.

For temperature and voltage ranges (both normal and error), see your product's Installation Guide.

## Minimum role

monitor

## Syntax

```
show sensor-status
```

## Output

Encl

The enclosure 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 enclosure.

```
# 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

standard

## Syntax

```
show sessions
    [detail]
```

## Parameters

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 SMU.

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

Storage Controller A

- up: The controller is operational.
- down: The controller is shut down.
- not installed: The controller is not installed.

Storage Controller B

- up: The controller is operational.
- down: The controller is shut down.
- not installed: The controller is not installed.

Other MC Status

The operational status of the Management Controller in the partner controller. This is not factored into system health.

- Operational: The partner Management Controller is responding normally.
- Not Operational: The local Management Controller has established communication with the partner Management Controller, but the partner is not responding because it's not currently in active-active or failed-over state.
- Not Communicating: The partner Management Controller is not ready to communicate.
- Unknown: The operational status of the partner Management Controller cannot be determined.

## Examples

Show the shutdown status of each controller.

```
# show shutdown-status
```

## Basetypes

```
shutdown-status  
show-other-MC-status  
status
```

## See also

```
restart mc  
restart sc  
shutdown
```



# 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>]
  [type standard|replication|all]
  [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, Vol1?? 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.

type standard|replication|all

Optional. Shows only standard snapshots, only replication snapshots, or snapshots of all types. If this parameter is omitted, snapshots of all types are shown.

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.

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 it as their root.

Snap-Pool

Not applicable.

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 snapshot-space

## Description

Shows snapshot-space settings for each 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 Snapshots:** 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 pool.

```
# show snapshot-space
```

## Basetypes

snap-space

status

**See also**

set snapshot-space

show pools

# 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 address of each trap host. The value can be an IPv4 address, IPv6 address, or FQDN.

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 `standard` or `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 `standard` or `manage` role.

Alert Notification

Shows whether the system will send SNMP notifications for alerts.

- `all`: The system will send SNMP notifications for alerts.
- `none`: The system will not send SNMP notifications for alerts.

Persistent Alerts

Shows whether weekly alerts about system health issues will be sent to configured email addresses until corrective action has been taken and the system health value has returned to `OK`.

## 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

The IP address or domain name of the remote syslog server used 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.

Alert Notification

Shows the filter for which alert notifications will be sent:

- `all`: Sends notifications for all alerts.
- `none`: Disables email notification for alerts.

Persistent Alerts

Shows whether system health alerts will be sent weekly on Sunday at 12:01 AM to configured email addresses.

## 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. This parameter shows additional detail about the system.

## 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 enclosure midplane.

Vendor Name

The vendor name.

Product ID

The product model identifier.

Product Brand

The product brand name.

SCSI Vendor ID

Shown by the `detail` parameter. The vendor name returned by the SCSI `INQUIRY` command.

SCSI Product ID

Shown by the `detail` parameter. The product identifier returned by the SCSI `INQUIRY` command.

Enclosure Count

The number of enclosures in the system.

## Health

- OK
- Degraded
- Fault
- Unknown
- N/A

## Health Reason

If Health is not OK, a message describes 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:** The partner Management Controller is responding normally.
- **Not Operational:** The local Management Controller has established communication with the partner Management Controller, but the partner is not responding because it's not currently in active-active or failed-over state.
- **Not Communicating:** The partner Management Controller is not ready to communicate.
- **Unknown:** The operational status of the partner Management Controller cannot be determined.

## 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 SMU 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 enclosure.

Maximum Disks

The number of disks that the system supports.

Maximum Volumes

The number of volumes that the system supports.

Maximum LUNs

The number of LUNs that the system supports.

Maximum Virtual Pools per Controller

The number of pools that each controller supports.

Maximum Virtual Disk Groups per Pool

The number of pools that each pool can contain.

Maximum Virtual Pool Size

The maximum capacity of a 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 Hosts

The maximum number of hosts for the system.

Maximum Initiators per Host

The maximum number of initiators that a host can contain.

Maximum Initiators

The maximum number of initiators for the system.

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.

Maximum number of MSA-DP+ Disk Groups per Controller

The maximum number of MSA-DP+ disk groups that each controller supports.

### 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>]
```

## Parameters

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 without 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.

### TakeSnapshot task with detail

Task Name

The name of the task.

Task Type

The 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:** Start process. Goes immediately to VerifyVolume.
- **VerifyVolume:** Ensure the volume exists and is a type of volume that can have a snapshot.
- **ValidateLicensingLimit:** Check the current number of snapshots versus the licensing limit to ensure the snapshot has not already been exceeded.
- **CreateName:** Build a unique name for the new snapshot using prefix and sequence number.
- **PlanCreateSnap:** Take the snapshot.
- **VerifySnap:** Ensure the new snapshot exists.
- **InspectRetention:** Check whether the snapshot retention count is exceeded.
- **FindOldestSnap:** Determine which is the oldest retained snapshot.
- **UnmapSnap:** Unmap the oldest snapshot so it can be reset.
- **ResetSnap:** Reset the oldest snapshot so it can be reused.
- **RenameSnap:** Rename the oldest snapshot to the new snapshot name.

## 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 reset and renamed.

## 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.

#### **ResetSnapshot task with detail**

Task Name

The name of the task.

Task Type

The 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: Start process. Goes immediately to VerifySnap.
- VerifySnap: Ensure the snapshot exists.
- ResetSnap: Reset the specified snapshot.

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.

#### **Replicate task with detail**

Task Name

The name of the task.

Task Type

The 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:

- **Start:** Start process. Goes immediately to `VerifySnap`.
- **PlanCreateRep:** Flush the replication set.
- **Replicate:** Replicate the volumes in the replication set.
- **VerifyRunning:** Ensure the new replication has started.

#### Error Message

- If an error occurred while processing the task, the error message.
- Blank if no error has occurred.

#### Replication Set Name

The name of the replication set.

#### Replication Set Serial Number

The serial number of the replication set.

#### Replicate Last Snapshot

If `True`, the task is set to replicate the most recent snapshot of the primary volume.

#### **EnableDSD task with detail**

##### Task Name

The name of the task.

##### Task Type

The 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.

#### **DisableDSD task with detail**

Task Name

The name of the task.

Task Type

The 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.

#### **StartScrub task with detail**

Task Name

The name of the task.

Task Type

The task type, StartScrub.

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.

#### **StopScrub task with detail**

Task Name

The name of the task.

Task Type

The task type, StopScrub.

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.

Statistics shown only in API output are described in ["API basetype properties" on page 469](#).

## 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 4MB pages that have been automatically reclaimed and deallocated because they are empty (they contain only zeroes for data).

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

The average response time, in microseconds, for read operations since the last sampling time.

#### Write Resp Time

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 timezones

## Description

Shows available timezones based on data from the public-domain TZ database.

Timezone names have the form <area>/<location>, where <area> is a continent or ocean and <location> is a significant location within that area, such as a city or island. For example, Pacific/Guam

## Minimum role

monitor

## Syntax

```
show timezones
    [<region>]
```

## Parameters

<region>

Optional. Limits output to timezone names that contain a specified, case-insensitive string indicating an area or location. If this parameter is omitted, all available timezones are listed.

## Output

Timezone list.

## Examples

Show all timezones.

```
# show timezones
```

Show all timezones in Africa.

```
# show timezones africa
```

Show the timezone for Singapore.

```
# show timezones sing
```

## Basetypes

timezones

status

## See also

set controller-date

set ntp-parameters

# 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 update-server

## Description

Shows settings for a configured update server proxy.

## Minimum role

monitor

## Syntax

```
show update-server
```

## Output

URL

The URL of the update server.

Proxy State

Shows whether the proxy is enabled or disabled.

Proxy Host

The proxy's hostname or IP-address.

Proxy Port

The proxy's port number, if set.

Proxy User

The username to access the proxy, if set.

Last Check

The date and time when the system last contacted the update server.

Last Status

The status of the last attempt to contact the update server.

## Examples

Show update server settings.

```
# show update-server
```

## Basetypes

update-server

status

## See also

check update-server

clear update-server-proxy

set proxy-server

set update-server

show proxy-server

# show user-groups

## Description

Shows configured LDAP user groups.

Properties shown only in API output are described in ["API basetype properties" on page 469](#).

## Minimum role

monitor

## Syntax

```
show user-groups
    [<user-group-name>]
```

## Parameters

<user-group-name>

Optional. Shows settings for the specified user group only. If this parameter is omitted, settings are shown for all user groups.

## Output

Name

The user group name.

Roles

- `monitor`: User group can view but not change system settings.
- `standard`: User group can view and change system settings except: configuring local users; configuring LDAP; performing write operations through FTP or SFTP; performing file uploads from the SMU; using the `restore defaults` command.
- `manage`: User group can view and change system settings.
- `diagnostic`: For use by or with direction from technical support.

Type

The user group type: LDAP.

Locale

The display language.

WBI

- `x`: User group can access the web-browser interface (the SMU).
- Blank: User group cannot access this interface.

CLI

- `x`: User group can access the command-line interface.
- Blank: User group cannot access this interface.

FTP

- `x`: User group can access the SFTP interface.
- Blank: User group cannot access this interface.

**Examples**

Show information about all user groups.

```
# show user-groups
```

Show information about user group StorageAdmins.

```
# show user-groups StorageAdmins
```

**Basetypes**

usergroups

status

**See also**

create user-group

delete user-group

set user-group

# 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.
- `standard`: User can view and change system settings except: configuring local users; configuring LDAP; performing write operations through FTP or SFTP; performing file uploads from the SMU; using the `restore defaults` command.
- `manage`: The user can view and change system settings.
- `diagnostic`: For use by or with direction from technical support.

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 SMU).
- 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.

## SNMP

- `x`: The user can access the SNMPv3 interface.
- `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.

## Trap Host Port

The SNMP trap destination port of the host 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 versions

## Description

Shows firmware and hardware version information for the system.

## Minimum role

monitor

## Syntax

```
show versions
  detail
  [firmware active|available]
  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.

firmware active|available

Optional. Shows information about the active bundle, all available installed bundles, or a specific bundle version.

- **active:** Accessible to users having any role to view the active bundle.
- **available:** Accessible to users having the `manage` role to view available bundles.

frus

Optional. Shows information about firmware versions for FRUs in each enclosure. 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 enclosure.

```
# show versions frus
```

Show version information for all installed bundles.

```
# show versions firmware available
```

## Basetypes

```
versions
firmware-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
```

## Output

Src Volume

The name of the source volume.

Src Type

The type of the source volume: Virtual.

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 volume.

Type

- base: Base volume

Health

- OK

Reason

If Health is not OK, a message describes the reason for the health state.



Action

If Health is not OK, a message describes recommended actions to resolve the 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 [www.t10.org](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 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 469](#).

## 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.

Eps

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.

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.

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

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

```
show volume-statistics
```

```
status
```

### See also

```
reset all-statistics
```

```
reset volume-statistics
```

```
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 base|standard|snapshot|primary-volume|secondary_volume]
  [<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 base|standard|snapshot|primary-volume|secondary\_volume

Optional.

- base: Show only volumes that are not snapshots of any other volume.
- snapshot: Show only snapshots.
- standard: Not supported.
- primary-volume: Show only primary volumes.
- secondary\_volume: Show only secondary volumes.

If this parameter is omitted, all volumes are shown.

<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`, a message describes recommended actions to resolve the issue.

### Alloc Size

The amount of space currently allocated to a 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.
- `cache-hit`: This controller cache mode of operation is optimized for workloads that are localized—that is, a substantial percentage of all accesses are hits in the controller's cache. In this mode, the cache is kept coherent with the partner controller.

### 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`

### Large Virtual Extents

Shown by the `details` parameter. Shows whether the system will try to allocate pages in a sequentially optimized way to reduce I/O latency and improve performance.

- `Disabled`: Optimized page allocation is disabled.
- `Enabled`: Optimized page allocation is enabled.

### Metadata In Use

Shown by the `details` parameter. The amount of pool metadata currently being used by the volume.

### 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 RAID and RAID 1 disk groups internally as if they have a stripe size of 512KB, 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, a message describes 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.

#### 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. 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.

#### Total Size

The total size of the volume.

#### Type

- **base:** Base volume
- **snapshot:** Snapshot volume

#### Usage Type

Shown by the `details` parameter. The purpose of the volume.

- **Database:** The volume is used for database applications.
- **Virtualization:** The volume is used as a datastore for a virtual machine.
- **Email:** The volume is used primarily to hold email or similar content.
- **Files:** The volume is used as a file share.
- **Other:** The usage type is not described by the other choices.
- **Unspecified:** The usage type is not set.

#### 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 information 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 workload

## Description

Calculates the system's I/O workload, and shows the relationship between the workload and the amount of storage capacity used.

This data reveals how much capacity is frequently accessed over time ("hot"). You can use this information to determine how system performance may benefit from implementing a tier of fast SSDs, instead of slower spinning disks, for some or all of that capacity. Users often see the greatest performance benefits when the SSD tier is sized to handle 80% or more of the I/O workload.

Calculations are based on user-specified settings and up to 8 days of usage data captured by the system. The storage system must be in a stable state for a minimum of 2 days to generate complete data.

For a graphical view of workload data, see the I/O workload panel in the SMU.

The workload history does not persist beyond a controller restart.

---

**NOTE** The suggested capacities may not apply to heavily streaming workloads.

---

## Minimum role

monitor

## Syntax

```
show workload
  calc-type peak|average
  io-type reads|writes|combined
  controller a|b
  [target-pct <target-percentages>]
```

## Parameters

`calc-type peak|average`

Specifies whether to base the calculations on either the peak values saved in the usage data or the average values.

For calculations, the pool is divided into equal bins of LBAs. Each sample contains readings for all bins. There are multiple samples taken per day. To calculate average, the sum of the readings of a bin are divided by the number of samples. To calculate peak, the largest bin value from the collection of samples is taken, instead. This leaves one value for each bin whether average or peak was selected. From there, workload calculations are made using the bin numbers as input.

`io-type reads|writes|combined`

Specifies to limit the data used for calculations to small read I/Os only, small write I/Os only, or the combined total of small read and small write I/Os. Small I/Os are random access operations, as opposed to large I/Os which are sequential access operations.

`controller a|b`

Specifies whether to base calculations on data from the pool owned by controller A or B.

`target-pct <target-percentages>`

Optional. Default workload calculations are based on low, mid, and high percentages of capacity: 50%, 80%, and 100%. This parameter overrides any or all calculations with your own percentages expressed as whole numbers. Enter a comma-separated list of up to three values. If a value is not specified, the corresponding default will be used. For example, entering **65 , , 95** would set percentages to 65%, 80%, and 95%. Entering % characters is optional.

## Output

Current SSD Space

Current SSD capacity allocated to the pool formatted to use the current base, precision, and units.

Pool

The pool for which the calculations are based: A or B.

Calculation Type

Either Peak or Average.

I/O Type

Calculations are based on either Reads, Writes, or the Combined total of reads and writes.

For each data sample:

Start Sample Time: Datestamp for the first data sample used in calculations.

End Sample Time: Datestamp for the last data sample used in calculations.

<low%>, <mid%>, <high%>: Columns showing calculated capacities based on the three percentage values specified in the target-pct parameter or their corresponding defaults. The column headings show the respective percentage values.

If less than 90% of the expected data samples are available for calculation, the calculated capacity will be N/A. Samples may be unavailable for rare reasons including controller failover conditions.

## Examples

Calculate the peak workload of small read I/Os for the pool owned by controller A, with a low capacity target of 70% instead of the default 50%. The results indicate that over the time and capacity ranges, about 1600GB of storage is frequently accessed, making it a good candidate for use of SSDs.

```
# show workload calc-type peak controller a io-type reads target-pct 70
```

## Basetypes

workload

status

## See also

show disks

show pools

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

standard

## 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
```

# start metrics

## Description

Starts retention of specified dynamic metrics.

The system automatically retains historical metrics and the last 5 minutes of all dynamic metrics. This command retains select dynamic metrics beyond 5 minutes, to a maximum of 4 hours of data points. It retains a few hours of 5-second-sampled data points. The oldest data points are automatically deleted as internal storage gets full.

Repeatedly calling this command is additive. That is, metrics are added to the existing list of metrics without clearing the list.

## Minimum role

monitor

## Syntax

```
start metrics
  <metrics-list>
```

## Parameters

<metrics-list>

A comma-separated list of individual dynamic metrics instances to start retaining.

## Examples

Start retaining individual dynamic metrics.

```
# start metrics controller.read-ops.A,controller.read-ops.B
```

## See also

```
query metrics
show metrics-list
stop metrics
```

# stop metrics

## Description

Stops data retention for specified dynamic metrics.

This command does not delete persisted data points. The oldest data points are automatically deleted as internal storage gets full.

---

**NOTE** Running this command without a parameter will stop data retention for all current metrics.

---

## Minimum role

monitor

## Syntax

```
stop metrics  
  <metrics-list>
```

## Parameters

```
<metrics-list>
```

A comma-separated list of individual dynamic metrics instances to stop retaining.

## Examples

Stop retaining individual dynamic metrics.

```
# stop metrics controller.read-ops.A,controller.read-ops.B
```

## See also

```
start metrics  
query metrics  
show metrics-list
```

# 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

standard

## 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

standard

## Syntax

test

email | managedlogs | managedlogswarn | managedlogswrap | notification | snmp | syslog

[region crash1 | crash2 | crash3 | crash4 | ecdebug | mc | scdebug]

## Parameters

email | managedlogs | managedlogswarn | managedlogswrap | notification | snmp | syslog

- **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 and SNMP. (Event 312)
- **snmp:** This option behaves the same as the `notification` option.
- **syslog:** Specify this option to test receipt of notifications by the remote syslog server.

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  
set syslog-parameters

# trust

## Description

Enables an offline or quarantined-offline disk group to be brought online for emergency data recovery.

---

 **CAUTION** This command is for use by or with direction from technical support. Improper use of trust may cause data corruption or data loss.

---

The `trust` command must be used in CLI console mode and 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 been quarantined due to inaccessible disks. 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 disks are operable, data can be read from the disks and restored to another location.

The system will automatically quarantine a disk group having a fault-tolerant RAID level if one or more of its disks becomes inaccessible. Quarantine will not occur if a known-failed disk becomes inaccessible or if a disk becomes inaccessible after failover or recovery.

To continue operation and not go to quarantined status, a 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 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. For an MSA-DP+ disk group, the MSA-DP+ technology keeps track of inaccessible disk zones within the disk group. Each disk is split into disk zones and 10 or 18 disk zones make up a stripe zone. Each stripe zone can be fault tolerant, degraded, critical, or failed. If any one stripe zone is failed then the entire disk group becomes quarantined.

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 **QTCD** 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. Operation of any volumes that have data on a quarantined disk group will be impacted while the disk group is quarantined.

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 is dequarantined when it is brought back online, which can occur as follows:

- If the inaccessible disks come online, making the disk group **FTOL**, **FTDN**, or **CRIT**, 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).
- 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.

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 enclosures 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.

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 procedures outline the general steps for performing a trust operation, but the best procedure to follow for your situation may vary. Before starting these procedures, contact technical support for assistance in determining if the trust operation applies to your situation, and for assistance to perform it.

---


 **CAUTION**

- Do not use the `trust` command when the storage system is unstable. For example, if there are many power or topology-change events.
  - The `trust` command can be run only on an offline or quarantined-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`. 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.
  - Never update controller-module, expansion-module, or disk firmware when the disk group is offline or quarantined-offline.
  - Never clear unwritten data cache when a disk group is offline or quarantined-offline.
  - Do not use the `trust` command on a disk group with status `FTDN` or `CRIT`. Instead, add spares and let the system reconstruct the disk group.
-

### Steps for running the `trust` command

1. Disable background scrub of disks and disk group to avoid running scrubs automatically.
2. Remove global spares to avoid reconstruction if the disk group status becomes `CRIT` after `trust` or if any disks fail immediately after `trust`.
3. Identify the cause for the disk group becoming offline or quarantined-offline.
4. 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.
5. 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.
6. 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.

---

7. Enable the `trust` command.
8. Run the `trust` command on the disk group.
9. 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.

### Minimum role

standard

### Syntax

```
trust
  [enable|disable]
  [disk-group <disk-group>]
  [unsafe]
```

## 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. This option should only be used with assistance from technical support.

---

## 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.
- **SSD SAS:** SAS solid-state disk.
- **SAS MDL:** Midline SAS spinning disk.

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
- **VIRTUAL POOL:** Used in a disk group

Partially Reconstructed

- **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. (2020-04-17 04:29:28)
```

```
# trust disk-group data_1
```

```
Success: Command completed successfully. (data_1) - Trust operation completed successfully for this disk group. (2020-04-17 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. (2020-04-17 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. (2020-04-17 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. (2020-04-17 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. (2020-04-17 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. (2020-04-17 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. (2020-04-17 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. (2020-04-17
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. (2020-04-17 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. (2020-04-17 17:40:01)

### See also

```
show disk-groups  
scrub disk-groups
```

# unfail controller

## Description

Allows the partner controller module to recover from a simulated failure performed with the `fail` command (which requires the `standard` 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

monitor

## Syntax

```
unfail controller
```

## Examples

From controller A, unfail the partner controller.

```
# unfail controller
```

## See also

```
fail  
show controllers  
show redundancy-mode
```

# unmap volume


## Description

Deletes 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

standard

## Syntax

```
unmap volume
  initiator <initiators>|<hosts>|<host-groups>
  <volumes>
```

## Parameters

```
initiator <initiators>|<hosts>|<host-groups>
```

Optional if default mapping is enabled. A comma-separated list of initiators, hosts, or host groups for which to delete mappings. For initiator, host, and host-group syntax, see ["Command syntax" on page 23](#). If default mapping is enabled and the `initiator` parameter is not specified, the default mapping for the volume is removed.

```
<volumes>
```

A comma-separated list of volumes to unmap. For a volume, specify its name or serial number. A name that includes a space must be enclosed in double quotes.

## Examples

Delete mappings for Host1 to volumes vol1 and vol3.

```
# unmap volume initiator Host1.* vol1,vol3
```

Delete mappings for volume vol2.

```
# unmap volume vol2
```

## See also

```
map volume
show initiators
show maps
show volumes
```

# whoami

## Description

Shows domain information for the current user.

## Minimum role

monitor

## Syntax

whoami

## Parameters

User Name

The username.

User Type

- **Local:** The user's credentials reside in the storage system.
- **LDAP:** The user's credentials reside in an Active Directory LDAP server.

Group Name

Shows the group name for an LDAP user, or *N/A* for a local user.

## Examples

Show domain information for the current user.

```
# whoami
```

## Basetypes

logon-user-detail

status

## 4 API basetype properties

The previous chapter describes command output that is shown in console mode. This chapter describes the basetype properties that CLI commands display in API mode, 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. If a property has a corresponding numeric property, the numeric property's name and data type are shown in parenthesis. For descriptions of other elements see [Table 1 on page 19](#).
- References to embedded or nested basetypes that the output may show.

### advanced-settings-table

This basetype is used by `show advanced-settings`.

**Table 8** advanced-settings-table properties

Name	Type	Description
background-scrub (background-scrub-numeric)	string (uint32)	Shows whether disks in disk groups are automatically checked for disk defects to ensure system health. <ul style="list-style-type: none"><li>• Disabled (0): Background disk-group scrub is disabled.</li><li>• Enabled (1): Background disk-group scrub is enabled.</li></ul>
background-scrub-interval	uint16	Not supported.
partner-firmware-upgrade (partner-firmware-upgrade-numeric)	string (uint32)	Shows whether component firmware versions are monitored and will be automatically updated on the partner controller. <ul style="list-style-type: none"><li>• Disabled (0): Partner firmware upgrade is disabled.</li><li>• Enabled (1): Partner firmware upgrade is enabled.</li></ul>
utility-priority (utility-priority-numeric)	string (uint32)	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.) <ul style="list-style-type: none"><li>• High (0): Utilities have higher priority than host I/O. This can cause heavy I/O to be slower than normal.</li><li>• Medium (1): Utility performance is balanced with host I/O performance.</li><li>• Low (2): Utilities run at a slower rate with minimal effect on host I/O.</li></ul>
smart (smart-numeric)	string (uint32)	Shows whether SMART (Self-Monitoring Analysis and Reporting Technology) is enabled or disabled for disks. <ul style="list-style-type: none"><li>• Detect-Only (0): Each disk in the system retains its individual SMART setting, as will new disks added to the system.</li><li>• Enabled (1): SMART is enabled for all disks in the system and will be enabled for new disks added to the system.</li><li>• Disabled (2): SMART is disabled for all disks in the system and will be disabled for new disks added to the system.</li></ul>
dynamic-spare (dynamic-spare-numeric)	string (uint32)	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. The dynamic spares feature does not apply to MSA-DP+ disk groups. <ul style="list-style-type: none"><li>• Disabled (0): The dynamic spares feature is disabled.</li><li>• Enabled (1): The dynamic spares feature is enabled.</li></ul>

**Table 8 advanced-settings-table properties (continued)**

Name	Type	Description
emp-poll-rate	string	Shows the interval in seconds at which the storage system will poll each enclosure's Enclosure Management Processor (EMP) for status changes, from 5 to 3600 seconds.
host-cache-control (host-cache-control-numeric)	string (uint32)	Shows whether hosts are allowed to use the SCSI MODE SELECT command to change the storage system's write-back cache setting. <ul style="list-style-type: none"> <li>Disabled (0): Hosts can use the SCSI MODE SELECT command to change the write-back cache setting. This is the default.</li> <li>Enabled (1): Hosts cannot override the storage system's write-back cache setting.</li> </ul>
sync-cache-mode (sync-cache-mode-numeric)	string (uint32)	Shows how the SCSI SYNCHRONIZE CACHE command is handled. <ul style="list-style-type: none"> <li>Immediate (0): Good status is returned immediately and cache content is unchanged.</li> <li>Flush to Disk (1): Good status is returned only after all write-back data for the specified volume is flushed to disk.</li> </ul>
missing-lun-response (missing-lun-response-numeric)	string (uint32)	Shows whether host drivers may probe for LUNs until the host drivers reach the LUN to which they have access. <ul style="list-style-type: none"> <li>Not Ready (0): 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.</li> <li>Illegal Request (1): Sends a reply that there is a LUN but that the request is "illegal." Sense data returned is sensekey = 5, code = 25h, qualifier = 0.</li> </ul>
controller-failure (controller-failure-numeric)	string (uint32)	Shows whether the cache policy will change from write-back to write-through when a controller fails. <ul style="list-style-type: none"> <li>Disabled (0): The controller failure trigger is disabled.</li> <li>Enabled (1): The controller failure trigger is enabled.</li> </ul>
super-cap-failure (super-cap-failure-numeric)	string (uint32)	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. <ul style="list-style-type: none"> <li>Disabled (0): The supercapacitor failure trigger is disabled.</li> <li>Enabled (1): The supercapacitor failure trigger is enabled.</li> </ul>
memory-card-failure (memory-card-failure-numeric)	string (uint32)	Shows whether the cache policy will change from write-back to write-through when the memory card is not detected during POST (Power-On Self-Test), fails during POST, or fails during controller operation. <ul style="list-style-type: none"> <li>Disabled (0): The memory-card failure trigger is disabled.</li> <li>Enabled (1): The memory-card failure trigger is enabled.</li> </ul>
power-supply-failure (power-supply-failure-numeric)	string (uint32)	Shows whether the cache policy will change from write-back to write-through when a power supply fails. <ul style="list-style-type: none"> <li>Disabled (0): The power-supply failure trigger is disabled.</li> <li>Enabled (1): The power-supply failure trigger is enabled.</li> </ul>
fan-failure (fan-failure-numeric)	string (uint32)	Shows whether the cache policy will change from write-back to write-through when a fan fails. <ul style="list-style-type: none"> <li>Disabled (0): The fan failure trigger is disabled.</li> <li>Enabled (1): The fan failure trigger is enabled.</li> </ul>
temperature-exceeded (temperature-exceeded-numeric)	string (uint32)	Shows whether the system will shut down a controller when its temperature exceeds the critical operating range. <ul style="list-style-type: none"> <li>Disabled (0): The over-temperature trigger is disabled.</li> <li>Enabled (1): The over-temperature trigger is enabled.</li> </ul>
partner-notify (partner-notify-numeric)	string (uint32)	Shows whether the partner controller will be notified when a trigger condition occurs. <ul style="list-style-type: none"> <li>Disabled (0): Notification is disabled. The partner controller will continue using its current caching mode.</li> <li>Enabled (1): Notification is enabled. The partner controller will change to write-through mode for better data protection.</li> </ul>

**Table 8 advanced-settings-table properties (continued)**

Name	Type	Description
auto-write-back (auto-write-back-numeric)	string (uint32)	Shows whether the cache policy will change from write-through to write-back when the trigger condition is cleared. <ul style="list-style-type: none"> <li>Disabled (0): Auto-write-back is disabled.</li> <li>Enabled (1): Auto-write-back is enabled.</li> </ul>
disk-dsd-enable (disk-dsd-enable-numeric)	string (uint32)	Shows whether spinning disks that are available or are global spares will spin down after a period of inactivity shown by the <code>disk-dsd-delay</code> property. <ul style="list-style-type: none"> <li>Disabled (0): Drive spin down for available disks and global spares is disabled.</li> <li>Enabled (1): Drive spin down for available disks and global spares is enabled.</li> </ul>
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.
managed-logs (managed-logs-numeric)	string (uint32)	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. <ul style="list-style-type: none"> <li>Disabled (0): The managed logs feature is disabled.</li> <li>Enabled (1): The managed logs feature is enabled.</li> </ul>
single-controller (single-controller-numeric)	string (uint32)	Not supported.
disk-protection-info (disk-protection-info-numeric)	string (uint32)	Not supported.
auto-stall-recovery (auto-stall-recovery-numeric)	string (uint32)	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. <ul style="list-style-type: none"> <li>Disabled (0): Auto stall recovery is disabled.</li> <li>Enabled (1): Auto stall recovery is enabled.</li> </ul>
delete-override (delete-override-numeric)	string (uint32)	Not supported.
restart-on-capi-fail (restart-on-capi-fail-numeric)	string (uint32)	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 <b>Maintenance &gt; Support &gt; Collect Logs</b> panel in the SMU. <ul style="list-style-type: none"> <li>Disabled (0): The Storage Controller is not forced to restart.</li> <li>Enabled (1): The Storage Controller is forced to restart.</li> </ul>
large-pools (large-pools-numeric)	string (uint32)	Deprecated.
ssd-concurrent-access (ssd-concurrent-access-numeric)	string (uint32)	Not supported.
slot-affinity (slot-affinity-numeric)	string (uint32)	Not supported.
random-io-performance-optimization (random-io-performance-optimization-numeric)	string (uint32)	Shows whether random I/O performance optimization is enabled or disabled. <ul style="list-style-type: none"> <li>Disabled (0)</li> <li>Enabled (1)</li> </ul>

**Table 8 advanced-settings-table properties (continued)**

Name	Type	Description
cache-flush-timeout (cache-flush-timeout-numeric)	string (uint32)	Shows whether the cache flush timeout is enabled or disabled. <ul style="list-style-type: none"> <li>Disabled (0)</li> <li>Enabled (1)</li> </ul>
remanufacture (remanufacture-numeric)	string (uint32)	Not supported.
hedged-reads-timeout (hedged-reads-timeout-numeric)	string (uint32)	Shows the waiting period for read requests before the hedged reads feature triggers. This feature reduces latency for read requests by using RAID parity information to reconstruct requested data if the read wait period is exceeded. Levels are: <ul style="list-style-type: none"> <li>0: Disabled. The hedged reads method is not used.</li> <li>1: 1.75 seconds wait time. This setting is the default.</li> <li>2: 2.25 seconds wait time.</li> <li>3: 2.75 seconds wait time.</li> <li>4: 3.25 seconds wait time.</li> </ul> All wait times are approximations.
auto-map (auto-map-numeric)	string (uint32)	Not supported.
auto-unmap (auto-unmap-numeric)	string (uint32)	Not supported.
default-mapping (default-mapping-numeric)	string (uint32)	Shows whether default mapping is enabled or disabled. <ul style="list-style-type: none"> <li>Disabled (0)</li> <li>Enabled (1)</li> </ul>
slow-disk-detection (slow-disk-detection-numeric)	string (uint32)	Shows whether slow-disk detection is enabled or disabled. <ul style="list-style-type: none"> <li>Disabled (0): Slow-disk detection is disabled.</li> <li>Enabled (1): Slow-disk detection is enabled.</li> </ul>
scrub-schedule (scrub-schedule-numeric)	string (uint32)	Shows whether disk-group scrub runs only when scheduled. <ul style="list-style-type: none"> <li>Disabled (0)</li> <li>Enabled (1)</li> </ul>
disk-firmware-update (disk-firmware-update-numeric)	string (uint32)	Not supported.

## alerts

This basetype is used by `show alerts`.

**Table 9 alerts properties**

Name	Type	Description
id	uint32	Alert sequence number.
component	string	Component name.
serial-number	string	Component serial number.
description	string	Component description.
durable-id	string	Unique alert ID.
condition-id	string	Unique condition ID.



**Table 9 alerts properties (continued)**

Name	Type	Description
severity (severity-numeric)	string (uint32)	Alert severity. <ul style="list-style-type: none"> <li>INFORMATIONAL (0): The system configuration does not match recommendations. No change is required, but for optimal system performance and security, you should resolve the issue.</li> <li>WARNING (1): A problem occurred that may affect system stability or performance but not data integrity. Evaluate the problem and correct it if necessary.</li> <li>CRITICAL (3): A failure occurred that may cause a controller to shut down or could affect data integrity or system stability. Correct the problem <i>immediately</i>.</li> <li>UNKNOWN (4294967295): The system is unable to determine the state of a component. In some configurations, this situation is normal. In other situations, resolving other system issues should resolve this issue as well.</li> </ul>
resolved (resolved-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>No (0): The alert condition is not resolved.</li> <li>Yes (1): The alert condition is resolved.</li> </ul>
acknowledged (acknowledged-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>No (0): The alert has not been acknowledged.</li> <li>Yes (1): The alert has been acknowledged.</li> </ul>
acknowledged-by	string	Username that acknowledged the alert.
acknowledged-time (acknowledged-time-numeric)	string (uint32)	Date and time when the alert was acknowledged. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
detected-time (detected-time-numeric)	string (uint32)	The most recent date and time when the alert condition was detected. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
resolved-time (resolved-time-numeric)	string (uint32)	Date and time when the alert condition was resolved. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00. If unresolved, N/A (0).
reminder-time (reminder-time-numeric)	string (uint32)	Not supported.
hit-count	uint32	Number of times an alert has occurred without being acknowledged.
basetype	string	Basetype of the component.
health (health-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>OK (0)</li> <li>Fault (2)</li> <li>N/A (4)</li> </ul>
reason (reason-numeric)	string (uint32)	A message describing the alert condition. The numeric property shows the message ID.
reason-id	uint32	Not used.
recommended-action (recommended-action-numeric)	string (uint32)	A message specifying the recommended action to take to resolve the alert condition. The numeric property shows the message ID.

## audit-log

This basetype is used by `show audit-log`.

**Table 10** audit-log properties

Name	Type	Description
audit-log	string	Audit log entry, specifying the date, time, user action, and other details.

## 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	The volume serial number.
volume-name	string	The volume name.
write-policy (write-policy-numeric)	string (uint32)	The volume's cache write policy. <ul style="list-style-type: none"><li>• <code>write-back (0)</code>: 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.</li><li>• <code>write-through (1)</code>: 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.</li></ul>
cache-optimization (cache-optimization-numeric)	string (uint32)	The volume's cache optimization mode. <ul style="list-style-type: none"><li>• <code>standard (0)</code>: 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.</li><li>• <code>cache-hit (4)</code>: This controller cache mode of operation is optimized for workloads that are localized—that is, a substantial percentage of all accesses are hits in the controller's cache. In this mode, the cache is kept coherent with the partner controller.</li></ul>
read-ahead-size (read-ahead-size-numeric)	string (uint32)	The volume's read-ahead cache setting. <ul style="list-style-type: none"><li>• <code>Disabled (0)</code>: Read-ahead is disabled.</li><li>• <code>Adaptive (-1)</code>: Adaptive read-ahead is enabled, which allows the controller to dynamically calculate the optimum read-ahead size for the current workload.</li><li>• <code>Stripe (-2)</code>: 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 512KB, even though they are not striped.</li><li>• 512 KB (524288)</li><li>• 1 MB (1048576)</li><li>• 2 MB (2097152)</li><li>• 4 MB (4194304)</li><li>• 8 MB (8388608)</li><li>• 16 MB (16777216)</li><li>• 32 MB (33554432)</li></ul>

## 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 (operation-mode-numeric)	string (uint32)	The system's operating mode, also called the cache redundancy mode. <ul style="list-style-type: none"><li>Active-Active ULP (2): 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.</li><li>Failed Over (4): Operation has failed over to one controller because its partner is not operational. The system has lost redundancy.</li><li>Down (5): Both controllers are not operational.</li></ul>
pi-format (pi-format-numeric)	string (uint32)	Not supported.
cache-block-size	uint16	512 Bytes
controller-cache-parameters	Embedded; see controller-cache-parameters.	

## certificates

This basetype is used by `show certificates`.

**Table 13** certificates properties

Name	Type	Description
certificate-name	string	The name of the certificate, either system-generated or user-supplied when the certificate is uploaded to the system.
certificate-type (certificate-type-numeric)	string (uint32)	Shows the certificate type. <ul style="list-style-type: none"><li>Device-Cert (0): Designation for server or device certificates.</li><li>Trust-Cert (1): Designation for trusted root or intermediate certificates.</li></ul>
certificate-controller (certificate-controller-numeric)	string (uint32)	The controller on which the certificate is installed. <ul style="list-style-type: none"><li>B (0): Controller B.</li><li>A (1): Controller A.</li></ul>
certificate-active-services	string	Displays the service that is actively using the certificate, if any.
certificate-service-web	string	Displays an x if the certificate is currently active for the web service. Otherwise, the value is blank.
certificate-service-wpa	string	Not supported.
certificate-service-ldap	string	Not supported.
certificate-identity-short	string	Not supported.
certificate-identity	string	Identity provided when the certificate was added to the system.
certificate-valid-from	string	The certificate start date.

**Table 13 certificates properties (continued)**

Name	Type	Description
certificate-valid-till	string	The certificate expiration date.
certificate-issued-to	string	The name or organization the certificate was granted to.
certificate-issued-by	string	The organization or entity that granted the certificate.
certificate-state (certificate-state-numeric)	string (uint32)	The current status of the certificate. <ul style="list-style-type: none"> <li>Unavailable (0)</li> <li>Available (1)</li> </ul>
certificate-status (certificate-status-numeric)	string (uint32)	The source of the certificate. <ul style="list-style-type: none"> <li>Unknown status (0): The origin of the certificate cannot be determined.</li> <li>Customer-supplied (1): The certificate was uploaded by the end user.</li> <li>System-generated (2): The certificate was generated by the system.</li> </ul>
certificate-default-services	string	Displays any service associated with the certificate by default, or N/A
certificate-text	string	Displays the certificate content as text.

## 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.

## ciphers

This basetype is used by `show ciphers`.

**Table 15 ciphers properties**

Name	Type	Description
ciphers	string	Active, user-supplied, and default cipher lists.

# cli-parameters

This basetype is used by show cli-parameters.

**Table 16 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 to 43200 seconds (2 to 720 minutes).
output-format	string	<ul style="list-style-type: none"> <li>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.</li> <li>api: Supports scripting by displaying command output in XML. All objects are displayed at the same level, related by COMP elements.</li> <li>api-embed: Alternate form of XML output which displays "child" objects embedded (indented) under "parent" objects.</li> <li>ipa: Alternate form of XML output which displays like api-embed format with brief mode enabled.</li> <li>json: Standard JavaScript Object Notation (JSON) output.</li> <li>wbi: A JSON-like format used internally by the SMU.</li> </ul>
output-format-api (output-format-api-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Console (1)</li> <li>api (2)</li> <li>api-brief (3)</li> <li>api-embed (4)</li> <li>api-embed-brief (5)</li> <li>json (6)</li> <li>json-full (7)</li> </ul>
brief-mode (brief-mode-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Disabled (0): In XML output, this setting shows all attributes of object properties.</li> <li>Enabled (1): In XML output, this setting shows a subset of attributes of object properties. The name and type attributes are always shown.</li> </ul>
base	uint8	Alias for storage-size-base.
pager (pager-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Disabled (0): Output is not halted. When displaying output in API format, which is intended for scripting, disable paging.</li> <li>Enabled (1): Halts output after each full screen to wait for keyboard input.</li> </ul>
locale (locale-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>English (0)</li> <li>Spanish (3)</li> <li>French (4)</li> <li>German (5)</li> <li>Italian (6)</li> <li>Japanese (7)</li> <li>Korean (8)</li> <li>Dutch (9)</li> <li>Chinese-simplified (11)</li> <li>Chinese-traditional (12)</li> </ul>
storage-size-base	uint8	<p>Base for entry and display of storage-space sizes.</p> <ul style="list-style-type: none"> <li>2: Sizes are shown as powers of 2, using 1024 as a divisor for each magnitude.</li> <li>10: Sizes are shown as powers of 10, using 1000 as a divisor for each magnitude.</li> </ul> <p>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.</p>
storage-size-precision	uint8	Number of decimal places (1 to 10) for display of storage-space sizes.

**Table 16 cli-parameters properties (continued)**

Name	Type	Description
storage-size-units (storage-size-units-numeric)	string (uint32)	Unit for display of storage-space sizes. <ul style="list-style-type: none"> <li>• Auto (0): Lets the system determine the proper unit for a size.</li> <li>• MB (1): Sizes are shown in megabytes.</li> <li>• GB (2): Sizes are shown in gigabytes.</li> <li>• TB (3): Sizes are shown in terabytes.</li> </ul> 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 0.11709TB is instead shown as 117.1GB.
temperature-scale (temperature-scale-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• Fahrenheit (0): Temperatures are shown in degrees Fahrenheit.</li> <li>• Celsius (1): Temperatures are shown in degrees Celsius.</li> </ul>
user-type (user-type-numeric)	string (uint32)	The logged-in user's experience level. <ul style="list-style-type: none"> <li>• Novice (1)</li> <li>• Standard (2)</li> <li>• Advanced (3)</li> <li>• Diagnostic (4)</li> </ul>
username	string	The logged-in user name.
usergroupname	string	The logged-in user group name. Shows the real name for an LDAP user or undefined for a local user.

## code-load-readiness

This basetype is used by check firmware-upgrade-health.

**Table 17 code-load-readiness properties**

Name	Type	Description
overall-health (overall-health-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• Pass (0): There are no risks to performing firmware upgrade.</li> <li>• Fail (1): At least one condition exists that presents a risk of upgrade failure or loss of availability.</li> </ul>
code-load-readiness-reasons	Embedded; see code-load-readiness-reasons.	

## code-load-readiness-reasons

This basetype is used by check firmware-upgrade-health.

**Table 18 code-load-readiness-reasons properties**

Name	Type	Description
readiness-reason	string	The condition that was detected.
failure-risks (failure-risks-numeric)	string (uint32)	The problems that are likely to result if you do not resolve the conditions before performing a firmware upgrade. The numeric property shows a corresponding numeric value.

## communication-ports

This basetype is used by show protocols.

**Table 19 communication-ports properties**

Name	Type	Description
ssh-port	uint16	The port number used for SSH.
sftp-port	uint16	The port number used for SFTP.

## conditions

This basetype is used by show alert-condition-history.

**Table 20 conditions properties**

Name	Type	Description
id	uint32	Alert condition sequence number.
severity (severity-numeric)	string (uint32)	Event severity. <ul style="list-style-type: none"><li>• INFORMATIONAL (0): The system configuration does not match recommendations. No change is required, but for optimal system performance and security, you should resolve the issue.</li><li>• WARNING (1): A problem occurred that may affect system stability or performance but not data integrity. Evaluate the problem and correct it if necessary.</li><li>• CRITICAL (3): A failure occurred that may cause a controller to shut down or could affect data integrity or system stability. Correct the problem <i>immediately</i>.</li><li>• UNKNOWN (4294967295): The system is unable to determine the state of a component. In some configurations, this situation is normal. In other situations, resolving other system issues should resolve this issue as well.</li></ul>
component	string	Component name.
index	uint32	For internal use only.
resolved (resolved-numeric)	string (uint32)	<ul style="list-style-type: none"><li>• No (0): The alert condition is not resolved.</li><li>• Yes (1): The alert condition is resolved.</li></ul>
detected-time (detected-time-numeric)	string (uint32)	The most recent date and time when the alert condition was detected. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
resolved-time (resolved-time-numeric)	string (uint32)	Date and time when the alert condition was resolved. N/A if unresolved. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00. (0) if unresolved.
reason (reason-numeric)	string (uint32)	A message describing the alert condition. The numeric property shows the message ID.
reason-id	uint32	Not used.

## controller-cache-parameters

This basetype is used by `show cache-parameters` to show controller cache properties.

**Table 21 controller-cache-parameters properties**

Name	Type	Description
durable-id	string	<ul style="list-style-type: none"><li> cache-params-a: Cache parameters for controller A.</li><li> cache-params-b: Cache parameters for controller B.</li></ul>
controller-id (controller-id-numeric)	string (uint32)	<ul style="list-style-type: none"><li> B (0): Controller B.</li><li> A (1): Controller A.</li></ul>
name	string	<ul style="list-style-type: none"><li> Controller A Cache Parameters</li><li> Controller B Cache Parameters</li></ul>
write-back-status (write-back-status-numeric)	string (uint32)	<p>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 fan 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.</p> <ul style="list-style-type: none"><li> Enabled (0): Write-back. This is the normal state.</li><li> Disabled (1): Write-through.</li><li> Not up (2): The controller is not up.</li></ul>
memory-card-status (memory-card-status-numeric)	string (uint32)	<ul style="list-style-type: none"><li> Not Installed (0): The memory card is not installed.</li><li> Installed (1): The memory card is installed.</li><li> Unknown (2): The memory card's status is unknown.</li></ul>
memory-card-health (memory-card-health-numeric)	string (uint32)	<ul style="list-style-type: none"><li> OK (0)</li><li> Degraded (1)</li><li> Fault (2)</li><li> Unknown (3)</li><li> N/A (4)</li></ul>
cache-flush (cache-flush-numeric)	string (uint32)	<ul style="list-style-type: none"><li> Disabled (0): Cache flush is disabled.</li><li> Enabled (1): If the controller loses power, it will automatically write cache data to the memory card. Cache flush is normally enabled, but is temporarily disabled during controller shut down.</li></ul>

## controller-statistics

This basetype is used by `show controller-statistics`.

**Table 22 controller-statistics properties**

Name	Type	Description
durable-id	string	<ul style="list-style-type: none"><li> controller_A</li><li> controller_B</li></ul>
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%.



**Table 22 controller-statistics properties (continued)**

Name	Type	Description
bytes-per-second (bytes-per-second-numeric)	string (uint64)	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. The numeric property shows the unformatted value in blocks.
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.
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 (data-read-numeric)	string (uint64)	Amount of data read since these statistics were last reset or since the controller was restarted. The numeric property shows the unformatted value in blocks.
data-written (data-written-numeric)	string (uint64)	Amount of data written since these statistics were last reset or since the controller was restarted. The numeric property shows the unformatted value in blocks.
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 (reset-time-numeric)	string (uint32)	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. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
start-sample-time (start-sample-time-numeric)	string (uint32)	Date and time, in the format <year>-<month>-<day> <hour>:<minutes>:<seconds>, when sampling started for the iops and bytes-per-second values. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
stop-sample-time (stop-sample-time-numeric)	string (uint32)	Date and time, in the format <year>-<month>-<day> <hour>:<minutes>:<seconds>, when sampling stopped for the iops and bytes-per-second values. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
total-power-on-hours	string	The total amount of hours the controller has been powered on in its life time.

## controllers

This basetype is used by `show configuration` and `show controllers`.

**Table 23 controllers properties**

Name	Type	Description
durable-id	string	<ul style="list-style-type: none"> <li> controller_a </li> <li> controller_b </li> </ul>
controller-id (controller-id-numeric)	string (uint32)	<ul style="list-style-type: none"> <li> B (0): Controller B. </li> <li> A (1): Controller A. </li> </ul>
url	string	For internal use only.
serial-number	string	<ul style="list-style-type: none"> <li> Serial number. </li> <li> Not Available: The controller module is down or not installed. </li> </ul>
hardware-version	string	Hardware version.
cpld-version	string	Complex Programmable Logic Device (CPLD) firmware version.
mac-address	string	Network port MAC address.
node-wwn	string	Storage system World Wide Node Name (WWNN).
ip-address	string	Network port IP address.
ip-subnet-mask	string	Network port IP subnet mask.
ip-gateway	string	Network port gateway IPv4 address.
ip6-link-local-address	string	The link-local IPv6 address.
ip6-link-local-gateway	string	The network port gateway IPv6 address.
autoconfig (autoconfig-numeric)	string (uint32)	<ul style="list-style-type: none"> <li> Disabled (0): Uses static IPv6 addresses set with the <code>add ipv6-address</code> command. </li> <li> Enabled (1): Uses an IPv6 address computed by SLAAC or assigned by a DHCPv6 server, depending on the network configuration. If a DHCPv6 address is available, then that address is used. Otherwise SLAAC is used. </li> </ul>
ip6-auto-address	string	The controller's automatically configured IPv6 address, when applicable.
dhcpv6	string	The IP address assigned by a DHCPv6 server.
slaac-ip	string	The IP address computed by SLAAC.
ip6-auto-address-source (ip6-auto-address-source-numeric)	string (uint32)	The method used to assign or compute the address, when applicable. <ul style="list-style-type: none"> <li> DHCPv6 (0) </li> <li> IPv6 SLAAC (1) </li> </ul>
ip6-auto-gateway	string	The IPv6 address of a gateway system (auto-discovered, not configured).
ip61-address	string	From one to four pairs of manually set IPv6 addresses and network-port gateway IPv6 addresses.
ip61-gateway	string	
ip62-address	string	
ip62-gateway	string	
ip63-address	string	
ip63-gateway	string	
ip64-address	string	
ip64-gateway	string	

**Table 23 controllers properties (continued)**

Name	Type	Description
disks	uint32	Number of disks in the storage system.
number-of-storage-pools	uint32	Number of 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 enclosure.
drive-bus-type (drive-bus-type-numeric)	string (uint32)	Controller interface to disks. <ul style="list-style-type: none"> <li>SAS (8)</li> </ul>
status (status-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Operational (0)</li> <li>Down (1)</li> <li>Not installed (2)</li> <li>Unknown (4)</li> </ul>
failed-over (failed-over-numeric)	string (uint32)	Indicates whether the partner controller has failed over to this controller. <ul style="list-style-type: none"> <li>No (0): The partner controller has not failed over to this controller.</li> <li>Yes (1): 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 <code>status</code> property becomes <code>Down</code> for one controller and the time that the value of the <code>failed-over</code> property becomes <code>Yes</code> for the other controller. This time period is the time that it takes for a controller to take over the responsibilities of its partner.</li> </ul>
fail-over-reason (fail-over-reason-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>If <code>failed-over</code> is <code>No</code> (0), <code>Not applicable</code> (0) appears.</li> <li>If <code>failed-over</code> is <code>Yes</code> (1), a message describes the reason. The numeric property shows the message ID.</li> </ul>
sc-fw	string	Storage Controller firmware version.
vendor	string	Controller manufacturer.
model	string	Controller model.
platform-type (platform-type-numeric)	string (uint32)	Enclosure platform type. The numeric property shows a corresponding numeric value.
multicore (multicore-numeric)	string (uint32)	Shows whether the controller module is using multiple application processing cores. <ul style="list-style-type: none"> <li>Enabled (0): Multiple cores are active.</li> <li>Disabled (1): A single core is active.</li> </ul>
sc-cpu-type	string	Storage Controller processor type.
sc-cpu-speed	uint32	Storage Controller processor speed.
internal-serial-number	string	Internal serial number of the controller.
cache-lock (cache-lock-numeric)	string (uint32)	Shows whether hosts are prevented from using the <code>SCSI MODE SELECT</code> command to change the storage system's write-back cache setting. <ul style="list-style-type: none"> <li>No (0): Hosts are permitted to disable write-back cache.</li> <li>Yes (1): Hosts are prevented from disabling write-back cache.</li> </ul>

**Table 23 controllers properties (continued)**

Name	Type	Description
write-policy (write-policy-numeric)	string (uint32)	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 fan 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. <ul style="list-style-type: none"> <li>write-back (0): This is the normal state.</li> <li>write-through (1)</li> <li>Not up (2): The controller is not up.</li> </ul>
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 (mfg-date-numeric)	string (uint32)	Date and time, in the format <year>-<month>-<day> <hour>:<minutes>:<seconds> (UTC), when the controller's PCBA was programmed. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
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 (locator-led-numeric)	string (uint32)	Shows the state of the locator LED on a controller module. <ul style="list-style-type: none"> <li>Off (0)</li> <li>On (1)</li> </ul>
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.
health (health-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>OK (0)</li> <li>Degraded (1)</li> <li>Fault (2)</li> <li>Unknown (3)</li> <li>N/A (4)</li> </ul>
health-reason	string	If Health is not OK, a message describes the reason for the health state.
health-recommendation	string	If Health is not OK, a message describes recommended actions to resolve the issue.
position (position-numeric)	string (uint32)	Position of the controller module, as viewed from the back of the enclosure. <ul style="list-style-type: none"> <li>Top (2)</li> <li>Bottom (3)</li> </ul>
rotation (rotation-numeric)	string (uint32)	Rotation of the controller module in the enclosure. <ul style="list-style-type: none"> <li>0 Degrees (0)</li> <li>90 Degrees (1)</li> <li>180 Degrees (2)</li> <li>270 Degrees (3)</li> </ul>
phy-isolation (phy-isolation-numeric)	string (uint32)	Shows whether the automatic disabling of SAS expander PHYs having high error counts is enabled or disabled for this controller. <ul style="list-style-type: none"> <li>Enabled (0): PHY fault isolation is enabled.</li> <li>Disabled (1): PHY fault isolation is disabled.</li> </ul>

**Table 23 controllers properties (continued)**

Name	Type	Description
redundancy-mode (redundancy-mode-numeric)	string (uint32)	The system's operating mode, also called the cache redundancy mode. <ul style="list-style-type: none"> <li>Active-Active ULP (8): 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.</li> <li>Failed Over (10): Operation has failed over to one controller because its partner is not operational. The system has lost redundancy.</li> <li>Down (11): Both controllers are not operational.</li> </ul>
redundancy-status (redundancy-status-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Redundant (2): Both controllers are operational</li> <li>Operational but not redundant (0): In active-active mode, one controller is operational and the other is offline.</li> <li>Down (4): This controller is not operational.</li> <li>Unknown (5): Status information is not available.</li> </ul>
conditions	Embedded; see health-conditions.	
unhealthy-component	Embedded; see unhealthy-component.	
ip-address	Embedded; see network-parameters.	
port-details	Embedded; see port.	
enclosure-id	Embedded; see expander-ports.	
expander-details	Embedded; see expanders.	

## copy-volumes

This basetype is used by `show volume-copies`.

**Table 24 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 (source-type-numeric)	string (uint32)	The type of the source volume. <ul style="list-style-type: none"> <li>Virtual (1)</li> </ul>
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 (destination-type-numeric)	string (uint32)	The type of the destination volume. <ul style="list-style-type: none"> <li>Virtual (1)</li> </ul>
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 tasks` for a `Replicate` task.

**Table 25** 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.
replicate-last-snapshot (replicate-last-snapshot-numeric)	string (uint32)	<ul style="list-style-type: none"><li>False (0): The primary volume will be replicated.</li><li>True (1): The most recent snapshot of the primary volume will be replicated.</li></ul>

## cs-replication

This basetype is used by `show replication-sets`.

**Table 26** cs-replication properties

Name	Type	Description
replication-state (replication-state-numeric)	string (uint32)	<ul style="list-style-type: none"><li>Last Run (0)</li><li>Current Run (1)</li></ul>
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 percent complete of the active replication. Otherwise, N/A.
total-data-transferred (total-data-transferred-numeric)	string (uint64)	The total number of bytes transferred. The numeric property shows the unformatted value in blocks.
collection-time (collection-time-numeric)	uint32 (uint32)	The date and time when the replication data shown by this command was collected. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
time-start (time-start-numeric)	string (uint32)	The date and time when the replication started. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
time-end (time-end-numeric)	string (uint32)	For the last run, the date and time when the replication ended. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
estimated-time-completion (estimated-time-completion-numeric)	string (uint32)	For the current run, the date and time when the replication is estimated to end. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
most-recent-suspend-time (most-recent-suspend-time-numeric)	string (uint32)	The most recent time that the replication was suspended. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
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 replication set.

**Table 27 cs-replication-set properties**

Name	Type	Description
name	string	The replication set name.
serial-number	string	The replication set serial number.
group (group-numeric)	string (uint32)	<ul style="list-style-type: none"><li>No (0): The replication set is not part of a group.</li><li>Yes (1): The replication set is part of a group.</li></ul>
primary-location (primary-location-numeric)	string (uint32)	The location of the primary volume in the replication set. <ul style="list-style-type: none"><li>remote (0)</li><li>local (1)</li></ul>
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.
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 (sync-job-active-numeric)	string (uint32)	<ul style="list-style-type: none"><li>False (0): No replication is in progress on the replication set.</li><li>True (1): A replication is currently in progress on the replication set.</li></ul>
queue-policy (queue-policy-numeric)	string (uint32)	The action to take when a replication is running and a new replication is requested. <ul style="list-style-type: none"><li>None (0): Take no action.</li><li>Discard (1): Discard the new replication request.</li><li>Queue Latest (2): 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.</li></ul>
queue-count	uint8	The number of queued replications for the replication set: either 0 or 1.
snapshot-history (snapshot-history-numeric)	string (uint32)	Specifies whether to maintain a replication snapshot history for the replication set. <ul style="list-style-type: none"><li>disabled (0): A snapshot history will not be kept.</li><li>secondary (1): A snapshot history set will be kept on the secondary system for the secondary volume.</li><li>both (2): A snapshot history will be kept for the primary volume on the primary system and for the secondary volume on the secondary system.</li></ul>
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 27 cs-replication-set properties (continued)**

Name	Type	Description
retention-priority (retention-priority-numeric)	string (uint32)	The retention priority for snapshots, which is used when automatic deletion of snapshots is enabled by using the <code>set snapshot-space</code> 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. <ul style="list-style-type: none"> <li><code>never-delete (0)</code>: Snapshots will never be deleted automatically to make space. The oldest snapshot in the snapshot history will be deleted once the <code>snapshot-count</code> value has been exceeded.</li> <li><code>low (1)</code>: Snapshots can be deleted.</li> <li><code>medium (2)</code>: Snapshots can be deleted after all eligible low-priority snapshots have been deleted.</li> <li><code>high (3)</code>: Snapshots can be deleted after all eligible medium-priority snapshots have been deleted.</li> </ul>
status (status-numeric)	string (uint32)	<ul style="list-style-type: none"> <li><code>Not Ready (1)</code>: The replication set is not ready for replications because the system is still preparing the replication set.</li> <li><code>Unsynchronized (2)</code>: The primary and secondary volumes are unsynchronized because the system has prepared the replication set, but the initial replication has not run.</li> <li><code>Running (3)</code>: A replication is in progress.</li> <li><code>Ready (4)</code>: The replication set is ready for a replication.</li> <li><code>Suspended (5)</code>: Replications have been suspended.</li> <li><code>Failed Over (6)</code>: The replication set's secondary system has allowed direct access to the secondary volume or volume group because the primary system is not operational. In this state no replications will occur, even if the primary system becomes operational and communication is restored.</li> <li><code>Unknown (7)</code>: 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.</li> </ul>
failback-in-progress (failback-in-progress-numeric)	string (uint32)	<ul style="list-style-type: none"> <li><code>False (0)</code>: The failback-restore process is complete on both systems.</li> <li><code>True (1)</code>: A failback-restore process for this replication set has started and is in progress.</li> </ul>
failback-sync-complete (failback-sync-complete-numeric)	string (uint32)	<ul style="list-style-type: none"> <li><code>False (0)</code>: Synchronization is not complete after replication-set failback.</li> <li><code>True (1)</code>: Synchronization is complete after replication-set failback.</li> </ul>
last-success-time (last-success-time-numeric)	string (uint32)	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. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
last-success-generation	sint32	The number of times a replication has successfully completed.
last-run-status (last-run-status-numeric)	string (uint32)	The status of the last attempted replication. <ul style="list-style-type: none"> <li><code>N/A (0)</code>: The replication has not yet completed.</li> <li><code>Success (1)</code>: The replication completed successfully.</li> <li><code>Fail (2)</code>: The replication failed.</li> </ul>
estimated-time-completion (estimated-time-completion-numeric)	string (uint32)	For the current run, the date and time when the replication is estimated to end. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00. If no replication is in progress, <code>N/A (0)</code> .
previous-replication-run	Embedded; see <code>cs-replication</code> .	



**Table 27 cs-replication-set properties (continued)**

Name	Type	Description
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 28 current-replication-snapshots properties**

Name	Type	Description
serial-number	string	The snapshot serial number.
name	string	The snapshot name.
creation-date-time (creation-date-time-numeric)	string (uint32)	The date and time when the snapshot was prepared or committed. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
snap-data (snap-data-numeric)	string (uint64)	The total amount of write data associated with the snapshot. The numeric property shows the unformatted value in blocks.
uniquedata (uniquedata-numeric)	string (uint64)	The amount of write data that is unique to the snapshot. The numeric property shows the unformatted value in blocks.
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 29 debug-log-parameters properties**

Name	Type	Description
host-dbg (host-dbg-numeric)	string (uint32)	Shows whether host interface debug messages are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>
disk (disk-numeric)	string (uint32)	Shows whether disk interface debug messages are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>
mem (mem-numeric)	string (uint32)	Shows whether internal memory debug messages are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>
fo (fo-numeric)	string (uint32)	Shows whether failover and recovery debug messages are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>

**Table 29 debug-log-parameters properties (continued)**

Name	Type	Description
msg (msg-numeric)	string (uint32)	Shows whether inter-controller message debug messages are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>
ioa (ioa-numeric)	string (uint32)	Shows whether standard debug messages for an I/O interface driver are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>
iob (iob-numeric)	string (uint32)	Shows whether resource-count debug messages for an I/O interface driver are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>
ioc (ioc-numeric)	string (uint32)	Shows whether upper-layer, verbose debug messages for an I/O interface driver are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>
iod (iod-numeric)	string (uint32)	Shows whether lower-layer, verbose debug messages for an I/O interface driver are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>
misc (misc-numeric)	string (uint32)	Shows whether internal debug messages are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>
host2 (host2-numeric)	string (uint32)	Shows whether host/SCSI debug messages are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>
raid (raid-numeric)	string (uint32)	Shows whether RAID debug messages are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>
cache (cache-numeric)	string (uint32)	Shows whether cache debug messages are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>
emp (emp-numeric)	string (uint32)	Shows whether Enclosure Management Processor debug messages are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>
capi (capi-numeric)	string (uint32)	Shows whether Internal Configuration API debug messages are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>

**Table 29 debug-log-parameters properties (continued)**

<b>Name</b>	<b>Type</b>	<b>Description</b>
mui (mui-numeric)	string (uint32)	Shows whether internal service interface debug messages are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>
bkcfg (bkcfg-numeric)	string (uint32)	Shows whether internal configuration debug messages are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>
awt (awt-numeric)	string (uint32)	Shows whether debug messages for auto-write-through cache triggers are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>
res2 (res2-numeric)	string (uint32)	Shows whether internal debug messages are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>
capi2 (capi2-numeric)	string (uint32)	Shows whether Internal Configuration API tracing messages are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled. This is the default.</li> <li>On (1): Enabled.</li> </ul>
dms (dms-numeric)	string (uint32)	Not supported.
fruid (fruid-numeric)	string (uint32)	Shows whether FRU ID debug messages are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>
resmgr (resmgr-numeric)	string (uint32)	Shows whether Reservation Manager debug messages are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>
init (init-numeric)	string (uint32)	Shows whether host-port initiator mode debug messages are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>
ps (ps-numeric)	string (uint32)	Shows whether paged storage debug messages are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>
cache2 (cache2-numeric)	string (uint32)	Shows whether extra cache debugging messages that may occur frequently enough to fill logs are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>
rtm (rtm-numeric)	string (uint32)	Shows whether Remote Target Manager debug messages are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>

**Table 29 debug-log-parameters properties (continued)**

Name	Type	Description
hb (hb-numeric)	string (uint32)	Shows whether inter-controller heartbeat debug messages are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>
autotest (autotest-numeric)	string (uint32)	Shows whether auto-test debug messages are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>
cs (cs-numeric)	string (uint32)	Shows whether Copy Services feature debug messages are enabled for inclusion in the Storage Controller debug log. <ul style="list-style-type: none"> <li>Off (0): Disabled.</li> <li>On (1): Enabled.</li> </ul>

## disk-groups

This basetype is used by `show configuration`, `show disk-groups`, and `show pools`.

**Table 30 disk-groups properties**

Name	Type	Description
name	string	The name of the disk group.
url	string	For internal use only.
blocksize	uint32	The size of a block, in bytes.
size (size-numeric)	string (uint64)	The capacity of the disk group, formatted to use the current base, precision, and units. The numeric property shows the unformatted value in blocks.
freespace (freespace-numeric)	string (uint64)	The amount of free space in the disk group, formatted to use the current base, precision, and units. The numeric property shows the unformatted value in blocks.
raw-size (raw-size-numeric)	string (uint64)	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. The numeric property shows the unformatted value in blocks.
storage-type (storage-type-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Virtual (1): The disk group is in a virtual pool.</li> </ul>
pool	string	The name of the pool that contains the disk group.
pools-url	string	For internal use only.
pool-serial-number	string	The serial number of the pool that contains the disk group.
storage-tier (storage-tier-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>N/A (0)</li> <li>Performance (1): The disk group is in the highest storage tier, which uses SSDs (high speed).</li> <li>Standard (2): The disk group is in the storage tier that uses enterprise-class spinning SAS disks (10K/15K RPM).</li> <li>Archive (4): The disk group is in the lowest storage tier, which uses midline spinning SAS disks (&lt;10K RPM, high capacity).</li> <li>Read Cache (8): The disk group uses SSDs, which provide high-speed read cache for a storage pool.</li> </ul>
total-pages	uint32	For a disk group, the total number of 4MB pages it contains.

**Table 30 disk-groups properties (continued)**

Name	Type	Description
allocated-pages	uint32	For a pool, the number of 4MB pages that are currently in use.
available-pages	uint32	For a pool, the number of 4MB pages that are still available to be allocated.
pool-percentage	uint8	The percentage of pool capacity that the disk group occupies.
performance-rank	uint8	Disk group performance rank within the pool.
owner (owner-numeric)	string (uint32)	Either the preferred owner during normal operation or the partner controller when the preferred owner is offline. <ul style="list-style-type: none"> <li>• B (0): Controller B.</li> <li>• A (1): Controller A.</li> </ul>
preferred-owner (preferred-owner-numeric)	string (uint32)	Controller that owns the disk group and its volumes during normal operation. <ul style="list-style-type: none"> <li>• B (0): Controller B.</li> <li>• A (1): Controller A.</li> </ul>
raidtype (raidtype-numeric)	string (uint32)	The RAID level of the disk group. <ul style="list-style-type: none"> <li>• RAID0 (0)</li> <li>• RAID1 (1)</li> <li>• MSA-DP+ (2)</li> <li>• RAID5 (5)</li> <li>• NRAID (6)</li> <li>• RAID10 (10)</li> <li>• RAID6 (11)</li> </ul>
diskcount	uint16	Number of disks in the disk group.
interleaved-volume-count	uint16	Not supported.
spear (spear-numeric)	string (uint32)	Not supported.
trusted-reads (trusted-reads-numeric)	string (uint32)	Not supported.
sparecount	uint16	For a disk group, 0.
chunksize	string	<ul style="list-style-type: none"> <li>• For RAID levels except NRAID and RAID 1, the chunk size for the disk group.</li> <li>• For NRAID and RAID 1, not applicable (N/A).</li> </ul>

**Table 30 disk-groups properties (continued)**

Name	Type	Description
status (status-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• FTOL (0): Fault tolerant.</li> <li>• FTDN (1): Fault tolerant with a down disk. The disk group is online and fault tolerant, but some of its disks are down.</li> <li>• CRIT (2): Critical. The disk group is online but isn't fault tolerant because some of its disks are down.</li> <li>• OFFL (3): Offline. Either the disk group is using offline initialization, or its disks are down and data may be lost.</li> <li>• QTCR (4): 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.</li> <li>• QTOF (5): 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.</li> <li>• QTDN (6): 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.</li> <li>• STOP (7): The disk group is stopped.</li> <li>• MSNG (8): Missing. The disk group is online and fault tolerant, but some of its disks are missing.</li> <li>• DMGD (9): Damaged. The disk group is online and fault tolerant, but some of its disks are damaged.</li> <li>• QTUN (11): Quarantined unsupported. The disk group contains data in a format that is not supported by this system. For example, this system does not support linear disk groups.</li> <li>• UP (250): Up. The disk group is online and does not have fault-tolerant attributes.</li> <li>• UNKN (other): Unknown.</li> </ul>
lun	uint32	Deprecated.
min-drive-size (min-drive-size-numeric)	string (uint64)	Minimum disk size that this disk group can use, formatted to use the current base, precision, and units. The numeric property shows the unformatted value in blocks.
create-date (create-date-numeric)	string (uint32)	Date and time, in the format <year>-<month>-<day><hour>-<minutes>-<seconds> (UTC), when the disk group was created. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
cache-read-ahead (cache-read-ahead-numeric)	string (uint64)	Deprecated.
cache-flush-period	uint32	Deprecated.
read-ahead-enabled (read-ahead-enabled-numeric)	string (uint32)	Deprecated.
write-back-enabled (write-back-enabled-numeric)	string (uint32)	Deprecated.
job-running	string	Same as current-job.

**Table 30 disk-groups properties (continued)**

Name	Type	Description
current-job (current-job-numeric)	string (uint32)	Job running on the disk group, if any. <ul style="list-style-type: none"> <li>Blank (0): No job is running.</li> <li>INIT (2): The disk group is initializing.</li> <li>RCON (3): At least one disk in the disk group is being reconstructed.</li> <li>VERFY (4): The disk group is being verified.</li> <li>VRSC (6): The disk group is being scrubbed.</li> <li>DRSC (7): A disk is being scrubbed.</li> <li>VREMV (9): The disk group and its data are being removed.</li> <li>VPREP (12): The disk group is being prepared for use in a pool.</li> <li>VDRAIN (13): The disk group is being removed and its data is being drained to another disk group.</li> <li>VRECV (14): The disk group is being recovered to restore its membership in the pool.</li> <li>PRERCON (15): At least one disk in the disk group is being preemptively reconstructed.</li> <li>RBAL (16): The MSA-DP+ disk group is being rebalanced.</li> <li>REFT (17): The MSA-DP+ disk group's fault-tolerant stripes are being rebalanced.</li> <li>QDAR (20): The MSA-DP+ disk group is being recovered.</li> </ul>
current-job-completion	string	<ul style="list-style-type: none"> <li>0% to 99%: Percent complete of running job.</li> <li>Blank: No job is running (job has completed).</li> </ul>
num-array-partitions	uint32	Number of volumes in the disk group.
largest-free-partition-space (largest-free-partition-space-numeric)	string (uint64)	The largest contiguous space in which a volume can be created. The value is formatted to use the current base, precision, and units. The numeric property shows the unformatted value in blocks.
num-drives-per-low-level-array	uint8	<ul style="list-style-type: none"> <li>For a RAID 10 disk group, the number of disks in each subgroup.</li> <li>For other RAID levels, 1.</li> </ul>
num-expansion-partitions	uint8	Not used.
num-partition-segments	uint8	Number of free segments available for expansion of volumes.
new-partition-lba (new-partition-lba-numeric)	string (uint64)	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. The numeric property shows the unformatted value in blocks.
array-drive-type (array-drive-type-numeric)	string (uint32)	Deprecated. See disk-description/disk-description-numeric.
disk-description (disk-description-numeric)	string (uint32)	Disk description. <ul style="list-style-type: none"> <li>SAS (4): Enterprise SAS spinning disk.</li> <li>SSD SAS (8): SAS solid-state disk.</li> <li>SAS MDL (11): Midline SAS spinning disk.</li> </ul>
is-job-auto-abortable (is-job-auto-abortable-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>false (0): The current job must be manually aborted before you can delete the disk group.</li> <li>true (1): The current job will automatically abort if you delete the disk group.</li> </ul>
serial-number	string	Disk group serial number.
blocks	uint64	The number of blocks, whose size is specified by the blocksize property.

**Table 30 disk-groups properties (continued)**

Name	Type	Description
disk-dsd-enable-vdisk (disk-dsd-enable-vdisk-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Disabled (0): DSD is disabled for the disk group.</li> <li>Enabled - all spinning (1): DSD is enabled for the disk group.</li> <li>Partial spin-down (2): DSD is enabled for the disk group and its disks are partially spun down to conserve power.</li> <li>Full spin-down (3): DSD is enabled for the disk group and its disks are fully spun down to conserve power.</li> </ul>
disk-dsd-delay-vdisk	uint32	For spinning disks, 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 supported.
pool-sector-format (pool-sector-format-numeric)	string (uint32)	<p>The sector format of disks in the disk group.</p> <ul style="list-style-type: none"> <li>512n (0): All disks use 512-byte native sector size. Each logical block and physical block is 512 bytes.</li> <li>512e (1): 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.</li> <li>Mixed (3): 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).</li> </ul>
stripe-width (stripe-width-numeric)	string (uint32)	Not supported.
target-spare-capacity (target-spare-capacity-numeric)	string (uint64)	For an MSA-DP+ disk group, the target spare capacity in GiB. Typically twice the capacity of the largest disk in the disk group. The numeric property shows the unformatted value in blocks.
actual-spare-capacity (actual-spare-capacity-numeric)	string (uint64)	For an MSA-DP+ disk group, the currently available spare capacity in GiB. The numeric property shows the unformatted value in blocks.
critical-capacity (critical-capacity-numeric)	string (uint64)	For an MSA-DP+ 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.) The numeric property shows the unformatted value in blocks.
degraded-capacity (degraded-capacity-numeric)	string (uint64)	For an MSA-DP+ 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.) The numeric property shows the unformatted value in blocks.
linear-volume-boundary	uint32	Not supported.
metadata-size (metadata-size-numeric)	string (uint64)	The amount of metadata the disk group is currently using. The numeric property shows the unformatted value in blocks.
extended-status	uint64	A bitmap that represents all alert conditions active on the component. If no conditions are active, 0.
health (health-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>OK (0)</li> <li>Degraded (1)</li> <li>Fault (2)</li> <li>Unknown (3)</li> <li>N/A (4)</li> </ul>
health-reason (health-reason-numeric)	string (uint32)	If Health is not OK, a message describes the reason for the health state. The numeric property shows the message ID.



**Table 30 disk-groups properties (continued)**

Name	Type	Description
health-recommendation (health-recommendation-numeric)	string (uint32)	If Health is not OK, a message describes recommended actions to resolve the issue. The numeric property shows the message ID.
conditions	Embedded; see health-conditions.	
unhealthy-component	Embedded; see unhealthy-component.	

## 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 (data-read-numeric)	string (uint64)	Amount of data read since these statistics were last reset or since the controller was restarted. The numeric property shows the unformatted value in blocks.
data-written (data-written-numeric)	string (uint64)	Amount of data written since these statistics were last reset or since the controller was restarted. The numeric property shows the unformatted value in blocks.
bytes-per-second (bytes-per-second-numeric)	string (uint64)	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. The numeric property shows the unformatted value in blocks.
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.
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`.

**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 4MB 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 4MB 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 (total-data-transferred-numeric)	string (uint64)	Total amount of data read and written since the last sampling time. The numeric property shows the unformatted value in blocks.
data-read (data-read-numeric)	string (uint64)	Amount of data read since the last sampling time. The numeric property shows the unformatted value in blocks.
data-written (data-written-numeric)	string (uint64)	Amount of data written since the last sampling time. The numeric property shows the unformatted value in blocks.
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 (total-bytes-per-sec-numeric)	string (uint64)	Total data transfer rate, in bytes per second, since the last sampling time. The numeric property shows the unformatted value in blocks.
read-bytes-per-sec (read-bytes-per-sec-numeric)	string (uint64)	Data transfer rate, in bytes per second, for read operations since the last sampling time. The numeric property shows the unformatted value in blocks.
write-bytes-per-sec (write-bytes-per-sec-numeric)	string (uint64)	Data transfer rate, in bytes per second, for write operations last sampling time. The numeric property shows the unformatted value in blocks.

**Table 33 disk-hist-statistics properties (continued)**

Name	Type	Description
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 (avg-io-size-numeric)	string (uint64)	Average data size of read and write operations since the last sampling time. The numeric property shows the unformatted value in blocks.
avg-read-io-size (avg-read-io-size-numeric)	string (uint64)	Average data size of read operations since the last sampling time. The numeric property shows the unformatted value in blocks.
avg-write-io-size (avg-write-io-size-numeric)	string (uint64)	Average data size of write operations since the last sampling time. The numeric property shows the unformatted value in blocks.
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 (sample-time-numeric)	string (uint32)	Date and time, in the format <year>-<month>-<day> <hour>:<minutes>:<seconds>, when the data sample was taken. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.

## 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 <code>disk_&lt;enclosure-number&gt;.&lt;disk-number&gt;</code> .
location	string	The disk location in the format <code>&lt;enclosure-number&gt;.&lt;disk-number&gt;</code> .
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 (bytes-per-second-numeric)	string (uint64)	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. The numeric property shows the unformatted value in blocks.
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.

**Table 34 disk-statistics properties (continued)**

Name	Type	Description
data-read (data-read-numeric)	string (uint64)	Amount of data read since these statistics were last reset or since the controller was restarted. The numeric property shows the unformatted value in blocks.
data-written (data-written-numeric)	string (uint64)	Amount of data written since these statistics were last reset or since the controller was restarted. The numeric property shows the unformatted value in blocks.
queue-depth	uint32	Number of pending I/O operations currently being serviced.
lifetime-data-read (lifetime-data-read-numeric)	string (uint64)	The amount of data read from the disk in its lifetime. The numeric property shows the unformatted value in blocks.
lifetime-data-written (lifetime-data-written-numeric)	string (uint64)	The amount of data written to the disk in its lifetime. The numeric property shows the unformatted value in blocks.
reset-time (reset-time-numeric)	string (uint32)	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. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
start-sample-time (start-sample-time-numeric)	string (uint32)	Date and time, in the format <year>-<month>-<day> <hour>:<minutes>:<seconds>, when sampling started for the iops and bytes-per-second values. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
stop-sample-time (stop-sample-time-numeric)	string (uint32)	Date and time, in the format <year>-<month>-<day> <hour>:<minutes>:<seconds>, when sampling stopped for the iops and bytes-per-second values. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
smart-count-1	uint32	For port 1, the number of SMART events recorded.
smart-count-2	uint32	For port 2, the number of SMART events recorded.
io-timeout-count-1	string	For port 1, the number of timeouts accessing the disk.
io-timeout-count-2	uint32	For port 2, the number of timeouts accessing the disk.
no-response-count-1	uint32	For port 1, the number of times the disk did not respond.
no-response-count-2	uint32	For port 2, 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.
spinup-retry-count-2	uint32	For port 2, 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-media-errors-2	uint32	For port 2, 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-nonmedia-errors-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-block-reassigns-1	uint32	For port 1, the number of times blocks were reassigned to alternate locations.
number-of-block-reassigns-2	uint32	For port 2, the number of times blocks were reassigned to alternate locations.

**Table 34 disk-statistics properties (continued)**

Name	Type	Description
number-of-bad-blocks-1	uint32	For port 1, the number of bad blocks encountered.
number-of-bad-blocks-2	uint32	For port 2, the number of bad blocks encountered.

## disk-update

This basetype is used by `show disks` with the `updates` parameter.

**Table 35 disk-update properties**

Name	Type	Description
location	string	Disk's enclosure ID and slot number.
vendor	string	Disk vendor.
model	string	Disk model.
current-revision	string	Currently installed firmware revision.
new-revision	string	New firmware revision.
build-date	string	Date and time when the firmware was built.
sha256-checksum	string	SHA-256 checksum.
upgrade-requirement (upgrade-requirement-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• Recommended (0)</li> <li>• Critical (1)</li> <li>• Required (2)</li> <li>• Unknown (other)</li> </ul>
site-link	string	URL of the website from which the firmware can be installed.
file-link	string	URL of the firmware file.
description	string	Description of the firmware file.

## dns-parameters

This basetype is used by `show dns-parameters`.

**Table 36 dns-parameters properties**

Name	Type	Description
controller (controller-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• B (0): Controller B.</li> <li>• A (1): Controller A.</li> </ul>
name-servers	string	Configured name server IP address values.
search-domains	string	Configured domain name values.

## drive-parameters

This basetype is used by `show disk-parameters`.

**Table 37** drive-parameters properties

Name	Type	Description
smart (smart-numeric)	string (uint32)	Shows whether SMART (Self-Monitoring Analysis and Reporting Technology) is enabled or disabled for disks. <ul style="list-style-type: none"><li>• Detect-Only (0): Each disk in the system retains its individual SMART setting, as will new disks added to the system.</li><li>• Enabled (1): SMART is enabled for all disks in the system and will be enabled for new disks added to the system.</li><li>• Disabled (2): SMART is disabled for all disks in the system and will be disabled for new disks added to the system.</li></ul>
drive-write-back-cache (drive-write-back-cache-numeric)	string (uint32)	<ul style="list-style-type: none"><li>• Disabled (2): 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.</li></ul>
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 <code>drive-attempt-timeout</code> and <code>drive-timeout-retry-max</code> settings. This value cannot be changed.
disk-dsd-enable (disk-dsd-enable-numeric)	string (uint32)	Shows whether spinning disks that are available or are global spares will spin down after a period of inactivity shown by the <code>disk-dsd-delay</code> property. <ul style="list-style-type: none"><li>• Disabled (0): Drive spin down for available disks and global spares is disabled.</li><li>• Enabled (1): Drive spin down for available disks and global spares is enabled.</li></ul>
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.
remanufacture (remanufacture-numeric)	string (uint32)	Not supported.

## drive-summary

This basetype is used by `show disk-statistics` when the `historical` parameter is specified.

**Table 38** drive-summary properties

Name	Type	Description
durable-id	string	Disk ID in the format <code>disk_&lt;enclosure-number&gt;.&lt;disk-number&gt;</code> .
serial-number	string	Disk serial number.
disk-hist-statistics	Embedded; see <code>disk-hist-statistics</code> .	

## drives

This basetype is used by `show configuration` and `show disks`.

**Table 39** drives properties

Name	Type	Description
durable-id	string	Disk ID in the format <code>disk_&lt;enclosure-ID&gt;.&lt;slot-number&gt;</code> .
enclosure-id	uint32	Enclosure ID.
drawer-id	uint8	<ul style="list-style-type: none"> <li>255: N/A</li> </ul>
slot	uint32	Disk slot number.
location	string	Disk's enclosure ID and slot number.
url	string	For internal use only.
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 <code>blocksize</code> 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.
description (description-numeric)	string (uint32)	Disk description. <ul style="list-style-type: none"> <li>SAS (4): Enterprise SAS spinning disk.</li> <li>SSD SAS (8): SAS solid-state disk.</li> <li>SAS MDL (11): Midline SAS spinning disk.</li> </ul>
architecture (architecture-numeric)	string (uint32)	Disk architecture. <ul style="list-style-type: none"> <li>SSD (0)</li> <li>HDD (1)</li> </ul>
interface	string	Disk interface: SAS (0).
single-ported (single-ported-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Disabled (0): The disk has a dual-port connection to the midplane.</li> <li>Enabled (1): The disk has a single-port connection to the midplane.</li> </ul>
type (type-numeric)	string (uint32)	Deprecated. See <code>description</code> , <code>architecture</code> , <code>interface</code> , and <code>single-ported</code> .

**Table 39 drives properties (continued)**

Name	Type	Description
usage (usage-numeric)	string (uint32)	Shows the disk's usage. <ul style="list-style-type: none"> <li>• AVAIL (0): Available.</li> <li>• GLOBAL SP (3): The disk is a global spare.</li> <li>• LEFTOVR (5): The disk is a leftover.</li> <li>• FAILED (7): The disk is unusable and must be replaced. Reasons for this status include: excessive media errors, SMART error, disk hardware failure, or unsupported disk.</li> <li>• UNUSABLE (8): The disk cannot be used in a disk group. Possible reasons include:               <ul style="list-style-type: none"> <li>• The system is secured and the disk is data locked with a different passphrase.</li> <li>• The system is secured/locked (no passphrase available) and the disk is data/locked.</li> <li>• The system is secured and the disk is not FDE capable.</li> <li>• The disk is from an unsupported vendor.</li> </ul> </li> <li>• VIRTUAL POOL (9): The disk is a member of a disk group in a pool.</li> </ul>
job-running (job-running-numeric)	string (uint32)	Job running on the disk, if any. <ul style="list-style-type: none"> <li>• Blank (0): No job is running.</li> <li>• INIT (2): The disk group is being initialized.</li> <li>• RCON (3): The disk is being used in a reconstruct operation.</li> <li>• VRFY (4): The disk group is being verified.</li> <li>• VRSC (6): The disk group is being scrubbed.</li> <li>• DRSC (7): The disk is being scrubbed.</li> <li>• VREMV (9): The disk group and its data are being removed.</li> <li>• VPREP (12): The disk group is being prepared for use in a pool.</li> <li>• VDRAIN (13): The disk group is being removed and its data is being drained to another disk group.</li> <li>• VRECV (14): The disk group is being recovered to restore its membership in the pool.</li> <li>• PRERCON (15): The disk is being used in a preemptive reconstruct operation.</li> <li>• RBAL (16): The MSA-DP+ disk group is being rebalanced.</li> <li>• REFT (17): The MSA-DP+ disk group's fault-tolerant stripes are being rebalanced.</li> <li>• ERASE (19): The disk is being erased.</li> </ul>
state	string	Deprecated. See usage and job-running.
current-job-completion	string	<ul style="list-style-type: none"> <li>• 0% to 99%: Percent complete of running job.</li> <li>• Blank: No job is running (job has completed).</li> </ul>
firmware-update-status (firmware-update-status-numeric)	string (uint32)	Not supported.
remanufacture (remanufacture-numeric)	string (uint32)	Not supported.
supports-unmap (supports-unmap-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• No (0): The disk does not support the SCSI UNMAP command.</li> <li>• Yes (1): The disk supports the SCSI UNMAP command.</li> </ul>
blink	uint32	Deprecated. For locator LED status, see locator-led.
locator-led (locator-led-numeric)	string (uint32)	Shows the state of the locator LED on a disk. <ul style="list-style-type: none"> <li>• Off (0)</li> <li>• On (1)</li> </ul>
speed	uint32	Not used.



**Table 39 drives properties (continued)**

Name	Type	Description
smart (smart-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Disabled (0): SMART is disabled for this disk.</li> <li>Enabled (1): SMART is enabled for this disk.</li> </ul>
dual-port	uint32	<ul style="list-style-type: none"> <li>0: Single-ported disk.</li> <li>1: Dual-ported disk.</li> </ul>
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 WWPNN.
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 WWPNN.
fc-p2-unit-number	uint32	Port 2 unit number.
drive-down-code	uint8	Numeric code indicating why the disk is down.
owner (owner-numeric)	string (uint32)	<p>Current owner, which is either the preferred owner during normal operation or the partner controller when the preferred owner is offline.</p> <ul style="list-style-type: none"> <li>B (0): Controller B.</li> <li>A (1): Controller A.</li> </ul>
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 (size-numeric)	string (uint64)	<p>Disk capacity, formatted to use the current base, precision, and units.</p> <p>The numeric property shows the unformatted value in blocks.</p>
sector-format (sector-format-numeric)	string (uint32)	<p>The disk sector format.</p> <ul style="list-style-type: none"> <li>512n (0): The disk uses 512-byte native sector size. Each logical block and physical block is 512 bytes.</li> <li>512e (1): 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.</li> </ul>
transfer-rate (transfer-rate-numeric)	string (uint32)	<p>Disk data transfer rate in Gb/s. It is normal behavior for the rate to vary.</p> <ul style="list-style-type: none"> <li>3.0 (2)</li> <li>6.0 (3)</li> <li>12.0 (4)</li> <li>1.5 (10)</li> </ul> <p>Some 6Gb/s disks might not consistently support a 6Gb/s transfer rate. If this happens, the controller automatically adjusts transfers to those disks to 3Gb/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.</p>

**Table 39 drives properties (continued)**

Name	Type	Description
attributes (attributes-numeric)	string (uint32)	Shows which controller a single-ported disk is connected to. <ul style="list-style-type: none"> <li>• B (0): Controller B.</li> <li>• A (1): Controller A.</li> <li>• Blank (2): Connected to both controllers (dual-ported).</li> <li>• Invalid (3)</li> </ul>
enclosure-wwn	string	Enclosure WWN.
enclosures-url	string	For internal use only.
status	string	Disk status. <ul style="list-style-type: none"> <li>• Up: The disk is present and is properly communicating with the expander.</li> <li>• Spun Down: The disk is present and has been spun down by the drive spin down feature.</li> <li>• 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.</li> <li>• Error: The disk is present but is not detected by the expander.</li> <li>• Unknown: Initial status when the disk is first detected or powered on.</li> <li>• Not Present: The disk slot indicates that no disk is present.</li> <li>• Unrecoverable: The disk is present but has unrecoverable errors.</li> <li>• Unavailable: The disk is present but cannot communicate with the expander.</li> <li>• Unsupported: The disk is present but is an unsupported type.</li> </ul>
recon-state (recon-state-numeric)	string (uint32)	The state of the disk (source or destination) if it is involved in a reconstruct operation. <ul style="list-style-type: none"> <li>• N/A (0): This disk is not being used in a reconstruct operation.</li> <li>• From (1): This disk is being used as the source of a reconstruct operation.</li> <li>• To (2): This disk is being used as the target of a reconstruct operation.</li> </ul>
copyback-state (copyback-state-numeric)	string (uint32)	Not supported.
virtual-disk-serial	string	Not applicable.
disk-group	string	If the disk is in a disk group, the disk group name. Otherwise, blank.
storage-pool-name	string	If the disk is in a pool, the pool name. Otherwise, blank.
storage-tier (storage-tier-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• N/A (0): Not applicable.</li> <li>• Performance (1): The disk is in the highest storage tier, which uses SSDs (high speed).</li> <li>• Standard (2): The disk is in the storage tier that uses enterprise-class spinning SAS disks (10K/15K RPM).</li> <li>• Archive (4): The disk is in the lowest storage tier, which uses midline spinning SAS disks (&lt;10K RPM, high capacity).</li> <li>• Read Cache (8): The disk is an SSD providing high-speed read cache for a storage pool.</li> </ul>
ssd-life-left (ssd-life-left-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• 100% to 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.</li> <li>• N/A (255): The disk is not an SSD.</li> </ul>

**Table 39 drives properties (continued)**

Name	Type	Description
led-status (led-status-numeric)	string (uint32)	Disk LED status. <ul style="list-style-type: none"> <li>• Online (1): The disk is operating normally.</li> <li>• Rebuild (2): The disk's disk group is being reconstructed.</li> <li>• Fault (4): The disk has a fault.</li> <li>• Pred Fail (8): The disk has a predictive failure.</li> <li>• ID (16): The disk's identification LED is illuminated.</li> </ul>
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. <ul style="list-style-type: none"> <li>• 0: Not spun down.</li> <li>• 1: Spun down.</li> </ul>
number-of-ios	uint64	Total number of I/O operations (reads and writes).
total-data-transferred (total-data-transferred-numeric)	string (uint64)	The total number of bytes transferred. The numeric property shows the unformatted value in blocks.
avg-rsp-time	uint64	Average I/O response time in microseconds.
fips-capable (fips-capable-numeric)	string (uint32)	Shows whether the disk can be secured with Federal Information Processing Standards (FIPS). <ul style="list-style-type: none"> <li>• No (0)</li> <li>• Yes (1)</li> </ul>
fde-state (fde-state-numeric)	string (uint32)	The FDE state of the disk. <ul style="list-style-type: none"> <li>• Unknown (0): The FDE state is unknown.</li> <li>• Not FDE Capable (1): The disk is not FDE-capable.</li> <li>• Not Secured (2): The disk is not secured.</li> <li>• Secured, Unlocked (3): The system is secured and the disk is unlocked.</li> <li>• Secured, Locked (4): The system is secured and the disk is locked to data access, preventing its use.</li> <li>• FDE Protocol Failure (5): A temporary state that can occur while the system is securing the disk.</li> <li>• Secured, Unlocked, FIPS (7): The system is secured to the FIPS standard and the disk is unlocked.</li> </ul>
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 (fde-config-time-numeric)	string (uint32)	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). The numeric property shows the value as seconds elapsed since January 1, 1970 00:00. If not secured, N/A (0).
temperature (temperature-numeric)	string (uint32)	Temperature of the disk. The numeric property shows the unformatted value.
temperature-status (temperature-status-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• OK (1): The disk sensor is present and detects no error condition.</li> <li>• Critical (2): The disk sensor detected a critical error condition. The temperature currently exceeds the critical threshold.</li> <li>• Warning (3): The disk sensor detected a non-critical error condition. The temperature is between the warning and critical thresholds.</li> <li>• Unknown (other): The disk sensor is present but status is not available.</li> </ul>

**Table 39 drives properties (continued)**

Name	Type	Description
pi-formatted (pi-formatted-numeric)	string (uint32)	Not supported.
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.
extended-status	uint64	A bitmap that represents all alert conditions active on the component. If no conditions are active, 0. <ul style="list-style-type: none"> <li>• 0x00000000: OK</li> <li>• 0x00000001: Single-pathed, A down</li> <li>• 0x00000002: SSD exhausted</li> <li>• 0x00000004: Degraded warning</li> <li>• 0x00000008: Spun down</li> <li>• 0x00000010: Downed by user</li> <li>• 0x00000020: Reconstruction failed</li> <li>• 0x00000040: Leftover, no reason</li> <li>• 0x00000080: Previously missing</li> <li>• 0x00000100: Medium error</li> <li>• 0x00000200: SMART event</li> <li>• 0x00000400: Hardware failure</li> <li>• 0x00000800: Foreign disk unlocked</li> <li>• 0x00001000: Non-FDE disk</li> <li>• 0x00002000: FDE protocol failure</li> <li>• 0x00004000: Using alternate path</li> <li>• 0x00008000: Initialization failed</li> <li>• 0x00010000: Unsupported type</li> <li>• 0x00040000: Recovered errors</li> <li>• 0x00080000: Unexpected leftover</li> <li>• 0x00100000: Not auto-secured</li> <li>• 0x00200000: SSD nearly exhausted</li> <li>• 0x00400000: Degraded critical</li> <li>• 0x00800000: Single-pathed, B down</li> <li>• 0x01000000: Foreign disk secured</li> <li>• 0x02000000: Foreign disk secured and locked</li> <li>• 0x04000000: Unexpected usage</li> <li>• 0x08000000: Enclosure fault sensed</li> <li>• 0x10000000: Unsupported block size</li> <li>• 0x20000000: Unsupported vendor</li> <li>• 0x40000000: Timed-out</li> <li>• 0x80000000: Slow critical</li> <li>• 0x100000000: Slow degraded</li> <li>• 0x200000000: Preemptive pending degraded</li> </ul>
health (health-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• OK (0)</li> <li>• Degraded (1)</li> <li>• Fault (2)</li> <li>• Unknown (3)</li> <li>• N/A (4)</li> </ul>
health-reason (health-reason-numeric)	string (uint32)	If Health is not OK, a message describes the reason for the health state. The numeric property shows the message ID.

**Table 39 drives properties (continued)**

Name	Type	Description
health-recommendation (health-recommendation-numeric)	string (uint32)	If Health is not OK, a message describes recommended actions to resolve the issue. The numeric property shows the message ID.
conditions	Embedded; see health-conditions.	

## email-parameters

This basetype is used by `show email-parameters`.

**Table 40 email-parameters properties**

Name	Type	Description
email-notification (email-notification-numeric)	string (uint32)	Shows whether email (SMTP) notification of events is enabled. <ul style="list-style-type: none"> <li>Disabled (0): Email notification is disabled.</li> <li>Enabled (1): Email notification is enabled.</li> </ul>
email-notification-filter (email-notification-filter-numeric)	string (uint32)	The minimum severity for which the system should send notifications: <ul style="list-style-type: none"> <li>info (0): Sends notifications for all events.</li> <li>resolved (1): Sends notifications for Resolved, Warning, Error, and Critical events.</li> <li>warn (2): Sends notifications for Warning, Error, and Critical events.</li> <li>error (3): Sends notifications for Error and Critical events.</li> <li>crit (4): Sends notifications for Critical events only.</li> <li>none (5): Email notification is disabled.</li> </ul> This parameter does not apply to managed-logs notifications.
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	The email address for the log-collection system used by the log-management feature.
email-security-protocol (email-security-protocol-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>None (0): No authentication is enabled.</li> <li>TLS (1): Transport Layer Security (TLS) authentication is enabled.</li> <li>SSL (2): Secure Sockets Layer (SSL) authentication is enabled.</li> </ul>
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.
email-sender-password	string	The sender password. For a configured sender, the password is represented by eight asterisks.
alert-notification (alert-notification-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>none (5): Email notification for alerts is disabled.</li> <li>all (6): Sends notifications for all alerts.</li> </ul>

**Table 40 email-parameters properties (continued)**

Name	Type	Description
event-notification (event-notification-numeric)	string (uint32)	The minimum severity for which the system should send event notifications: <ul style="list-style-type: none"> <li>crit (4): Sends notifications for Critical events only.</li> <li>error (3): Sends notifications for Error and Critical events.</li> <li>warn (2): Sends notifications for Warning, Error, and Critical events.</li> <li>resolved (1): Sends notifications for Resolved, Warning, Error, and Critical events.</li> <li>info(0): Sends notifications for all events.</li> <li>none (5): Disables email notification.</li> </ul> This parameter does not apply to managed-logs notifications.
persistent-alerts (persistent-alerts-numeric)	string (uint32)	Shows whether weekly alerts about system health issues will be sent to configured email addresses until corrective action has been taken and the system health value has returned to OK. <ul style="list-style-type: none"> <li>Disabled (0)</li> <li>Enabled (1)</li> </ul>
email-include-logs (email-include-logs-numeric)	string (uint32)	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. <ul style="list-style-type: none"> <li>Disabled (0)</li> <li>Enabled (1)</li> </ul>

## enclosure-fru

This basetype is used by `show configuration` and `show frus`.

**Table 41 enclosure-fru properties**

Name	Type	Description
name	string	FRU name. <ul style="list-style-type: none"> <li>CHASSIS_MIDPLANE: Chassis and midplane circuit board.</li> <li>RAID_IOM: Controller module.</li> <li>BOD_IOM: Expansion module.</li> <li>POWER_SUPPLY: Power supply module.</li> </ul>
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 (mfg-date-numeric)	string (uint32)	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. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
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 41 enclosure-fru properties (continued)**

Name	Type	Description
fru-location	string	Location of the FRU in the enclosure. <ul style="list-style-type: none"> <li>MID-PLANE SLOT: Chassis midplane.</li> <li>UPPER IOM SLOT: Controller module or expansion module A.</li> <li>LOWER IOM SLOT: Controller module or expansion module B.</li> <li>LEFT PSU SLOT: Power supply module on the left, as viewed from the back.</li> <li>RIGHT PSU SLOT: Power supply module on the right, as viewed from the back.</li> <li>CONTROLLER A: Controller module A.</li> <li>CONTROLLER B: Controller module B.</li> </ul>
configuration-serialnumber	string	Configuration serial number.
fru-status (fru-status-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Invalid Data (0): The FRU ID data is invalid. The FRU's EEPROM is improperly programmed.</li> <li>Fault (1): The FRU's health is Degraded or Fault.</li> <li>Absent (2): The FRU is not present.</li> <li>Power OFF (3): The FRU is powered off.</li> <li>OK (4): The FRU is operating normally.</li> </ul>
original-serialnumber	string	For a power supply module, the original manufacturer serial number. Otherwise, N/A.
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 42 enclosure-list properties**

Name	Type	Description
status (status-numeric)	string (uint32)	Disk slot status. <ul style="list-style-type: none"> <li>Unsupported (0): The disk is present but is an unsupported type.</li> <li>Up (1): The disk is present and is properly communicating with the expander.</li> <li>Error (2): The disk is present but is not detected by the expander.</li> <li>Warning (3): 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.</li> <li>Unrecoverable (4): The disk is present but has unrecoverable errors.</li> <li>Not Present (5): The disk slot indicates that no disk is present.</li> <li>Unknown (6): Initial status when the disk is first detected or powered on.</li> <li>Unavailable (7): The disk is present but cannot communicate with the expander.</li> <li>Spun Down (20): The disk is present and has been spun down by the drive spin down feature.</li> </ul>
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 (size-numeric)	string (uint64)	Disk capacity, formatted to use the current base, precision, and units. The numeric property shows the unformatted value in blocks.

# enclosures

This basetype is used by show configuration and show enclosures.

**Table 43** enclosures properties

Name	Type	Description
durable-id	string	Enclosure ID in the format enclosure_<number>.
enclosure-id	uint8	Enclosure ID.
url	string	For internal use only.
enclosure-wwn	string	Enclosure WWN.
name	string	Enclosure name.
type (type-numeric)	string (uint32)	Internal name for the enclosure type. The numeric property shows a corresponding numeric value.
iom-type (iom-type-numeric)	string (uint32)	I/O module type. The numeric property shows a corresponding numeric value.
platform-type (platform-type-numeric)	string (uint32)	Hardware platform type. The numeric property shows a corresponding numeric value.
board-model (board-model-numeric)	string (uint32)	Board model. The numeric property shows a corresponding numeric value.
location	string	Enclosure location, or blank if not set.
rack-number	uint8	Number of the rack that contains the enclosure.
rack-position	uint8	Position of the enclosure in the rack.
number-of-coolings- elements	uint8	Number of fan units in the enclosure.
number-of-disks	uint8	Number of disk slots (not installed disks) in the enclosure.
number-of-power- supplies	uint8	Number of power supplies in the enclosure.
status (status-numeric)	string (uint32)	Enclosure status. <ul style="list-style-type: none"><li>• Unsupported (0)</li><li>• OK (1)</li><li>• Critical (2)</li><li>• Warning (3)</li><li>• Unrecoverable (4)</li><li>• Not Installed (5)</li><li>• Unknown (6)</li><li>• Unavailable (7)</li></ul>
extended-status	hex32	A bitmap that represents all alert conditions active on the component. If no conditions are active, 0.
midplane-serial- number	string	Midplane serial number.
vendor	string	Enclosure vendor.
model	string	Enclosure model.
fru-tlapn	string	FRU top-level assembly part number.
fru-shortname	string	FRU short description.



**Table 43 enclosures properties (continued)**

Name	Type	Description
fru-location	string	FRU location. <ul style="list-style-type: none"> <li>MID-PLANE SLOT: Chassis midplane.</li> </ul>
part-number	string	FRU part number.
mfg-date (mfg-date-numeric)	string (uint32)	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. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
mfg-location	string	City, state/province, and country where the FRU was manufactured.
description	string	FRU long description.
revision	string	Hardware revision level for the FRU.
dash-level	string	FRU template revision number.
emp-a-rev	string	Not supported.
emp-b-rev	string	Not supported.
gem-version-a	string	GEM firmware component version in controller module A.
gem-version-b	string	GEM firmware component version in controller module B.
rows	uint8	Number of rows of disk slots.
columns	uint8	Number of columns of disk slots.
slots	uint8	Number of disk slots in this enclosure.
locator-led (locator-led-numeric)	string (uint32)	Shows the state of the locator LED on an enclosure. <ul style="list-style-type: none"> <li>Off (0)</li> <li>On (1)</li> </ul>
drive-orientation (drive-orientation-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>vertical (0): Disks are oriented vertically.</li> <li>horizontal (1): Disks are oriented horizontally.</li> </ul>
enclosure-arrangement (enclosure-arrangement-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>vertical (0): Disks are numbered vertically (by column from top to bottom, proceeding rightward).</li> <li>horizontal (1): Disks are numbered horizontally (by row from left to right, proceeding downward).</li> </ul>
emp-a-busid	string	Not supported.
emp-a-targetid	string	Not supported.
emp-b-busid	string	Not supported.
emp-b-targetid	string	Not supported.
emp-a	string	Not supported.
emp-a-ch-id-rev	string	Not supported.
emp-b	string	Not supported.
emp-b-ch-id-rev	string	Not supported.
midplane-type (midplane-type-numeric)	string (uint32)	An abbreviation that describes the enclosure midplane's rack-unit height, maximum number of disks, maximum data rate to disks (Gb/s), and hardware version. The numeric property shows a corresponding numeric value.
midplane-rev	uint8	Midplane revision number.
enclosure-power	string	Enclosure power in watts.

**Table 43 enclosures properties (continued)**

Name	Type	Description
pcie2-capable (pcie2-capable-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>False (0): Enclosure is not capable of using PCI Express version 2.</li> <li>True (1): Enclosure is capable of using PCI Express version 2.</li> </ul>
health (health-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>OK (0)</li> <li>Degraded (1)</li> <li>Fault (2)</li> <li>Unknown (3)</li> <li>N/A (4)</li> </ul>
health-reason	string	If Health is not OK, a message describes the reason for the health state.
health-recommendation	string	If Health is not OK, a message describes recommended actions to resolve the issue..
conditions	Embedded; see health-conditions.	
unhealthy-component	Embedded; see unhealthy-component.	
controllers	Embedded; see controllers, io-modules.	
power-supplies	Embedded; see power-supplies.	

## enclosure-sku

This basetype is used by show frus.

**Table 44 enclosure-sku properties**

Name	Type	Description
sku-partnumber	string	System part number.
sku_serialnumber	string	System serial number.
sku-revision	string	System revision level.
enclosure-id	uint32	Enclosure ID.

## event-subscriber

This basetype is used by show event-subscriber.

**Table 45 event-subscriber properties**

Name	Type	Description
destination	string	The subscription destination.
protocol	string	The subscription protocol: Redfish
context	string	The subscription context.
subscription-type	string	The subscription type.
subscription-id	string	The subscriber ID generated by the system when the subscriber is added.
registry-prefix	string	The registry prefix.
resource-type	string	The resource type.
delivery-retry-policy	string	The delivery retry policy.
controller	string	The controller on which the subscriber was added: A or B. This has no effect on which controller issues notifications.

## events

This basetype is used by `show events`.

**Table 46** events properties

Name	Type	Description
time-stamp (time-stamp-numeric)	string (uint32)	Date and time, in the format <year>-<month>-<day> <hour>:<minutes>:<seconds> (UTC), when this event was detected.  The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
event-code	string	Event code. For event-code descriptions, see the <i>HPE MSA 1060/2060/2062 Event Descriptions Reference Guide</i> .
event-id	string	Event ID.
url	string	For internal use only.
model	string	Controller model.
serial-number	string	Controller serial number.
controller (controller-numeric)	string (uint32)	<ul style="list-style-type: none"><li>• B (0): Controller B.</li><li>• A (1): Controller A.</li></ul>
severity (severity-numeric)	string (uint32)	Event severity. <ul style="list-style-type: none"><li>• INFORMATIONAL (0): A configuration or state change occurred, or a problem occurred that the system corrected. No action is required.</li><li>• WARNING (1): A problem occurred that may affect system stability but not data integrity. Evaluate the problem and correct it if necessary.</li><li>• ERROR (2): A failure occurred that may affect data integrity or system stability. Correct the problem as soon as possible.</li><li>• CRITICAL (3): A failure occurred that may cause a controller to shut down. Correct the problem <i>immediately</i>.</li><li>• RESOLVED (4): A condition that caused an event to be logged has been resolved.</li></ul>
message	string	Brief description of the event that occurred. For some events, the message includes data about affected components.
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 47** 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 (time-stamp-numeric)	string (uint32)	Date and time, in the format <year>-<month>-<day> <hour>:<minutes>:<seconds> (UTC), when this event was detected.  The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
event-code	string	Event code identifying the type of event to help diagnose problems.

**Table 47 eventsLogs properties (continued)**

Name	Type	Description
severity (severity-numeric)	string (uint32)	Event severity. <ul style="list-style-type: none"> <li>• INFORMATIONAL (0): A configuration or state change occurred, or a problem occurred that the system corrected. No action is required.</li> <li>• WARNING (1): A problem occurred that may affect system stability but not data integrity. Evaluate the problem and correct it if necessary.</li> <li>• ERROR (2): A failure occurred that may affect data integrity or system stability. Correct the problem as soon as possible.</li> <li>• CRITICAL (3): A failure occurred that may cause a controller to shut down. Correct the problem <i>immediately</i>.</li> <li>• RESOLVED (4): A condition that caused an event to be logged has been resolved.</li> </ul>
message	string	Message giving details about the event.

## expander-ports

This basetype is used by `show sas-link-health`.

**Table 48 expander-ports properties**

Name	Type	Description
durable-id	string	Expander port ID.
enclosure-id	uint32	Enclosure ID.
controller (controller-id-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• B (0): Controller B.</li> <li>• A (1): Controller A.</li> </ul>
sas-port-type (sas-port-type-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• Expansion Port Egress (3)</li> <li>• Expansion Port Ingress (4)</li> <li>• Expansion Port Universal (5)</li> </ul>
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	The expansion port name.
status (status-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• Up (0): The port is cabled and has an I/O link.</li> <li>• Warning (1): Not all of the port's PHYs are up.</li> <li>• Error (2): The port is reporting an error condition.</li> <li>• Not Present (3): The controller module is not installed or is down.</li> <li>• Unknown (4): The status is unknown.</li> <li>• Disconnected (6): Either no I/O link is detected or the port is not cabled.</li> </ul>
health (health-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• OK (0)</li> <li>• Degraded (1)</li> <li>• Fault (2)</li> <li>• Unknown (3)</li> <li>• N/A (4)</li> </ul>
health-reason	string	If Health is not OK, a message describes the reason for the health state.
health-recommendation	string	If Health is not OK, a message describes recommended actions to resolve the issue..
conditions	Embedded; see health-conditions.	

## expander-versions

This basetype is used by show versions when the frus parameter is specified.

**Table 49** expander-versions properties

Name	Type	Description
name	string	Expander name.
location	string	Expander location.
enclosure-id	uint32	Enclosure ID.
drawer-id	uint8	<ul style="list-style-type: none"><li>• 255: N/A</li></ul>
expander-id	uint8	Expander ID.
controller (controller-numeric)	string	<ul style="list-style-type: none"><li>• B (0): Controller B.</li><li>• A (1): Controller A.</li></ul>
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.

## expanders

This basetype is used by show enclosures.

**Table 50** expanders properties

Name	Type	Description
durable-id	string	Expander ID.
enclosure-id	uint32	Enclosure ID.
drawer-id	uint8	<ul style="list-style-type: none"><li>• 255: N/A</li></ul>
dom-id	uint32	For internal use only.
path-id	string	<ul style="list-style-type: none"><li>• A (1): Controller A.</li><li>• B (0): Controller B.</li></ul>
name	string	Expander name.
location	string	Expander location.
status (status-numeric)	string (uint32)	Enclosure status. <ul style="list-style-type: none"><li>• Unsupported (0)</li><li>• OK (1)</li><li>• Critical (2)</li><li>• Warning (3)</li><li>• Unrecoverable (4)</li><li>• Not Installed (5)</li><li>• Unknown (6)</li><li>• Unavailable (7)</li></ul>

**Table 50 expanders properties (continued)**

Name	Type	Description
extended-status	hex32	A bitmap that represents all alert conditions active on the component. If no conditions are active, 0.
fw-revision	string	Expander firmware revision.
health (health-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• OK (0)</li> <li>• Degraded (1)</li> <li>• Fault (2)</li> <li>• Unknown (3)</li> <li>• N/A (4)</li> </ul>
health-reason	string	If Health is not OK, a message describes the reason for the health state.
health-recommendation	string	If Health is not OK, a message describes recommended actions to resolve the issue.
conditions	Embedded; see health-conditions.	
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 51 fan properties**

Name	Type	Description
durable-id	string	Fan ID in the format <code>fan_&lt;enclosure-ID&gt;.&lt;fan-number&gt;</code> .
url	string	For internal use only.
name	string	Fan name.
location	string	Fan location.
status-ses (status-ses-numeric)	string (uint32)	Fan status. <ul style="list-style-type: none"> <li>• Unsupported (0)</li> <li>• OK (1)</li> <li>• Critical (2)</li> <li>• Warning (3)</li> <li>• Unrecoverable (4)</li> <li>• Not Installed (5)</li> <li>• Unknown (6)</li> <li>• Unavailable (7)</li> </ul>
extended-status	hex32	A bitmap that represents all alert conditions active on the component. If no conditions are active, 0.
status (status-numeric)	string (uint32)	Fan unit status. <ul style="list-style-type: none"> <li>• Up (0)</li> <li>• Error (1)</li> <li>• Off (2)</li> <li>• Missing (3)</li> </ul>
speed	uint32	Fan speed (revolutions per minute).
position (position-numeric)	string (uint32)	Fan position, as viewed from the back of the enclosure. <ul style="list-style-type: none"> <li>• Left (0)</li> <li>• Right (1)</li> </ul>

**Table 51 fan properties (continued)**

Name	Type	Description
serial-number	string	<ul style="list-style-type: none"> <li>N/A: Not applicable.</li> </ul>
part-number	string	<ul style="list-style-type: none"> <li>N/A: Not applicable.</li> </ul>
fw-revision	string	<ul style="list-style-type: none"> <li>Blank: Not applicable.</li> <li>Firmware revision of a fan FRU.</li> </ul>
hw-revision	string	<ul style="list-style-type: none"> <li>Blank: Not applicable.</li> </ul>
locator-led (locator-led-numeric)	string (uint32)	Shows the state of the locator LED on a fan unit. <ul style="list-style-type: none"> <li>Off (0)</li> <li>On (1)</li> </ul>
health (health-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>OK (0)</li> <li>Degraded (1)</li> <li>Fault (2)</li> <li>Unknown (3)</li> <li>N/A (4)</li> </ul>
health-reason	string	If Health is not OK, a message describes the reason for the health state.
health-recommendation	string	If Health is not OK, a message describes recommended actions to resolve the issue.
conditions	Embedded: see health-conditions.	

## fc-port

This basetype is used by `show ports` for a Fibre Channel port.

**Table 52 fc-port properties**

Name	Type	Description
configured-topology (configured-topology-numeric)	string (uint32)	Configured topology. <ul style="list-style-type: none"> <li>Loop (0): Fibre Channel arbitrated loop (public or private).</li> <li>PTP (1): Fibre Channel point-to-point.</li> <li>Auto (2): Loop preferred, otherwise point-to-point, based on the detected connection type.</li> </ul>
primary-loop-id	string	If the port is using loop topology and the port status is <code>Up</code> , this field shows the primary loop ID. If the port is not using loop topology or the port status is not <code>Up</code> , this field shows N/A.
sfp-status (sfp-status-numeric)	string (uint32)	SFP status. <ul style="list-style-type: none"> <li>Not compatible (0): The SFP in this port is not qualified for use in this system. When this condition is detected, event 464 is logged.</li> <li>Incorrect protocol (1): The SFP protocol does not match the port protocol. When this condition is detected, event 464 is logged.</li> <li>Not present (2): No SFP is inserted in this port.</li> <li>OK (3)</li> </ul>
sfp-present (sfp-present-numeric)	string (uint32)	Shows whether the port contains an SFP. <ul style="list-style-type: none"> <li>Not Present (0)</li> <li>Present (1)</li> </ul>
sfp-vendor	string	The SFP vendor.
sfp-part-number	string	The SFP part number.

**Table 52 fc-port properties (continued)**

Name	Type	Description
sfp-revision	string	The SFP revision.
sfp-supported-speeds (sfp-supported-speeds-numeric)	string (uint32)	<p>The link speeds that the SFP supports. If applicable, this property reports multiple values as a comma-separated list.</p> <ul style="list-style-type: none"> <li>• 1G</li> <li>• 2G</li> <li>• 4G</li> <li>• 8G</li> <li>• 16G</li> <li>• 32G</li> </ul> <p>The numeric property shows a computed hex value representing each list item that evaluates as true.</p>

## fde-state

This basetype is used by `show fde-state`.

**Table 53 fde-state properties**

Name	Type	Description
fde-security-status (fde-security-status-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• Unsecured (1): The system is not secured with a passphrase.</li> <li>• Secured (2): The system is secured with a passphrase using FDE.</li> <li>• Secured, Lock Ready (3): The system is secured and lock keys have been cleared. The system will become locked after the next power cycle.</li> <li>• Secured, Locked (4): The system is secured and the disks are locked to data access, preventing their use.</li> <li>• Secured FIPS (6): The system is secured with a passphrase to the FIPS standard.</li> </ul>
lock-key-id	string	Current lock ID.
import-lock-key-id	string	The previous or import lock ID.
fde-config-time (fde-config-time-numeric)	string (uint32)	<p>If the system is secured, the time at which the current lock ID was set in the format &lt;year&gt;-&lt;month&gt;-&lt;day&gt; &lt;hour&gt;:&lt;minutes&gt;:&lt;seconds&gt; (UTC).</p> <p>The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.</p>

## firmware-bundles

This basetype is used by `show firmware-bundles`.

**Table 54 firmware-bundles properties**

Name	Type	Description
bundle-version	string	Version name of the firmware bundle.
build-date	string	Build date of the firmware bundle.
status (status-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• Unknown (0)</li> <li>• Empty (1)</li> <li>• Active (2)</li> <li>• Available (3)</li> <li>• Inactive (4)</li> <li>• Default (5)</li> <li>• Last (6)</li> </ul>



**Table 54 firmware-bundles properties (continued)**

Name	Type	Description
health (health-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• OK (0)</li> <li>• Degraded (1)</li> <li>• Fault (2)</li> <li>• Unknown (3)</li> <li>• N/A (4)</li> </ul>
health-reason	string	If Health is not OK, a message describes the reason for the health state.
health-recommendation	string	If Health is not OK, a message describes recommended actions to resolve the issue.

## firmware-update

This basetype is used by `show firmware-bundles` with the `updates` parameter.

**Table 55 firmware-update properties**

Name	Type	Description
current-revision	string	Currently installed firmware revision.
new-revision	string	New firmware revision.
build-date	string	Date and time when the firmware was built.
sha256-checksum	string	SHA-256 checksum.
upgrade-requirement (upgrade-requirement-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• Recommended (0)</li> <li>• Critical (1)</li> <li>• Required (2)</li> <li>• Unknown (other)</li> </ul>
site-link	string	URL of the website from which the firmware can be installed.
file-link	string	URL of the firmware file.
description	string	Description of the firmware file.

## firmware-versions

This basetype is used by `show versions` when the `firmware` parameter is specified.

**Table 56 firmware-versions properties**

Name	Type	Description
bundle-version	string	Firmware bundle version.
build-date	string	Firmware bundle build date.
bundle-state	string	Firmware bundle status.
sc-fw	string	Storage Controller firmware version.
sc-fu-version	string	Storage Controller ASIC Controller version.
mc-fw	string	Management Controller firmware version.
mc-loader	string	Management Controller loader firmware version.
gem-version	string	Expander Controller GEM firmware version.
pld-rev	string	Complex Programmable Logic Device (CPLD) firmware version.

**Table 56** firmware-versions properties (continued)

Name	Type	Description
ctk-version	string	<ul style="list-style-type: none"> <li>• &lt;version&gt;: Customization Toolkit (CTK) version applied to system.</li> <li>• No CTK Version: No CTK version has been applied to this system.</li> </ul>
mcos-version	string	Management Controller operating system version.

## fru-versions

This basetype is used by `show versions` when the `frus` parameter is specified.

**Table 57** fru-versions properties

Name	Type	Description
enclosure-id	uint32	The enclosure ID.
midplane-versions	Embedded; see <code>midplane-versions</code> .	
expander-versions	Embedded; see <code>expander-versions</code> .	
psu-versions	Embedded; see <code>psu-versions</code> .	

## health-conditions

This basetype is used by `show controllers`, `show disks`, `show disk-groups`, `show enclosures`, `show expander-status`, `show fans`, `show pools`, `show power-supplies`, `show sas-link-health`.

**Table 58** health-conditions properties

Name	Type	Description
health-reason (health-reason-numeric)	string (uint32)	A message describing the alert condition. The numeric property shows the message ID.
reason-id	uint32	Not used.
health-recommendation (health-recommendation-numeric)	string (uint32)	A message specifying the recommended action to take to resolve the alert condition. The numeric property shows the message ID.

## heatmaps

This basetype is used by `show workload`.

**Table 59** heatmaps properties

Name	Type	Description
sample-interval	uint16	Sample interval.
sample-count	uint16	Number of samples used for calculations.
start-sample-time (start-sample-time-numeric)	string (uint32)	Datestamp for the first data sample used in calculations. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
stop-sample-time (stop-sample-time-numeric)	string (uint32)	Datestamp for the last data sample used in calculations. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.

**Table 59 heatmaps properties (continued)**

Name	Type	Description
capacity-a (capacity-a-numeric)	string (uint64)	Calculated capacity for the low target. The numeric property shows the unformatted value in blocks.
capacity-b (capacity-b-numeric)	string (uint64)	Calculated capacity for the medium target. The numeric property shows the unformatted value in blocks.
capacity-c (capacity-c-numeric)	string (uint64)	Calculated capacity for the high target. The numeric property shows the unformatted value in blocks.

## host

This basetype is used by `show host-groups`.

**Table 60 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 61 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.
url	string	For internal use only.
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 62** 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 <code>host-group.*.*</code> , where the first <code>*</code> represents all hosts in the group and the second <code>*</code> represents all initiators in those hosts.
ini-view-mappings	Embedded; see <code>host-view-mappings</code> .	
ini-view-initiators	Embedded; see <code>initiator-view</code> .	

## host-port-statistics

This basetype is used by `show host-port-statistics`.

**Table 63** host-port-statistics properties

Name	Type	Description
durable-id	string	Host port ID in the format <code>hostport_&lt;controller-ID-and-port-number&gt;</code> .
bytes-per-second (bytes-per-second-numeric)	string (uint64)	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. The numeric property shows the unformatted value in blocks.
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 (data-read-numeric)	string (uint64)	Amount of data read since these statistics were last reset or since the controller was restarted. The numeric property shows the unformatted value in blocks.
data-written (data-written-numeric)	string (uint64)	Amount of data written since these statistics were last reset or since the controller was restarted. The numeric property shows the unformatted value in blocks.
queue-depth	uint32	The number of pending I/O operations currently being serviced.
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 read and write 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 (reset-time-numeric)	string (uint32)	Date and time, in the format <code>&lt;year&gt;-&lt;month&gt;-&lt;day&gt; &lt;hour&gt;:&lt;minutes&gt;:&lt;seconds&gt;</code> , when these statistics were last reset, either by a user or by a controller restart. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.

**Table 63 host-port-statistics properties (continued)**

Name	Type	Description
start-sample-time (start-sample-time-numeric)	string (uint32)	Date and time, in the format <year>-<month>-<day> <hour>:<minutes>:<seconds>, when sampling started for the <code>iops</code> and <code>bytes-per-second</code> values. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
stop-sample-time (stop-sample-time-numeric)	string (uint32)	Date and time, in the format <year>-<month>-<day> <hour>:<minutes>:<seconds>, when sampling stopped for the <code>iops</code> and <code>bytes-per-second</code> values. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.

## host-view-mappings

This basetype is used by `show maps` when the `initiator` parameter is specified.

**Table 64 host-view-mappings properties**

Name	Type	Description
volume	string	Volume name.
volume-serial	string	Volume serial number.
lun	string	LUN assigned to the mapping.
access (access-numeric)	string (uint32)	Type of host access to the volume. <ul style="list-style-type: none"> <li>not-mapped (0): Not mapped.</li> <li>no-access (1): No access (masked).</li> <li>read-only (2): Read only.</li> <li>read-write (3): Read and write.</li> </ul>
ports	string	Controller host ports assigned to the mapping.

## initiator

This basetype is used by `show initiators`.

**Table 65 initiator properties**

Name	Type	Description
durable-id	string	Initiator ID.
nickname	string	The nickname of the initiator, or blank.
discovered	string	<ul style="list-style-type: none"> <li>Yes: The initiator was discovered and its entry was automatically created.</li> <li>No: The initiator was manually created.</li> </ul>
mapped	string	<ul style="list-style-type: none"> <li>Yes: At least one volume is explicitly mapped to the initiator.</li> <li>No: No volumes are explicitly mapped to the initiator.</li> </ul>
profile (profile-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Standard (0): Default profile.</li> <li>HP-UX (1): The host uses Flat Space Addressing.</li> <li>OpenVMS (2): The initiator does not allow LUN 0 to be assigned to a mapping.</li> </ul>
host-bus-type (host-bus-type-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>UNKNOWN (0)</li> <li>FC (6)</li> <li>SAS (8)</li> <li>iSCSI (9)</li> </ul>

**Table 65 initiator properties (continued)**

Name	Type	Description
id	string	<ul style="list-style-type: none"> <li>For an FC initiator, its WWPN.</li> <li>For a SAS initiator, its WWPN.</li> <li>For an iSCSI initiator, its node name (typically the IQN).</li> </ul>
url	string	For internal use only.
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` operator is specified.

**Table 66 initiator-view properties**

Name	Type	Description
id	string	<ul style="list-style-type: none"> <li>For an FC initiator, its WWPN.</li> <li>For a SAS initiator, its WWPN.</li> <li>For an iSCSI initiator, its node name (typically the IQN).</li> </ul>
hba-nickname	string	The nickname of the initiator.
host-profile (host-profile-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Standard (0): Default profile.</li> <li>HP-UX (1): The host uses Flat Space Addressing.</li> <li>OpenVMS (2): The initiator does not allow LUN 0 to be assigned to a mapping.</li> </ul>
host-view-mapping	Embedded; see <code>host-view-mappings</code> .	

## inquiry

This basetype is used by `show inquiry`.

**Table 67 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.
ip6-link-local-address	string	The link-local IPv6 address.
ip6-auto-address	string	The automatically configured IPv6 address, when applicable.
dhcpv6	string	The DHCP IPv6 address.
slaac-ip	string	The SLAAC IPv6 address.

**Table 67 inquiry properties (continued)**

Name	Type	Description
ip6-auto-address-source (ip6-auto-address-source-numeric)	string (uint32)	The method used to assign or compute the automatic address. <ul style="list-style-type: none"> <li>DHCPv6 (0)</li> <li>IPv6 SLAAC (1)</li> </ul>
ip61-address	string	First IPv6 address for the controller management port, if set.
ip62-address	string	Second IPv6 address for the controller management port, if set.
ip63-address	string	Third IPv6 address for the controller management port, if set.
ip64-address	string	Fourth IPv6 address for the controller management port, if set.
nvr-am-defaults	string	For internal use only.

## io-modules

This basetype is used by show enclosures for an expansion module.

**Table 68 io-modules properties**

Name	Type	Description
durable-id	string	Expansion module ID.
controller-id (controller-id-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>B (0): Controller B.</li> <li>A (1): Controller A.</li> </ul>
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 (mfg-date-numeric)	string (uint32)	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. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
mfg-location	string	City, state/province, and country where the FRU was manufactured.
mfg-vendor-id	string	JEDEC ID of the FRU manufacturer.
position (position-numeric)	string (uint32)	FRU position, as viewed from the back of the enclosure. <ul style="list-style-type: none"> <li>Left (0)</li> <li>Right (1)</li> <li>Top (2)</li> <li>Bottom (3)</li> </ul>
rotation (rotation-numeric)	string (uint32)	Rotation of the controller module in the enclosure. <ul style="list-style-type: none"> <li>0 Degrees (0)</li> <li>90 Degrees (1)</li> <li>180 Degrees (2)</li> <li>270 Degrees (3)</li> </ul>

**Table 68 io-modules properties (continued)**

Name	Type	Description
configuration-serialnumber	string	Configuration serial number.
phy-isolation (phy-isolation-numeric)	string (uint32)	Shows whether the automatic disabling of SAS expander PHYs having high error counts is enabled or disabled for this controller. <ul style="list-style-type: none"> <li>Enabled (0): PHY fault isolation is enabled.</li> <li>Disabled (1): PHY fault isolation is disabled.</li> </ul>
locator-led (locator-led-numeric)	string (uint32)	Shows the state of the locator LED on an expansion module. <ul style="list-style-type: none"> <li>Off (0)</li> <li>On (1)</li> </ul>
status (status-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Operational (0)</li> <li>Down (1)</li> <li>Not installed (2)</li> <li>Unknown (4)</li> </ul>
health (health-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>OK (0)</li> <li>Degraded (1)</li> <li>Fault (2)</li> <li>Unknown (3)</li> <li>N/A (4)</li> </ul>
health-reason	string	If Health is not OK, a message describes the reason for the health state.
health-recommendation	string	If Health is not OK, a message describes recommended actions to resolve the issue.
conditions	Embedded; see health-conditions.	
unhealthy-component	Embedded; see unhealthy-component.	
enclosure-id	Embedded; see expander-ports.	
expander-details	Embedded; see expanders.	

## ipv6-addresses

This basetype is used by `show ipv6-addresses`.

**Table 69 ipv6-addresses properties**

Name	Type	Description
controller (controller-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>B (0): Controller B.</li> <li>A (1): Controller A.</li> </ul>
index	uint8	The controller's index value for the address. For internal use only.
address-label	string	The name assigned to the address, or blank if the address is unnamed.
ipv6-address	string	The IPv6 address with prefix length.



## ipv6-network-parameters

This basetype is used by `show ipv6-network-parameters`.

**Table 70** ipv6-network-parameters properties

Name	Type	Description
controller (controller-numeric)	string (uint32)	<ul style="list-style-type: none"><li>• B (0): Controller B.</li><li>• A (1): Controller A.</li></ul>
firewall (firewall-numeric)	string (uint32)	For internal use only.
autoconfig (autoconfig-numeric)	string (uint32)	<ul style="list-style-type: none"><li>• Disabled (0)</li><li>• Enabled (1)</li></ul>
gateway	string	The gateway IP address.
link-local-address	string	The link-local IPv6 address.
autoconfig-ip	string	The auto-configured IPv6 address for the controller.
dhcpv6	string	The DHCP IPv6 address.
slaac-ip	string	The SLAAC IPv6 address.
ip6-address-1	string	First IPv6 address for the controller management port, if set.
ip6-label-1	string	First IPv6 address name, if set.
ip6-address-2	string	Second IPv6 address for the controller management port, if set.
ip6-label-2	string	Second IPv6 address name, if set.
ip6-address-3	string	Third IPv6 address for the controller management port, if set.
ip6-label-3	string	Third IPv6 address name, if set.
ip6-address-4	string	Fourth IPv6 address for the controller management port, if set.
ip6-label-4	string	Fourth IPv6 address name, if set.

## iscsi-parameters

This basetype is used by `show iscsi-parameters`.

**Table 71** iscsi-parameters properties

Name	Type	Description
chap (chap-numeric)	string (uint32)	Shows whether Challenge-Handshake Authentication Protocol (CHAP) is enabled. <ul style="list-style-type: none"><li>• Disabled (0): CHAP is disabled.</li><li>• Enabled (1): CHAP is enabled.</li></ul>
jumbo-frames (jumbo-frames-numeric)	string (uint32)	Shows whether support for jumbo frames is enabled. <ul style="list-style-type: none"><li>• Disabled (0): Jumbo-frame support is disabled.</li><li>• Enabled (1): Jumbo-frame support is enabled.</li></ul>
isns (isns-numeric)	string (uint32)	Shows whether support for Internet Storage Name Service (iSNS) is enabled. <ul style="list-style-type: none"><li>• Disabled (0): iSNS is disabled.</li><li>• Enabled (1): iSNS is enabled.</li></ul>
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.

**Table 71 iscsi-parameters properties (continued)**

Name	Type	Description
iscsi-speed (iscsi-speed-numeric)	string (uint32)	iSCSI host port link speed. <ul style="list-style-type: none"> <li>• auto (0): The proper speed is auto-negotiated.</li> <li>• 1Gbps (1): The speed is forced to 1Gb/s, overriding a downshift that can occur during auto-negotiation with 1Gb/s HBAs. This setting does not apply to 10Gb/s HBAs.</li> </ul>
iscsi-ip-version	uint8	iSCSI IP version. <ul style="list-style-type: none"> <li>• 4: iSCSI host port addresses use IPv4 format.</li> <li>• 6: iSCSI host port addresses use IPv6 format.</li> </ul>

## iscsi-port

This basetype is used by `show ports` for an iSCSI host port.

**Table 72 iscsi-port properties**

Name	Type	Description
ip-version	string	iSCSI IP version. <ul style="list-style-type: none"> <li>• IPv4: iSCSI host port addresses use IPv4 format.</li> <li>• IPv6: iSCSI host port addresses use IPv6 format.</li> </ul>
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.
mac-address	string	Unique Media Access Control (MAC) hardware address, also called the physical address.
sfp-status (sfp-status-numeric)	string (uint32)	SFP status. <ul style="list-style-type: none"> <li>• Not compatible (0): The SFP in this port is not qualified for use in this system. When this condition is detected, event 464 is logged.</li> <li>• Incorrect protocol (1): The SFP protocol does not match the port protocol. When this condition is detected, event 464 is logged.</li> <li>• Not present (2): No SFP is inserted in this port.</li> <li>• OK (3)</li> </ul>
sfp-present (sfp-present-numeric)	string (uint32)	Shows whether the port contains an SFP. <ul style="list-style-type: none"> <li>• Not Present (0)</li> <li>• Present (1)</li> </ul>
sfp-vendor	string	The SFP vendor.
sfp-part-number	string	The SFP part number.
sfp-revision	string	The SFP revision.

**Table 72 iscsi-port properties (continued)**

Name	Type	Description
sfp-10G-compliance (sfp-10G-compliance-numeric)	string (uint32)	The SFP's 10G compliance code, if supported, or N/A. If applicable, this property reports multiple values as a comma-separated list. <ul style="list-style-type: none"> <li>ER: Extended Reach</li> <li>LRM: Long Reach Multimode</li> <li>LR: Long Reach</li> <li>10Gb</li> <li>Special</li> </ul> The numeric property shows a computed hex value representing each list item that evaluates as true.
sfp-ethernet-compliance (sfp-ethernet-compliance-numeric)	string (uint32)	The SFP's Ethernet compliance code, if supported, or N/A. If applicable, this property reports multiple values as a comma-separated list. <ul style="list-style-type: none"> <li>BasePX</li> <li>BaseBX10</li> <li>100baseFX</li> <li>100baseLX</li> <li>1Gb</li> <li>1000baseCX</li> <li>1000baseLX</li> <li>1000baseSX</li> </ul> The numeric property shows a computed hex value representing each list item that evaluates as true.
sfp-cable-technology (sfp-cable-technology-numeric)	string (uint32)	Shows whether the SFP supports active or passive cable technology. If applicable, this property reports multiple values as a comma-separated list., or N/A if neither value is true. <ul style="list-style-type: none"> <li>Active</li> <li>Passive</li> </ul> The numeric property shows a computed hex value representing each list item that evaluates as true.
sfp-cable-length	string	The link length (in meters) that is supported by the SFP while operating in compliance with applicable standards for the cable type.

## ldap-parameters

This basetype is used by `show ldap-parameters`.

**Table 73 ldap-parameters properties**

Name	Type	Description
ldap-protocol (ldap-protocol-numeric)	string (uint32)	Shows whether LDAP support is enabled or disabled. <ul style="list-style-type: none"> <li>Disabled (0)</li> <li>Enabled (1)</li> </ul>
user-search-base	string	Attributes that define where to start searching for users in the LDAP directory tree.
ldap-server	string	The IP address or domain name of the primary LDAP server.
ldap-port	uint32	The port number to use for communication with the primary LDAP server. If not set, shows 636.
alternate-ldap-server	string	The address of the alternate LDAP server.
alternate-ldap-port	uint32	The port number to use for communication with the alternate LDAP server. If not set, shows 636.

# license

This basetype is used by `show license`.

**Table 74** license properties

Name	Type	Description
license-key	string	<ul style="list-style-type: none"><li>The license key, if a license is installed and valid.</li><li>Blank if a license is not installed.</li></ul>
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 (max-snapshots-expiry-numeric)	string (uint32)	Shows when the snapshot license will expire. <ul style="list-style-type: none"><li>Never (0): License is purchasable and doesn't expire.</li></ul>
virtualization (virtualization-numeric)	string (uint32)	Shows whether the capability to create and manage pools is enabled or disabled. <ul style="list-style-type: none"><li>Disabled (0): The capability is disabled.</li><li>Enabled (1): The capability is enabled.</li></ul>
virtualization-expiry (virtualization-expiry-numeric)	string (uint32)	Shows when the virtualization license will expire. <ul style="list-style-type: none"><li>Never (0): License doesn't expire.</li></ul>
performance-tier (performance-tier-numeric)	string (uint32)	Shows whether the capability to create a Performance tier comprised of SSDs is enabled or disabled. <ul style="list-style-type: none"><li>Disabled (0): The capability is disabled.</li><li>Enabled (1): The capability is enabled.</li></ul>
performance-tier-expiry (performance-tier-expiry-numeric)	string (uint32)	Shows when the performance tier license will expire. <ul style="list-style-type: none"><li>Never (0): License is purchasable and doesn't expire.</li></ul>
volume-copy (volume-copy-numeric)	string (uint32)	Shows whether the capability to copy volumes is enabled or disabled. <ul style="list-style-type: none"><li>Disabled (0): The capability is disabled.</li><li>Enabled (1): The capability is enabled.</li></ul>
volume-copy-expiry (volume-copy-expiry-numeric)	string (uint32)	Shows when the volume copy license will expire. <ul style="list-style-type: none"><li>Never (0): Always enabled and doesn't expire.</li></ul>
remote-snapshot-replication (remote-snapshot-replication-numeric)	string (uint32)	Shows whether the capability to replicate volumes to a remote system is enabled or disabled. <ul style="list-style-type: none"><li>Disabled (0): The capability is disabled.</li><li>Enabled (1): The capability is enabled.</li></ul>
remote-snapshot-replication-expiry (remote-snapshot-replication-expiry-numeric)	string (uint32)	Shows when the volume replication feature will expire. <ul style="list-style-type: none"><li>Never (0): License is purchasable and doesn't expire.</li></ul>

**Table 74 license properties (continued)**

Name	Type	Description
vds (vds-numeric)	string (uint32)	Shows whether the VDS (Virtual Disk Service) Hardware Provider is enabled. <ul style="list-style-type: none"> <li>Disabled (0): VDS is disabled.</li> <li>Enabled (1): VDS is enabled.</li> </ul>
vds-expiry (vds-expiry-numeric)	string (uint32)	Shows when the VDS (Virtual Disk Service) Hardware Provider will expire. <ul style="list-style-type: none"> <li>Never (0): Always enabled and doesn't expire.</li> </ul>
vss (vss-numeric)	string (uint32)	Shows whether the VSS (Volume Shadow Copy Service) Hardware Provider is enabled. <ul style="list-style-type: none"> <li>Disabled (0): VSS is disabled.</li> <li>Enabled (1): VSS is enabled.</li> </ul>
vss-expiry (vss-expiry-numeric)	string (uint32)	Shows when the VSS (Volume Shadow Copy Service) Hardware Provider will expire. <ul style="list-style-type: none"> <li>Never (0): Always enabled and doesn't expire.</li> </ul>
dsd (dsd-numeric)	string (uint32)	Shows whether the Drive Spin Down (DSD) feature is enabled. <ul style="list-style-type: none"> <li>Disabled (0): DSD is disabled.</li> <li>Enabled (1): DSD is enabled.</li> </ul>
dsd-expiry (dsd-expiry-numeric)	string (uint32)	Shows when the Drive Spin Down (DSD) feature will expire. <ul style="list-style-type: none"> <li>Never (0): Always enabled and doesn't expire.</li> </ul>
sra (sra-numeric)	string (uint32)	Shows whether Storage Replication Adapter (SRA) support is enabled. <ul style="list-style-type: none"> <li>Disabled (0): SRA is disabled.</li> <li>Enabled (1): SRA is enabled.</li> </ul>
sra-expiry (sra-expiry-numeric)	string (uint32)	Shows when the SRA feature will expire. <ul style="list-style-type: none"> <li>Never (0): Always enabled and doesn't expire.</li> </ul>

## local-ports

This basetype is used by `show peer-connections`.

**Table 75 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 76 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 SMU or FTP.

**Table 77** log-header-table properties

Name	Type	Description
log-contact	string	Contact person's name, if specified in the SMU <b>Collect Logs</b> panel.
log-email	string	Contact's email address, if specified in the SMU <b>Collect Logs</b> panel.
log-phone	string	Contact's phone number, if specified in the SMU <b>Collect Logs</b> panel.
log-comments	string	Comments describing the problem and specifying the date and time when the problem occurred, if specified in the SMU <b>Collect Logs</b> panel.
log-content	uint32	For internal use only.
log-timestamp (log-timestamp- numeric)	string (uint32)	Date and time, in the format <year>-<month>-<day> <hour>:<minutes>:<seconds> (UTC), when log content was saved to the file. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.

## logon-user-detail

This basetype is used by whoami.

**Table 78** logon-user-detail properties

Name	Type	Description
logon-user	string	The user name.
logon-user-type	string	<ul style="list-style-type: none"><li>Local: The user's credentials reside in the storage system.</li><li>LDAP: The user's credentials reside in an Active Directory LDAP server.</li></ul>
logon-usergroup	string	The group name for an LDAP user, or N/A for a local user.

## metrics-list

This basetype is used by show metrics-list.

**Table 79** metrics-list properties

Name	Type	Description
name	string	The name of the metrics list.
started (started-numeric)	string (uint32)	Shows whether metrics retention has started or not. <ul style="list-style-type: none"><li>No (0)</li><li>Yes (1)</li></ul>
type (type-numeric)	string (uint32)	The type of storage object in the metrics list. <ul style="list-style-type: none"><li>N/A (0)</li><li>Controller (1)</li><li>Host-port (2)</li><li>System (3)</li><li>Volume (4)</li><li>Pool (5)</li></ul>

**Table 79 metrics-list properties (continued)**

Name	Type	Description
field (field-numeric)	string (uint32)	The metric name. <ul style="list-style-type: none"> <li>time (0)</li> <li>total-bytes-per-second (1)</li> <li>total-iops (2)</li> <li>total-max-response-time (3)</li> <li>total-num-bytes (4)</li> <li>read-iops (5)</li> <li>write-iops (6)</li> <li>read-bytes-per-second (7)</li> <li>write-bytes-per-second (8)</li> <li>read-io-count (9)</li> <li>write-io-count (10)</li> <li>read-num-bytes (11)</li> <li>write-num-bytes (12)</li> <li>total-avg-response-time (13)</li> <li>read-avg-response-time (14)</li> <li>write-avg-response-time (15)</li> <li>read-max-response-time (16)</li> <li>write-max-response-time (17)</li> <li>read-avg-queue-depth (18)</li> <li>write-avg-queue-depth (19)</li> <li>small-destages (20)</li> <li>write-full-stripe-destages (21)</li> <li>read-ahead-ops (22)</li> <li>write-cache-space (23)</li> <li>write-cache-percent (24)</li> </ul>
serial-number	string	The serial number of the storage object.
time-start (time-start-numeric)	string (uint32)	The date and time when the metrics retention started. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
time-end (time-end-numeric)	string (uint32)	The date and time when the metrics retention ended. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.

## mgmt-hostnames

This basetype is used by show dns-management-hostname.

**Table 80 mgmt-hostnames properties**

Name	Type	Description
controller (controller-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>B (0): Controller B.</li> <li>A (1): Controller A.</li> </ul>
mgmt-hostname	string	The controller's management host name.
domain-name	string	The controller's FQDN if available.
default-hostname (default-hostname-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Disabled (0)</li> <li>Enabled (1)</li> </ul>

## midplane-versions

This basetype is used by `show versions` when the `frus` parameter is specified.

**Table 81 midplane-versions properties**

Name	Type	Description
<code>vpd-format-version</code>	string	Vital Product Data (VPD) version.
<code>vpd-crc</code>	string	VPD CRC.
<code>cfg-mismatch-version</code>	string	Configuration mismatch version.
<code>cpld-version</code>	string	Complex Programmable Logic Device (CPLD) firmware version.
<code>fru-descriptor</code>	string	FRU descriptor.
<code>part-number</code>	string	Midplane part number.
<code>midplane-serial-number</code>	string	Midplane serial number.

## network-parameters

This basetype is used by `show network-parameters`.

**Table 82 network-parameters properties**

Name	Type	Description
<code>durable-id</code>	string	Controller network port ID in the format <code>mgmtport_&lt;controller-ID&gt;</code> .
<code>active-version</code>	uint32	The configured network port IP version. <ul style="list-style-type: none"><li>• 4: IPv4</li><li>• 6: IPv6</li></ul>
<code>ip-address</code>	string	Controller network port IP address.
<code>gateway</code>	string	Controller network port gateway IP address.
<code>subnet-mask</code>	string	Controller network port IP subnet mask.
<code>mac-address</code>	string	Controller network port MAC address.
<code>addressing-mode</code> ( <code>addressing-mode-numeric</code> )	string (uint32)	<ul style="list-style-type: none"><li>• DHCP (0): DHCP is used to set network parameters.</li><li>• Manual (1): Network settings are set manually (statically).</li></ul>
<code>link-speed</code> ( <code>link-speed-numeric</code> )	string (uint32)	<ul style="list-style-type: none"><li>• 10mbps (0): The network port link speed is set to 10Mb/s.</li><li>• 100mbps (1): The network port link speed is set to 100Mb/s.</li><li>• 1000mbps (2): The network port link speed is set to 1000Mb/s.</li></ul>
<code>duplex-mode</code> ( <code>duplex-mode-numeric</code> )	string (uint32)	<ul style="list-style-type: none"><li>• full (0): The network port duplex mode is set to full duplex.</li><li>• half (1): The network port duplex mode is set to half duplex.</li></ul>
<code>auto-negotiation</code> ( <code>auto-negotiation-numeric</code> )	string (uint32)	Not supported.
<code>health</code> ( <code>health-numeric</code> )	string (uint32)	<ul style="list-style-type: none"><li>• OK (0)</li><li>• Degraded (1)</li><li>• Fault (2)</li><li>• Unknown (3)</li><li>• N/A (4)</li></ul>
<code>health-reason</code>	string	If Health is not OK, a message describes the reason for the health state.



**Table 82 network-parameters properties (continued)**

Name	Type	Description
health-recommendation	string	If Health is not OK, a message describes recommended actions to resolve the issue.
ping-broadcast (ping-broadcast-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Disabled (0): The system will not respond to a broadcast ping.</li> <li>Enabled (1): The system will respond to a broadcast ping.</li> </ul>

## ntp-status

This basetype is used by `show ntp-status`.

**Table 83 ntp-status properties**

Name	Type	Description
ntp-status	string	Shows whether use of Network Time Protocol (NTP) is enabled. <ul style="list-style-type: none"> <li>activated: NTP is enabled.</li> <li>deactivated: NTP is disabled.</li> </ul>
ntp-server-address	string	<ul style="list-style-type: none"> <li>The current NTP server IP address if NTP is enabled.</li> <li>The last-set NTP server IP address if NTP was enabled and has been disabled.</li> <li>0.0.0.0 if the NTP server IP address has not been set.</li> </ul>
ntp-contact-time	string	<ul style="list-style-type: none"> <li>Date and time, in the format &lt;year&gt;-&lt;month&gt;-&lt;day&gt; &lt;hour&gt;:&lt;minutes&gt;:&lt;seconds&gt; (UTC), of the last message received from the NTP server.</li> <li>none: No contact.</li> </ul>

## peer-connection-info

This basetype is used by `query peer-connection`.

**Table 84 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 enclosure 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 85 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 (connection-type-numeric)	string (uint32)	The type of ports being used for the peer connection. <ul style="list-style-type: none"><li>• FC (1)</li><li>• iSCSI (2)</li></ul>
connection-status (connection-status-numeric)	string (uint32)	<ul style="list-style-type: none"><li>• Offline (0): No connection is available to the remote system.</li><li>• Online (1): The systems have a valid connection.</li><li>• Suspended (2): The user has temporarily disabled the connection.</li></ul>
health (health-numeric)	string (uint32)	<ul style="list-style-type: none"><li>• OK (0)</li><li>• Fault (2)</li><li>• N/A (4)</li></ul>
health-reason	string	If Health is not OK, a message describes the reason for the health state.
health-recommendation	string	If Health is not OK, a message describes recommended actions to resolve the issue.
local-ports	Embedded; see local-ports.	
remote-ports	Embedded; see remote-ports.	

## peer-controllers

This basetype is used by `query peer-connection`.

**Table 86 peer-controllers properties**

Name	Type	Description
controller (controller-numeric)	string (uint32)	<ul style="list-style-type: none"><li>• B (0): Controller B.</li><li>• A (1): Controller A.</li></ul>
sc-fw	string	Storage Controller firmware version.
sc-loader	string	Storage Controller loader firmware version.
mc-fw	MadCap:snippetText src="..../Resources/Snippets/CLI_basetypes/string.flsnp" />	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.
host-name	string	The remote host name.
ip6-address-1	string	First IPv6 address for the controller management port, if set.
ip6-address-2	string	Second IPv6 address for the controller management port, if set.
ip6-address-3	string	Third IPv6 address for the controller management port, if set.

**Table 86 peer-controllers properties (continued)**

Name	Type	Description
ip6-address-4	string	Fourth IPv6 address for the controller management port, if set.
local-ports	Embedded; see peer-ports.	

## peer-ports

This basetype is used by query peer-connection.

**Table 87 peer-ports properties**

Name	Type	Description
local-host-port	string	The ID of the port in the local system.
connection-type (connection-type-numeric)	string (uint32)	The type of ports being used for the peer connection. <ul style="list-style-type: none"> <li>Unknown (0)</li> <li>FC (6)</li> <li>iSCSI (9)</li> </ul>
host-port-health (host-port-health-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Unknown (0)</li> <li>Down (1, 6, 7, 8)</li> <li>Up (2, 4, 5)</li> <li>Degraded (3)</li> <li>SFP Issue (9)</li> </ul>
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 88 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 (total-data-transferred-numeric)	string (uint64)	Total amount of data read and written since the last sampling time. The numeric property shows the unformatted value.
data-read (data-read-numeric)	string (uint64)	Amount of data read since the last sampling time. The numeric property shows the unformatted value.
data-written (data-written-numeric)	string (uint64)	Amount of data written since the last sampling time. The numeric property shows the unformatted 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.

**Table 88 pool-hist-statistics properties (continued)**

Name	Type	Description
total-bytes-per-sec (total-bytes-per-sec-numeric)	string (uint64)	Total data transfer rate, in bytes per second, since the last sampling time. The numeric property shows the unformatted value.
read-bytes-per-sec (read-bytes-per-sec-numeric)	string (uint64)	Data transfer rate, in bytes per second, for read operations since the last sampling time. The numeric property shows the unformatted value.
write-bytes-per-sec (write-bytes-per-sec-numeric)	string (uint64)	Data transfer rate, in bytes per second, for write operations last sampling time. The numeric property shows the unformatted value.
number-of-allocated-pages	uint64	The number of 4MB pages allocated to volumes in the pool.
sample-time (sample-time-numeric)	string (uint32)	Date and time, in the format <year>-<month>-<day> <hour>:<minutes>:<seconds>, when the data sample was taken. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.

## pools

This basetype is used by `show configuration` and `show pools`.

**Table 89 pools properties**

Name	Type	Description
name	string	The name of the pool.
serial-number	string	The serial number of the pool.
url	string	Pool URL.
storage-type (storage-type-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Virtual (1): The disk group is in a virtual pool.</li> </ul>
blocksize	uint32	The size of a block, in bytes.
total-size (total-size-numeric)	string (uint64)	The total capacity of the pool. The numeric property shows the unformatted value in blocks.
total-avail (total-avail-numeric)	string (uint64)	The available capacity in the pool. The numeric property shows the unformatted value in blocks.
snap-size (snap-size-numeric)	string (uint64)	Not applicable.
allocated-pages	uint32	For a pool, the number of 4MB pages that are currently in use.
available-pages	uint32	For a pool, the number of 4MB pages that are still available to be allocated.
overcommit (overcommit-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Disabled (0): The capacity allocated to volumes when they are created cannot exceed the physical capacity of the pool.</li> <li>Enabled (1): The pool uses thin provisioning, which means that more capacity can be allocated to volumes than physically exists in the pool.</li> </ul>
over-committed (over-committed-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>False (0): The pool is not overcommitted.</li> <li>True (1): The pool is overcommitted.</li> </ul>
disk-groups	uint16	The number of disk groups in the pool.
volumes	uint16	The number of volumes in the pool.

**Table 89 pools properties (continued)**

Name	Type	Description
page-size (page-size-numeric)	string (uint64)	The page size, formatted to use the current base, precision, and units. The numeric property shows the unformatted 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 as the available capacity of the pool minus 400GiB — or if that result is below the mid threshold, then mid threshold capacity plus 1%.
utility-running (utility-running-numeric)	string (uint32)	Job running on the disk group, if any. <ul style="list-style-type: none"> <li>Blank (0): No job is running.</li> <li>INIT (2): The disk group is initializing.</li> <li>RCON (3): At least one disk in the disk group is being reconstructed.</li> <li>VERFY (4): The disk group is being verified.</li> <li>VRSC (6): The disk group is being scrubbed.</li> <li>DRSC (7): A disk is being scrubbed.</li> <li>VREMV (9): The disk group and its data are being removed.</li> <li>VPREP (12): The disk group is being prepared for use in a pool.</li> <li>VDRAIN (13): The disk group is being removed and its data is being drained to another disk group.</li> <li>VRECV (14): The disk group is being recovered to restore its membership in the pool.</li> <li>PRERCON (15): At least one disk in the disk group is being preemptively reconstructed.</li> <li>RBAL (16): The MSA-DP+ disk group is being rebalanced.</li> <li>REFT (17): The MSA-DP+ disk group's fault-tolerant stripes are being rebalanced.</li> </ul>
preferred-owner (preferred-owner-numeric)	string (uint32)	Controller that owns the disk group and its volumes during normal operation. <ul style="list-style-type: none"> <li>B (0): Controller B.</li> <li>A (1): Controller A.</li> </ul>
owner (owner-numeric)	string (uint32)	Either the preferred owner during normal operation or the partner controller when the preferred owner is offline. <ul style="list-style-type: none"> <li>B (0): Controller B.</li> <li>A (1): Controller A.</li> </ul>
rebalance (rebalance-numeric)	string (uint32)	For internal use only.
migration (migration-numeric)	string (uint32)	For internal use only.
zero-scan (zero-scan-numeric)	string (uint32)	For internal use only.
idle-page-check (idle-page-check-numeric)	string (uint32)	For internal use only.
read-flash-cache (read-flash-cache-numeric)	string (uint32)	For internal use only.
metadata-vol-size (metadata-vol-size-numeric)	string (uint64)	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. The numeric property shows the unformatted value in blocks.

**Table 89 pools properties (continued)**

Name	Type	Description
total-rfc-size (total-rfc-size-numeric)	string (uint64)	The total size in blocks of the read cache in the pool. The numeric property shows the unformatted value in blocks.
available-rfc-size (available-rfc-size-numeric)	string (uint64)	The unused read-cache space in blocks that is available for use by the pool. The numeric property shows the unformatted value in blocks.
reserved-size (reserved-size-numeric)	string (uint64)	The total number of pages that are reserved for volumes in the pool. The numeric property shows the unformatted value in blocks.
reserved-unalloc-size (reserved-unalloc-size-numeric)	string (uint64)	The total number of pages that are reserved, but not yet allocated, for volumes in the pool. The numeric property shows the unformatted value in blocks.
pool-sector-format (pool-sector-format-numeric)	string (uint32)	The sector format of disks in the disk group. <ul style="list-style-type: none"> <li>512n (0): All disks use 512-byte native sector size. Each logical block and physical block is 512 bytes.</li> <li>512e (1): 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.</li> <li>Mixed (3): 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).</li> </ul>
metadata-allocated (metadata-allocated-numeric)	string (uint64)	Pool metadata currently in use. The numeric property shows the unformatted value in blocks.
metadata-available (metadata-available-numeric)	string (uint64)	Pool metadata available capacity. The numeric property shows the unformatted value in blocks.
metadata-total-size (metadata-total-size-numeric)	string (uint64)	Disk group metadata total size. The numeric property shows the unformatted value in blocks.
extended-status	uint64	A bitmap that represents all alert conditions active on the component. If no conditions are active, 0.
health (health-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>OK (0)</li> <li>Degraded (1)</li> <li>Fault (2)</li> <li>Unknown (3)</li> <li>N/A (4)</li> </ul>
health-reason (health-reason-numeric)	string (uint32)	If Health is not OK, a message describes the reason for the health state. The numeric property shows the message ID.
health-recommendation (health-recommendation-numeric)	string (uint32)	If Health is not OK, a message describes recommended actions to resolve the issue. The numeric property shows the message ID.
conditions	Embedded; see health-conditions.	
disk-groups	Embedded; see disk-groups.	

**Table 89 pools properties (continued)**

Name	Type	Description
tiers	Embedded;	see tiers.
unhealthy-component	Embedded;	see unhealthy-component.

## pool-statistics

This basetype is used by `show pool-statistics`.

**Table 90 pool-statistics properties**

Name	Type	Description
sample-time (sample-time-numeric)	string (uint32)	Date and time, in the format <year>-<month>-<day> <hour>:<minutes>:<seconds>, when the data sample was taken. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
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 4MB 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 4MB 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.
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 4MB 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.
reset-table-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 91 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.

## port

This basetype is used by `show configuration` and `show ports`.

**Table 92 port properties**

Name	Type	Description
durable-id	string	Controller host port ID in the format <code>hostport_&lt;controller-ID-and-port-number&gt;</code> .
controller (controller-numeric)	string (uint32)	<ul style="list-style-type: none"><li>B (0): Controller B.</li><li>A (1): Controller A.</li></ul>
port	string	Controller ID and port number.
url	string	For internal use only.
port-type (port-type-numeric)	string (uint32)	<ul style="list-style-type: none"><li>UNKNOWN (0)</li><li>FC (6): Fibre Channel.</li><li>SAS (8): Serial Attached SCSI.</li><li>iSCSI (9): Internet SCSI.</li></ul>
media	string	<ul style="list-style-type: none"><li>FC (P): Fibre Channel Point-to-Point.</li><li>FC (L): Fibre Channel-Arbitrated Loop (public or private).</li><li>FC (-): Not applicable, as when the port is disconnected.</li><li>SAS: Serial Attached SCSI.</li><li>iSCSI: Internet SCSI.</li></ul>
target-id	string	<ul style="list-style-type: none"><li>For an FC port, its WWPN.</li><li>For a SAS port, its WWPN.</li><li>For an iSCSI port, its node name (typically the IQN).</li></ul>
status (status-numeric)	string (uint32)	Port status. <ul style="list-style-type: none"><li>Up (0): The port is cabled and has an I/O link.</li><li>Warning (1): Not all of the port's PHYs are up.</li><li>Error (2): The port is reporting an error condition.</li><li>Not Present (3): The controller module is not installed or is down.</li><li>Disconnected (6): Either no I/O link is detected or the port is not cabled.</li></ul>



**Table 92 port properties (continued)**

Name	Type	Description
actual-speed (actual-speed-numeric)	string (uint32)	Actual link speed in Mb/s or Gb/s. <ul style="list-style-type: none"> <li>• 1Gb (0)</li> <li>• 4Gb (2)</li> <li>• 6Gb (6)</li> <li>• 8Gb (7)</li> <li>• 10Mb (8)</li> <li>• 100Mb (9)</li> <li>• 12Gb (11)</li> <li>• 16Gb (12) (MSA 2060 only)</li> <li>• Blank (255): Port is disconnected.</li> </ul>
configured-speed (configured-speed-numeric)	string (uint32)	Configured host-port link speed in Gb/s. <ul style="list-style-type: none"> <li>• 1Gb (0)</li> <li>• 4Gb (2)</li> <li>• Auto (3)</li> <li>• 8Gb (7)</li> <li>• 12Gb (11)</li> <li>• 16Gb (12) (MSA 2060 only)</li> </ul>
fan-out	uint8	Applicable to an MSA 1060SAS controller module only. <ul style="list-style-type: none"> <li>• Disabled: The port is configured to use a standard cable.</li> <li>• Enabled: The port is configured to use a fan-out cable.</li> </ul>
health (health-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• OK (0)</li> <li>• Degraded (1)</li> <li>• Fault (2)</li> <li>• Unknown (3)</li> <li>• N/A (4)</li> </ul>
health-reason	string	If Health is not OK, a message describes the reason for the health state.
health-recommendation	string	If Health is not OK, a message describes recommended actions to resolve the issue.
port-details	Embedded; see <code>fc-port</code> , <code>iscsi-port</code> , <code>sas-port</code> .	

## power-supplies

This basetype is used by `show power-supplies`.

**Table 93 power-supplies properties**

Name	Type	Description
durable-id	string	Power supply ID in the format <code>psu_&lt;enclosure-ID&gt;.&lt;power-supply-number&gt;</code> .
url	string	For internal use only.
enclosures-url	string	For internal use only.
enclosure-id	uint32	Enclosure ID.
dom-id	uint32	For internal use only.
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.

**Table 93 power-supplies properties (continued)**

Name	Type	Description
fw-revision	string	<ul style="list-style-type: none"> <li>Blank: Not applicable.</li> <li>Firmware revision of the power supply.</li> </ul>
revision	string	FRU hardware revision level.
model	string	Power supply model.
vendor	string	Power supply vendor.
location	string	Power supply location, as viewed from the back of the enclosure.
position (position-numeric)	string (uint32)	FRU position, as viewed from the back of the enclosure. <ul style="list-style-type: none"> <li>Left (0)</li> <li>Right (1)</li> <li>Top (2)</li> <li>Bottom (3)</li> </ul>
dash-level	string	FRU template revision number.
fru-shortname	string	FRU short description.
mfg-date (mfg-date-numeric)	string (uint32)	Date and time, in the format <year><month><day> <hour><minutes><seconds> (UTC), when the power supply module was manufactured. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
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.
dc5v		
dc33v		
dc12i		
dc5i		
dctemp		
health (health-numeric)		
health-reason	string	If Health is not OK, a message describes the reason for the health state..
health-recommendation	string	If Health is not OK, a message describes recommended actions to resolve the issue..
status (status-numeric)	string (uint32)	Power supply status. <ul style="list-style-type: none"> <li>Up (0)</li> <li>Warning (1)</li> <li>Error (2)</li> <li>Not Present (3)</li> <li>Unknown (4)</li> </ul>
conditions	Embedded; see health-conditions.	
unhealthy-component	Embedded; see unhealthy-component.	
fan-details	Embedded; see fan.	

## product-info

This basetype is used by `show inquiry`.

**Table 94 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.
scsi-product-id	string	Product name returned by the SCSI INQUIRY command.

## provisioning

This basetype is used by `show provisioning`.

**Table 95 provisioning properties**

Name	Type	Description
volume	string	<ul style="list-style-type: none"><li>Volume name.</li><li>Blank if the pool does not have a volume.</li></ul>
volume-serial	string	Volume serial number.
wwn	string	<ul style="list-style-type: none"><li>Volume World Wide Name.</li><li>Blank if the pool does not have a volume.</li></ul>
controller (controller-numeric)	string (uint32)	Owning controller of the pool. <ul style="list-style-type: none"><li>B (0): Controller B.</li><li>A (1): Controller A.</li></ul>
disk-display	string	Shorthand list of the disks within a pool.
disk-display-full	string	List or range of the disks in the pool specified by the <code>virtual-disk</code> property.
virtual-disk	string	Name of the pool.
virtual-disk-serial	string	Serial number of the pool.
health (health-numeric)	string (uint32)	Health of the associated pool. <ul style="list-style-type: none"><li>OK (0)</li><li>Degraded (1)</li><li>Fault (2)</li><li>Unknown (3)</li><li>N/A (4)</li></ul>
mapped	string	<ul style="list-style-type: none"><li>Yes: The volume is mapped.</li><li>No: The volume is not mapped.</li></ul>
lun-view		Embedded; see <code>volume-view-mappings</code> .

## proxy-server

This basetype is used by `show proxy-server`.

**Table 96 proxy-server properties**

Name	Type	Description
proxy-state (proxy-state-numeric)	string (uint32)	The proxy state, either Enabled or Disabled.
host	string	The proxy server address.
port	string	Proxy server port numbers, if set.
user	string	The username to access the proxy server, if set.
password	string	The password to access the proxy server, even if not set; shown encrypted.

## psu-versions

This basetype is used by `show versions` when the `frus` parameter is specified.

**Table 97 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.
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 98 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 (total-data-transferred-numeric)	string (uint64)	Total amount of data read and written since the last sampling time. The numeric property shows the unformatted value in blocks.
data-read (data-read-numeric)	string (uint64)	Amount of data read since the last sampling time. The numeric property shows the unformatted value in blocks.
data-written (data-written-numeric)	string (uint64)	Amount of data written since the last sampling time. The numeric property shows the unformatted value in blocks.
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.

**Table 98 readcache-hist-statistics properties (continued)**

Name	Type	Description
write-iops	uint64	The number of write operations per second since the last sampling time.
total-bytes-per-sec (total-bytes-per-sec-numeric)	string (uint64)	Total data transfer rate, in bytes per second, since the last sampling time. The numeric property shows the unformatted value in blocks.
read-bytes-per-sec (read-bytes-per-sec-numeric)	string (uint64)	Data transfer rate, in bytes per second, for read operations since the last sampling time. The numeric property shows the unformatted value in blocks.
write-bytes-per-sec (write-bytes-per-sec-numeric)	string (uint64)	Data transfer rate, in bytes per second, for write operations last sampling time. The numeric property shows the unformatted value in blocks.
number-of-allocated-pages	uint64	The number of 4MB 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 (sample-time-numeric)	string (uint32)	Date and time, in the format <year>-<month>-<day> <hour>:<minutes><seconds>, when the data sample was taken. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.

## redfish-persistent-data

This basetype is used by show redfish-persistent-data.

**Table 99 redfish-persistent-data properties**

Name	Type	Description
composition-service (composition-service-numeric)	string (uint32)	Shows whether the composition service is Enabled or Disabled.
systems-log-service (systems-log-service-numeric)	string (uint32)	Shows whether the systems log service is Enabled or Disabled.
task-service (task-service-numeric)	string (uint32)	Shows whether the task service is Enabled or Disabled.
update-service (update-service-numeric)	string (uint32)	Shows whether the update service is Enabled or Disabled.
update-monitor-task-a (update-monitor-task-a-numeric)	string (uint32)	Shows whether the update monitor task for controller A is Enabled or Disabled.
update-monitor-task-a-start-time (update-monitor-task-a-start-time-numeric)	string (uint32)	Shows the update monitor start time setting for controller A. If the start time is not set, the value is blank.

**Table 99 redfish-persistent-data properties (continued)**

Name	Type	Description
update-monitor-task-b (update-monitor-task-b-numeric)	string (uint32)	Shows whether the update monitor task for controller B is Enabled or Disabled.
update-monitor-task-b-start-time (update-monitor-task-b-start-time-numeric)	string (uint32)	Shows the update monitor start time setting for controller B. If the start time is not set, the value is blank.

## redundancy

This basetype is used by `show redundancy-mode`.

**Table 100 redundancy properties**

Name	Type	Description
redundancy-mode (redundancy-mode-numeric)	string (uint32)	<p>The system's operating mode, also called the cache redundancy mode.</p> <ul style="list-style-type: none"> <li>Active-Active ULP (8): 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.</li> <li>Failed Over (10): Operation has failed over to one controller because its partner is not operational. The system has lost redundancy.</li> <li>Down (11): Both controllers are not operational.</li> </ul>
redundancy-status (redundancy-status-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Operational but not redundant (0): In active-active mode, one controller is operational and the other is offline.</li> <li>Redundant (2): Both controllers are operational.</li> <li>Down (4): This controller is not operational.</li> <li>Unknown (5): Status information is not available.</li> </ul>
controller-a-status (controller-a-status-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Operational (0): The controller is operational.</li> <li>Down (1): The controller is installed but not operational.</li> <li>Not installed (2): The controller is not installed.</li> <li>Unknown (4)</li> </ul>
controller-a-serial-number	string	<ul style="list-style-type: none"> <li>Controller module serial number.</li> <li>Not Available: The controller is down or not installed.</li> </ul>
controller-b-status (controller-b-status-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Operational (0): The controller is operational.</li> <li>Down (1): The controller is installed but not operational.</li> <li>Not installed (2): The controller is not installed.</li> <li>Unknown (4)</li> </ul>
controller-b-serial-number	string	<ul style="list-style-type: none"> <li>Controller module serial number.</li> <li>Not Available: The controller is down or not installed.</li> </ul>

**Table 100 redundancy properties (continued)**

Name	Type	Description
other-MC-status (other-MC-status-numeric)	string (uint32)	The operational status of the Management Controller in the partner controller. This is not factored into system health. <ul style="list-style-type: none"> <li>Unknown (0): The operational status of the partner Management Controller cannot be determined.</li> <li>Not Communicating (1): The partner Management Controller is not ready to communicate.</li> <li>Not Operational (2): The local Management Controller has established communication with the partner Management Controller, but the partner is not responding because it is not currently in active-active or failed-over state.</li> <li>Operational (3): The partner Management Controller is responding normally.</li> </ul>
system-ready (system-ready-numeric)	string (uint32)	Shows whether the system is ready for running a script. <ul style="list-style-type: none"> <li>Ready (0): The system is ready.</li> <li>Not Ready (1): The system is not ready.</li> </ul>
local-ready (local-ready-numeric)	string (uint32)	Shows the local controller's contribution towards <code>system-ready</code> . <ul style="list-style-type: none"> <li>Ready (0): The local controller's contribution is ready.</li> <li>Storage Controller is Not Ready (1): The Storage Controller's contribution is not ready.</li> <li>Management Controller is Not Ready (2): The Management Controller's contribution is not ready.</li> <li>Activity is currently in progress (3): A partner firmware update, firmware installation, or log retrieval is in progress. Wait for that operation to complete and try again.</li> </ul>
local-reason	string	The explanation for the <code>local-ready</code> value.
other-ready (other-ready-numeric)	string (uint32)	Shows the partner controller's contribution towards <code>system-ready</code> . <ul style="list-style-type: none"> <li>Ready (0): The partner controller's contribution is ready.</li> <li>Storage Controller is Not Ready (1): The Storage Controller's contribution is not ready.</li> <li>Management Controller is Not Ready (2): The Management Controller's contribution is not ready.</li> <li>Activity is currently in progress (3): A partner firmware update, firmware installation, or log retrieval is in progress. Wait for that operation to complete and try again.</li> </ul>
other-reason	string	The explanation for the <code>other-ready</code> value.

## remote-ports

This basetype is used by `show peer-connections`.

**Table 101 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 102 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 103 remote-system properties**

Name	Type	Description
id	string	Remote system ID.
system-name	string	<ul style="list-style-type: none"><li>The name of the remote system.</li><li>Uninitialized Name: The default value.</li></ul>
system-contact	string	<ul style="list-style-type: none"><li>The name of the person who administers the remote system.</li><li>Uninitialized Contact: The default value.</li></ul>
system-location	string	<ul style="list-style-type: none"><li>The location of the remote system.</li><li>Uninitialized Location: The default value.</li></ul>
system-information	string	<ul style="list-style-type: none"><li>A brief description of the remote system.</li><li>Uninitialized Info: The default value.</li></ul>
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	<ul style="list-style-type: none"><li>The IP address of the network port in controller A in the remote system.</li><li>Not Present</li></ul>
ip-address-b	string	<ul style="list-style-type: none"><li>The IP address of the network port in controller B in the remote system.</li><li>Not Present</li></ul>
username	string	The name of a user that is configured in the remote system. This must be a user with the <code>manage</code> role to remotely configure or provision that system.
status (status-numeric)	string (uint32)	<ul style="list-style-type: none"><li>Uninitialized (0): This system hasn't communicated with the remote system.</li><li>Ready (1): This system has contacted the remote system and it is ready to use.</li><li>Connected(2): This system is transferring data to the remote system.</li><li>Not Connected (4): The system is not connected to the remote system.</li></ul>
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 <code>Not Connected</code> .
interfaces (interfaces-numeric)	string (uint32)	<ul style="list-style-type: none"><li>FC (0)</li><li>iSCSI (1)</li><li>SAS (2)</li></ul>



**Table 103 remote-system properties (continued)**

Name	Type	Description
storage-model (storage-model-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Paged (1)</li> </ul>
isvalid-ip-a (isvalid-ip-a-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>False (0): The IP address is not valid for controller module A in the remote system.</li> <li>True (1): The IP address is valid for controller module A in the remote system.</li> </ul>
isvalid-ip-b (isvalid-ip-b-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>False (0): The IP address is not valid for controller module B in the remote system.</li> <li>True (1): The IP address is valid for controller module B in the remote system.</li> </ul>

## replication-snapshot-history

This basetype is used by `show replication-snapshot-history`.

**Table 104 replication-snapshot-history properties**

Name	Type	Description
name	string	The replication set name.
serial-number	string	The replication set serial number.
snapshot-history (snapshot-history-numeric)	string (uint32)	<p>Specifies whether to maintain a replication snapshot history for the replication set.</p> <ul style="list-style-type: none"> <li>disabled (0): A snapshot history will not be kept.</li> <li>secondary (1): A snapshot history set will be kept on the secondary system for the secondary volume.</li> <li>both (2): A snapshot history will be kept for the primary volume on the primary system and for the secondary volume on the secondary system.</li> </ul>
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.
retention-priority (retention-priority-numeric)	string (uint32)	<p>The retention priority for snapshots, which is used when automatic deletion of snapshots is enabled by using the <code>set snapshot-space</code> 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.</p> <ul style="list-style-type: none"> <li>never-delete (0): 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.</li> <li>low (1): Snapshots can be deleted.</li> <li>medium (2): Snapshots can be deleted after all eligible low-priority snapshots have been deleted.</li> <li>high (3): Snapshots can be deleted after all eligible medium-priority snapshots have been deleted.</li> </ul>
current-replication-snapshots	Embedded; see <code>current-replication-snapshots</code> .	

## reset-snapshot-tasks

This basetype is used by `show tasks` for a `ResetSnapshot` task.

**Table 105** 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 106** 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 (data-read-numeric)	string (uint64)	Amount of data read since these statistics were last reset or since the controller was restarted. The numeric property shows the unformatted value in blocks.
data-written (data-written-numeric)	string (uint64)	Amount of data written since these statistics were last reset or since the controller was restarted. The numeric property shows the unformatted value in blocks.
bytes-per-second (bytes-per-second-numeric)	string (uint64)	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. The numeric property shows the unformatted value in blocks.
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 107** 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 to 3 for host port PHYs. Each SAS host will have multiple PHYs.
disparity-errors	hex32	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	hex32	The number of times the PHY has lost doubleword synchronization and restarted the Link Reset sequence.
invalid-dwords	hex32	The number of invalid doublewords that have been received by the PHY, not including those received during Link Reset sequences.
reset-error-counter	hex32	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 108** sas-port properties

Name	Type	Description
configured-topology (configured-topology-numeric)	string (uint32)	Direct (0)
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 <code>Warning</code> , the health will change to <code>Degraded</code> , and event 354 will be logged.
sas-disabled-lanes	uint8	Number of disabled lanes in the SAS port. If the fan-out setting does not match the type of cable connected to the port, event 569 will report two lanes in the port are disabled. This field can be used to identify those lanes.

## sas-status-controller-a

This basetype is used by `show expander-status`.

**Table 109** sas-status-controller-a properties

Name	Type	Description
enclosure-id	uint32	Enclosure ID.
drawer-id	uint8	<ul style="list-style-type: none"><li>• 255: N/A</li></ul>
baseplane-id	uint8	Baseplane ID.
expander-id	uint8	Expander ID.

**Table 109 sas-status-controller-a properties (continued)**

Name	Type	Description
controller (controller-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>B (0): Controller B.</li> <li>A (1): Controller A.</li> </ul>
wide-port-index	uint32	The wide-port index.
phy-index	uint32	The PHY index.
wide-port-role (wide-port-role-numeric)	string (uint32)	The wide-port role. <ul style="list-style-type: none"> <li>Unknown (0)</li> <li>Drive (1)</li> <li>Expansion Egress (4)</li> <li>Expansion Ingress (5)</li> <li>SC Primary (6)</li> <li>SC Alternate (7)</li> <li>Inter Expander (8)</li> <li>Unused (9)</li> </ul>
wide-port-num	uint32	The wide-port number.
type	string	The PHY type. <ul style="list-style-type: none"> <li>Drive: Drive slot PHY.</li> <li>SC-P: Storage Controller primary PHY.</li> <li>SC-A: Storage Controller alternate PHY.</li> <li>Expander-Universal-0: Expansion port 0 universal PHY.</li> <li>Expander-Universal-1: Expansion port 1 universal PHY.</li> <li>Expander-Universal-2: Expansion port 2 universal PHY.</li> </ul>
status (status-numeric)	string (uint32)	PHY status. <ul style="list-style-type: none"> <li>Unavailable (0): No status information is available.</li> <li>Enabled - Healthy (1): The PHY is enabled and healthy.</li> <li>Enabled - Degraded (2): The PHY is enabled but degraded.</li> <li>Disabled (3): The PHY has been disabled by a user or by the system.</li> </ul>
elem-status (elem-status-numeric)	string (uint32)	The SES status that corresponds to the PHY status. <ul style="list-style-type: none"> <li>Error (0, 4): Unrecoverable condition is detected. Appears only if there is a firmware problem related to PHY definition data.</li> <li>OK (1): Element is installed and no error conditions are known.</li> <li>Disabled (2): Critical condition is detected.</li> <li>Non-critical (3): Non-critical condition is detected.</li> <li>Not Used (5): Element is not installed in enclosure.</li> <li>Unknown (6): Element is installed with no known errors, but the element has not been turned on or set into operation.</li> <li>Unknown (7): 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.</li> </ul>
elem-disabled (elem-disabled-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Disabled (0): PHY is disabled.</li> <li>Enabled (1): PHY is enabled.</li> </ul>

**Table 109 sas-status-controller-a properties (continued)**

Name	Type	Description
elem-reason (elem-reason-numeric)	string (uint32)	More information about the status value. <ul style="list-style-type: none"> <li>Blank (0): elem-status is OK.</li> <li>Error count interrupts (3): PHY disabled because of error-count interrupts.</li> <li>PHY control (5): PHY disabled by a SES control page as a result of action by a Storage Controller or user.</li> <li>Not ready (6): PHY is enabled but not ready. Appears for SC PHYs when the partner I/O module is not installed. Appears for Drive, SC, or Ingress PHYs when a connection problem exists such as a broken connector.</li> <li>Firmware reboot (7): PHY disabled because of a firmware reboot.</li> <li>Disk removed (8): PHY disabled because drive slot is empty.</li> <li>Unused - disabled by default (9): PHY is disabled by default because it is not used.</li> <li>Excessive PHY changes (10) : PHY is disabled because of excessive PHY change counts.</li> <li>Did not initialize (11): PHY is enabled but not ready because it did not pass COMINIT.</li> </ul>
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 do not alternate.
crc-errors	hex32	In a sequence of SAS transfers (frames), the data is protected by a cyclic redundancy check (CRC) value. The <code>crc-errors</code> 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.

## schedules

This basetype is used by `show schedules`.

**Table 110 schedules properties**

Name	Type	Description
name	string	Schedule name.
schedule-specification	string	Schedule settings for running the associated task.

**Table 110** schedules properties (continued)

Name	Type	Description
status	string	Schedule status. <ul style="list-style-type: none"> <li>Uninitialized: The schedule is not yet ready to run.</li> <li>Ready: The schedule is ready to run at the next scheduled time.</li> <li>Suspended: The schedule had an error and is holding in its current state.</li> <li>Expired: The schedule has exceeded a constraint and will not run again.</li> <li>Invalid: The schedule is invalid.</li> <li>Deleted: The task has been deleted.</li> </ul>
next-time (next-time-numeric)	string (uint32)	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. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
last-initiated (last-initiated-numeric)	string (uint32)	Date and time, in the format <year>-<month>-<day> <hour>:<minutes>:<seconds> (UTC), when the schedule was last run, or N/A if the schedule has not yet run. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
task-to-run	string	Name of the task that the schedule runs.
error-message	string	<ul style="list-style-type: none"> <li>If an error occurred while running the schedule, the error message.</li> <li>Blank if no error occurred.</li> </ul>
task	Embedded; see tasks.	

## security-communications-protocols

This basetype is used by show protocols.

**Table 111** security-communications-protocols properties

Name	Type	Description
wbi-http (wbi-http-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Disabled (0): The standard SMU web server is disabled.</li> <li>Enabled (1): The standard SMU web server is enabled.</li> </ul>
wbi-https (wbi-https-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Disabled (0): The secure SMU web server is disabled.</li> <li>Enabled (1): The secure SMU web server is enabled.</li> </ul>
cli-telnet (cli-telnet-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Disabled (0): The standard CLI is disabled.</li> <li>Enabled (1): The standard CLI is enabled.</li> </ul>
cli-ssh (cli-ssh-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Disabled (0): The secure shell CLI is disabled.</li> <li>Enabled (1): The secure shell CLI is enabled.</li> </ul>
smis (smis-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Disabled (0): The secure SMI-S interface is disabled.</li> </ul>
usmis (usmis-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Disabled (0): The insecure SMI-S interface is disabled.</li> </ul>
slp (slp-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Disabled (0): The SLP interface is disabled.</li> <li>Enabled (1): The SLP interface is enabled.</li> </ul>
ftp (ftp-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Disabled (0): The FTP interface is disabled.</li> <li>Enabled (1): The FTP interface is enabled.</li> </ul>
sftp (sftp-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Disabled (0): The SFTP interface is disabled.</li> <li>Enabled (1): The SFTP interface is enabled.</li> </ul>

**Table 111 security-communications-protocols properties (continued)**

Name	Type	Description
snmp (snmp-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Disabled (0): The SNMP interface is disabled. All SNMP requests to the MIB are disabled and SNMP traps are disabled.</li> <li>Enabled (1): The SNMP interface is enabled.</li> </ul>
debug-interface (debug-interface-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Disabled (0): The Telnet debug port is disabled.</li> <li>Enabled (1): The Telnet debug port is enabled. Remote connection is allowed, through incoming ports only, by HPE or HPE's authorized representatives for troubleshooting. Disabling the service debug protocol removes this access.</li> </ul>
activity-progress (activity-progress-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Disabled (0): Access to the activity progress interface via HTTP port 8081 is disabled.</li> </ul>

## sensors

This basetype is used by `show sensor-status`.

**Table 112 sensors properties**

Name	Type	Description
durable-id	string	Sensor ID.
enclosure-id	uint32	Enclosure ID.
drawer-id (drawer-id-numeric)	string (uint8)	<ul style="list-style-type: none"> <li>255: N/A</li> </ul>
controller-id (controller-id-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>B (0): Controller B.</li> <li>A (1): Controller A.</li> <li>both (2): Both controllers.</li> <li>N/A (3)</li> </ul>
sensor-name	string	Sensor name and location.
value	string	<ul style="list-style-type: none"> <li>For a sensor, its value.</li> <li>For overall unit status, one of the status values below.</li> </ul>
status (status-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Unsupported (0): Status detection is not implemented.</li> <li>OK (1): The sensor is present and detects no error condition.</li> <li>Critical (2): The sensor detected a critical error condition. Temperature, voltage, or current exceeds the critical threshold.</li> <li>Warning (3): The sensor detected a non-critical error condition. Temperature, voltage, or current is between the warning and critical thresholds.</li> <li>Unrecoverable (4): The enclosure management processor (EMP) cannot communicate with the sensor.</li> <li>Not Installed (5): The sensor is not present.</li> <li>Unknown (6): The sensor is present but status is not available.</li> <li>Unavailable (7): 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.</li> </ul>

**Table 112 sensors properties (continued)**

Name	Type	Description
container (container-numeric)	string (uint32)	Hardware component that contains the sensor. <ul style="list-style-type: none"> <li>• enclosures (14)</li> <li>• midplane (15)</li> <li>• controllers (16)</li> <li>• iom (17)</li> <li>• power-supplies (18)</li> <li>• fan (19)</li> <li>• drawer (28)</li> <li>• baseplane (41)</li> </ul>
sensor-type (sensor-type-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• Temperature (0)</li> <li>• Current (1)</li> <li>• Voltage (2)</li> <li>• Charge Capacity (3)</li> <li>• Capacitance (4)</li> <li>• Resistance (5)</li> <li>• Unknown Type (6)</li> </ul>

## sessions

This basetype is used by `show sessions`.

**Table 113 sessions properties**

Name	Type	Description
sessionId	string	The session ID.
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 SMU.
locale (locale-numeric)	string (uint32)	The display language. <ul style="list-style-type: none"> <li>• English (0)</li> <li>• Spanish (3)</li> <li>• French (4)</li> <li>• German (5)</li> <li>• Italian (6)</li> <li>• Japanese (7)</li> <li>• Korean (8)</li> <li>• Dutch (9)</li> <li>• Chinese-simplified (11)</li> <li>• Chinese-traditional (12)</li> </ul>
host	string	For a CLI session, the connected system's IP address and port number.
state	string	<ul style="list-style-type: none"> <li>• Active</li> <li>• Expired</li> </ul>
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.



**Table 113 sessions properties (continued)**

Name	Type	Description
first-access (first-access-numeric)	string (uint32)	The date and time when the session started. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
last-access (last-access-numeric)	string (uint32)	The date and time when the session was last accessed. It updates to the current time when a command is issued. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.

## show-other-MC-status

This basetype is used by `show shutdown-status`.

**Table 114 show-other-MC-status properties**

Name	Type	Description
other-MC	string	Other MC Status
other-MC-status (other-MC-status-numeric)	string (uint32)	The operational status of the Management Controller in the partner controller. This is not factored into system health. <ul style="list-style-type: none"> <li>Unknown (1496): The operational status of the partner Management Controller cannot be determined.</li> <li>Not Communicating (1524): The partner Management Controller is not ready to communicate.</li> <li>Not Operational (3231): The local Management Controller has established communication with the partner Management Controller, but the partner is not responding because it's not currently in active-active or failed-over state.</li> <li>Operational (4749): The partner Management Controller is responding normally.</li> </ul>

## shutdown-status

This basetype is used by `show shutdown-status`.

**Table 115 shutdown-status properties**

Name	Type	Description
controller	string	<ul style="list-style-type: none"> <li>A: Controller A.</li> <li>B: Controller B.</li> </ul>
status (status-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>up (0): The controller is operational.</li> <li>down (1): The controller is shut down.</li> <li>not installed (2): The controller is not installed.</li> </ul>

## snapshots

This basetype is used by `show snapshots`.

**Table 116 snapshots properties**

Name	Type	Description
durable-id	string	Snapshot ID.
virtual-disk-name	string	Deprecated.

**Table 116 snapshots properties (continued)**

Name	Type	Description
storage-pool-name	string	The name of the pool that contains the snapshot.
storage-pools-url	string	Deprecated.
serial-number	string	Snapshot serial number.
name	string	Snapshot name.
url	string	For internal use only.
creation-date-time (creation-date-time-numeric)	string (uint32)	Date and time, in the format <year>-<month>-<day> <hour>:<minutes>:<seconds> (UTC), when the snapshot was prepared or committed. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
status (status-numeric)	string (uint32)	Snapshot status. <ul style="list-style-type: none"> <li>Available (0)</li> <li>Unavailable (nonzero): See the status-reason value.</li> </ul>
status-reason (status-reason-numeric)	string (uint32)	Shows N/A (254) for Available status, or one of the following reasons for Unavailable status: <ul style="list-style-type: none"> <li>snapshot pending (1) (Not yet committed)</li> <li>master volume not accessible (4)</li> <li>Volume copy with modified data is in progress (7)</li> <li>snapshot not found (8)</li> <li>master volume not found (10)</li> <li>Unknown reason (&lt;hex-code&gt;)</li> </ul>
master-volume-name	string	Deprecated.
volume-parent	string	The name of the volume of which the snapshot was taken.
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	Not applicable.
snap-data (snap-data-numeric)	string (uint64)	The total amount of write data associated with the snapshot. The numeric property shows the unformatted value in blocks.
uniquedata (uniquedata-numeric)	string (uint64)	The amount of write data that is unique to the snapshot. The numeric property shows the unformatted value in blocks.
shareddata (shareddata-numeric)	string (uint64)	The amount of write data that is shared between this snapshot and other snapshots. The numeric property shows the unformatted value in blocks.
retention-priority (retention-priority-numeric)	string (uint64)	The retention priority for the snapshot. <ul style="list-style-type: none"> <li>never-delete (0): Snapshots will never be deleted.</li> <li>high (1): Snapshots may be deleted after all eligible medium-priority snapshots have been deleted.</li> <li>medium (2): Snapshots may be deleted after all eligible low-priority snapshots have been deleted. This is the default.</li> <li>low (3): Snapshots may be deleted.</li> </ul> Snapshots that are mapped or are not leaves of a volume's snapshot tree are not eligible for automatic deletion.

**Table 116 snapshots properties (continued)**

Name	Type	Description
priority-value	string	Retention priority for the snapshot, based on the snapshot attributes and the user-defined retention priority for the snapshot type. <ul style="list-style-type: none"> <li>0x6000: Standard snapshot.</li> <li>0xa000: Volume-copy snapshot. Snapshot that is being used to copy data from a source volume to a destination volume.</li> </ul>
user_priority-value	string	User-defined retention priority for the snapshot type.
snapshot-type (snapshot-type-numeric)	string (uint64)	Snapshot type. <ul style="list-style-type: none"> <li>N/A (254)</li> </ul>
storage-type (storage-type-numeric)	string (uint64)	Virtual (1)
total-size (total-size-numeric)	string (uint64)	The total size of the snapshot. The numeric property shows the unformatted value in blocks.

## snapshot-with-retention-tasks

This basetype is used by show tasks for a TakeSnapshot task.

**Table 117 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 reset and renamed.
last-created	string	<ul style="list-style-type: none"> <li>The name of the last snapshot created by the task.</li> <li>Blank if the task has not created a snapshot.</li> </ul>
snapshot	Embedded; see snap-tasks.	

## snap-space

This basetype is used by show snapshot-space.

**Table 118 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 (snap-limit-size-numeric)	string (uint64)	The actual size of the snapshot space. The numeric property shows the unformatted value in blocks.
allocated-percent-pool	string	The percentage of the pool currently used by snapshots.

**Table 118 snap-space properties (continued)**

Name	Type	Description
allocated-percent-snap-space	string	The percentage of the snapshot space currently used by snapshots.
allocated-size (allocated-size-numeric)	string (uint64)	The actual amount of space currently used by snapshots. The numeric property shows the unformatted value in blocks.
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 (limit-policy-numeric)	string (uint32)	The limit policy for when the percentage of the pool designated for snapshots is reached. <ul style="list-style-type: none"> <li>Notify Only (0): When the snapshot space is reached an event is generated and logged.</li> <li>Delete Snapshots (1): When the snapshot space is reached an event is generated and logged and automatic deletion of snapshots occurs.</li> </ul>

## snap-tasks

This basetype is used by `show tasks` for a `TakeSnapshot` task that has created at least one snapshot.

**Table 119 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 120 snmp-parameters properties**

Name	Type	Description
snmp-enabled (snmp-enabled-numeric)	string (uint32)	Shows whether the Simple Network Management Protocol (SNMP) interface is enabled or disabled. <ul style="list-style-type: none"> <li>Disabled (0): SNMP is disabled.</li> <li>Enabled (1): SNMP is enabled.</li> </ul>
snmp-filter (snmp-filter-numeric)	string (uint32)	Minimum level of events to include for SNMP traps. <ul style="list-style-type: none"> <li>info (0): Sends notifications for all events.</li> <li>resolved (1): Sends notifications for Resolved, Warning, Error, and Critical events.</li> <li>warn (2): Sends notifications for Warning, Error, and Critical events.</li> <li>error (3): Sends notifications for Error and Critical events.</li> <li>crit (4): Sends notifications for Critical events only.</li> <li>none (5): No events are sent as traps and traps are disabled.</li> </ul>
snmp-trap-host-1	string	Trap host IP address.
snmp-trap-host-2	string	Trap host IP address.
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 <code>monitor</code> role and is shown in clear text for users having the <code>standard</code> or <code>manage</code> role.

**Table 120 snmp-parameters properties (continued)**

Name	Type	Description
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 standard or manage role.
alert-notification (alert-notification-numeric)	string (uint32)	Shows whether the system will send SNMP notifications for alerts. <ul style="list-style-type: none"> <li>• none (5): The system will not send SNMP notifications for alerts.</li> <li>• all (6): The system will send SNMP notifications for alerts.</li> </ul>
persistent-alerts (persistent-alerts-numeric)	string (uint32)	Shows whether weekly alerts about system health issues will be sent to configured email addresses until corrective action has been taken and the system health value has returned to OK. <ul style="list-style-type: none"> <li>• Disabled (0)</li> <li>• Enabled (1)</li> </ul>

## 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 121 status properties**

Name	Type	Description
response-type (response-type-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• Success (0): The command succeeded.</li> <li>• Error (1): The command failed.</li> <li>• Info (2): The command returned an informational message.</li> <li>• Warning (3): The command returned a warning message.</li> </ul>
response	string	A message stating what the command accomplished, why the command failed, or information about the command's progress.
return-code	sint32	<ul style="list-style-type: none"> <li>• 0: The command completed.</li> <li>• -nnnnn: The command failed.</li> </ul>
component-id	string	Not used.
time-stamp (time-stamp-numeric)	string (uint32)	Date and time, in the format <year>-<month>-<day> <hour>:<minutes>:<seconds> (UTC), when the command was issued.  The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.

## syslog-parameters

This basetype is used by `show syslog-parameters`.

**Table 122 syslog-parameters properties**

Name	Type	Description
syslog-host	string	The IP address of the remote syslog server to use for the notifications.
syslog-notification-level (syslog-notification-level-numeric)	string (uint32)	Shows the minimum severity for which the system sends notifications: <ul style="list-style-type: none"> <li>• info (0): Sends notifications for all events.</li> <li>• resolved (1): Sends notifications for Resolved, Warning, Error, and Critical events.</li> <li>• warn (2): Sends notifications for Warning, Error, and Critical events.</li> <li>• error (3): Sends notifications for Error and Critical events.</li> <li>• crit (4): Sends notifications for Critical events only.</li> <li>• none (5): Disables syslog notification and clears the settings.</li> </ul>

**Table 122 syslog-parameters properties (continued)**

Name	Type	Description
syslog-host-port	uint32	The port on which the remote syslog facility is expected to listen for notifications.
alert-notification (alert-notification-numeric)	string (uint32)	Shows whether the system will send SNMP notifications for alerts. <ul style="list-style-type: none"> <li>• none (5) : The system will not send SNMP notifications for alerts.</li> <li>• all (6): The system will send SNMP notifications for alerts.</li> </ul>
persistent-alerts (persistent-alerts-numeric)	string (uint32)	Shows whether weekly alerts about system health issues will be sent to configured email addresses until corrective action has been taken and the system health value has returned to OK. <ul style="list-style-type: none"> <li>• Disabled (0)</li> <li>• Enabled (1)</li> </ul>

## system

This basetype is used by show configuration and show system

**Table 123 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 enclosure midplane.
url	string	For internal use only.
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 enclosures in the system.
health (health-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• OK (0)</li> <li>• Degraded (1)</li> <li>• Fault (2)</li> <li>• Unknown (3)</li> <li>• N/A (4)</li> </ul>
health-reason	string	If Health is not OK, a message describes the reason for the health state.
other-MC-status (other-MC-status-numeric)	string (uint32)	The operational status of the Management Controller in the partner controller. This is not factored into system health. <ul style="list-style-type: none"> <li>• Unknown (1496): The operational status of the partner Management Controller cannot be determined.</li> <li>• Not Communicating (1524): The partner Management Controller is not ready to communicate.</li> <li>• Not Operational (3231): The local Management Controller has established communication with the partner Management Controller, but the partner is not responding because it's not currently in active-active or failed-over state.</li> <li>• Operational (4749): The partner Management Controller is responding normally.</li> </ul>

**Table 123 system properties (continued)**

Name	Type	Description
pfuStatus (pfuStatus-numeric)	string (uint32)	Shows whether partner firmware update is running on the system, or is idle. <ul style="list-style-type: none"> <li>Idle (0)</li> <li>Running (1)</li> </ul>
supported-locales	string	Supported display languages.
current-node-wwn	string	Storage system node World Wide Name (WWNN).
fde-security-status (fde-security-status-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Unsecured (1): The system has not been secured with a passphrase.</li> <li>Secured (2): The system has been secured with a passphrase using FDE.</li> <li>Secured, Lock Ready (3): The system has been secured and lock keys have been cleared. The system will become locked after the next power cycle.</li> <li>Secured, Locked (4): The system is secured and the disks are locked to data access, preventing their use.</li> <li>Secured, FIPS (6): The system has been secured with a passphrase using FIPS.</li> </ul>
platform-type (platform-type-numeric)	string (uint32)	Platform type. The numeric property shows a corresponding numeric value.
platform-brand (platform-brand-numeric)	string (uint32)	Active platform brand of the Management Controller firmware. The numeric property shows a corresponding numeric value.
configuration-selector	hex8	For internal use only.
redundancy-mode	Embedded; see redundancy.	
unhealthy-component	Embedded; see unhealthy-component.	

## system-parameters-table

This basetype is used by `show system-parameters`.

**Table 124 system-parameters-table properties**

Name	Type	Description
ulp-enabled	string	Shows <code>true</code> 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	<ul style="list-style-type: none"> <li><code>true</code>: Host profiles are enabled.</li> <li><code>false</code>: Host profiles are disabled.</li> </ul>
max-ports	uint32	Number of host-interface ports in the controller enclosure.
max-drives	uint32	Number of disks that the system supports.
max-volumes	uint32	Number of volumes that the system supports.
max-vdisks	uint32	Not supported.
max-luns	uint32	Number of LUNs that the system supports.

**Table 124 system-parameters-table properties (continued)**

Name	Type	Description
max-owned-arrays-per-controller	uint32	Not supported.
max-storage-pools-per-controller	uint32	The number of pools that each controller supports.
max-components-per-storage-pool	uint32	The number of disk groups that each pool can contain.
max-storage-pool-size (max-storage-pool-size-numeric)	string (uint64)	The maximum size of a pool. The numeric property shows the unformatted value in blocks.
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 (enclosures, 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 disk-group metadata, in blocks.
vdisk-metadata-size-blocks	uint32	Amount of disk-group 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-hosts	uint32	The maximum number of hosts for the system.
max-initiators-per-host	uint32	The maximum number of initiators that a host can contain.
max-initiator	uint32	Deprecated; use max-initiators-per-host.
max-initiators	uint32	The maximum number of initiators for the system.
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 enclosures that the system supports.
local-controller (local-controller-numeric)	string (uint32)	The ID of the controller you are accessing. <ul style="list-style-type: none"> <li>• B (0): Controller B.</li> <li>• A (1): Controller A.</li> </ul>
serial-number	string	Last six digits of the midplane serial number.
external-targetid-control (external-targetid-control-numeric)	string (uint32)	Not used.
lan-heartbeat (lan-heartbeat-numeric)	string (uint32)	Not used.



**Table 124 system-parameters-table properties (continued)**

Name	Type	Description
ip-address-mode (ip-address-mode-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• CAPI_TWO_IP_ADDRESSES_MODE (0): Dual controller system has a unique IP address for each controller.</li> <li>• CAPI_ONE_IP_ADDRESS_MODE (1): Dual controller system has the same IP address for both controllers, only one active at a time.</li> </ul>
debug-flags	uint32	For use by service personnel.
enclosure-flags	uint32	For internal use only.
num-global-spare	uint32	Number of global-spare disks defined in the storage system.
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 (performance-tuning-flags-numeric)	string (uint32)	For internal use only.
max-task-retention-count	uint32	Maximum retention count for a task that creates snapshots or replication volumes.
max-fc-speed (max-fc-speed-numeric)	string (uint32)	Maximum FC host-port speed. The numeric property shows a corresponding numeric value.
max-iscsi-speed (max-iscsi-speed-numeric)	string (uint32)	Maximum iSCSI host-port speed. The numeric property shows a corresponding numeric 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 replication volumes that the system supports.
ar-sets-in-use-count	uint32	The number of replication volumes present in the system.
virtual-replication-configured (virtual-replication-configured-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• False (0): No replication sets exist on the system.</li> <li>• True (1): At least one replication set exists on the system.</li> </ul>
max-msadpp-drives-per-disk-group	uint32	The maximum number of disks that an MSA-DP+ disk group can contain.
min-msadpp-drives-per-disk-group	uint32	The minimum number of disks that an MSA-DP+ disk group can contain.
max-msadpp-disk-groups-per-system	uint32	The maximum number of MSA-DP+ disk groups that the system supports.
max-msadpp-disk-groups-per-controller	uint32	The maximum number of MSA-DP+ disk groups that each controller supports.
max-msadpp-drives-per-expansion	uint32	The maximum number of disks by which an MSA-DP+ disk group can be expanded.

# tasks

This basetype is used by `show tasks`.

**Table 125 tasks properties**

Name	Type	Description
name	string	Task name.
type	string	Type of operation this task performs. <ul style="list-style-type: none"> <li>TakeSnapshot</li> <li>ResetSnapshot</li> <li>Replicate</li> <li>EnableDSD</li> <li>DisableDSD</li> <li>StartScrub</li> <li>StopScrub</li> </ul>
status	string	Task status. <ul style="list-style-type: none"> <li>Uninitialized: The task is not yet ready to run.</li> <li>Ready: The task is ready to run.</li> <li>Active: The task is running.</li> <li>Error: The task has an error.</li> <li>Complete: For a TakeSnapshot task only, the task is complete but not yet ready to run again.</li> <li>Deleted: The task is expired but this state is not yet synchronized to the partner controller.</li> </ul>
state	string	Current step of the task. <ul style="list-style-type: none"> <li>For an EnableDSD or DisableDSD task:               <ul style="list-style-type: none"> <li>Start</li> </ul> </li> <li>For a TakeSnapshot task:               <ul style="list-style-type: none"> <li>Start</li> <li>VerifyVolume</li> <li>ValidateLicensingLimit</li> <li>CreateName</li> <li>PlanCreateSnap (Formerly CreateSnap)</li> <li>VerifySnap</li> <li>InspectRetention</li> <li>FindOldestSnap</li> <li>UnmapSnap</li> <li>ResetSnap</li> <li>RenameSnap</li> </ul> </li> <li>For a ResetSnapshot task:               <ul style="list-style-type: none"> <li>Start</li> <li>VerifySnap</li> <li>UnmapSnap</li> <li>ResetSnap</li> </ul> </li> <li>For a Replicate task               <ul style="list-style-type: none"> <li>Idle</li> <li>Replicate</li> <li>VerifyRunning</li> </ul> </li> </ul>
error-message	string	<ul style="list-style-type: none"> <li>If an error occurred while processing the task, the error message.</li> <li>Blank if no error has occurred.</li> </ul>
associated-vdisk-serial	string	Not applicable.
task-details		Embedded; see <code>cs-replicate-tasks</code> , <code>reset-snapshot-tasks</code> , <code>snap-tasks</code> , <code>snapshot-with-retention-tasks</code> .

## tier-hist-statistics

This basetype is used by `show pool-statistics` when the `historical` parameter is specified.

**Table 126 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 (total-data-transferred-numeric)	string (uint64)	Total amount of data read and written since the last sampling time. The numeric property shows the unformatted value in blocks.
data-read (data-read-numeric)	string (uint64)	Amount of data read since the last sampling time. The numeric property shows the unformatted value in blocks.
data-written (data-written-numeric)	string (uint64)	Amount of data written since the last sampling time. The numeric property shows the unformatted value in blocks.
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 (total-bytes-per-sec-numeric)	string (uint64)	Total data transfer rate, in bytes per second, since the last sampling time. The numeric property shows the unformatted value in blocks.
read-bytes-per-sec (read-bytes-per-sec-numeric)	string (uint64)	Data transfer rate, in bytes per second, for read operations since the last sampling time. The numeric property shows the unformatted value in blocks.
write-bytes-per-sec (write-bytes-per-sec-numeric)	string (uint64)	Data transfer rate, in bytes per second, for write operations last sampling time. The numeric property shows the unformatted value in blocks.
number-of-allocated-pages	uint64	The number of 4MB pages allocated to volumes in the tier.
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.
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 4MB 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 4MB 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 4MB 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 (sample-time-numeric)	string (uint32)	Date and time, in the format <year>-<month>-<day> <hour>:<minutes>:<seconds>, when the data sample was taken. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.

## tiers

This basetype is used by `show pools` and `show tiers`.

**Table 127 tiers properties**

Name	Type	Description
serial-number	string	The serial number of the tier.
pool	string	The name of the pool.
tier (tier-numeric)	string (uint32)	<ul style="list-style-type: none"><li>• N/A (0)</li><li>• Performance (1): The highest storage tier, which uses SSDs (high speed).</li><li>• Standard (2): The tier that uses enterprise-class spinning SAS disks (10K/15K RPM).</li><li>• Archive (4): The lowest storage tier, which uses midline spinning SAS disks (&lt;10K RPM, high capacity).</li><li>• Read Cache (8): The tier that provides read cache for a storage pool.</li></ul>
pool-percentage	uint8	The percentage of pool capacity that the tier occupies.
diskcount	uint8	The number of disks in the tier.
raw-size (raw-size-numeric)	string (uint64)	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. The numeric property shows the unformatted value in blocks.
total-size (total-size-numeric)	string (uint64)	The total capacity of the tier. The numeric property shows the unformatted value in blocks.
allocated-size (allocated-size-numeric)	string (uint64)	The amount of space currently allocated to volumes in the tier. The numeric property shows the unformatted value in blocks.
available-size (available-size-numeric)	string (uint64)	The available capacity in the tier. The numeric property shows the unformatted value in blocks.
affinity-size (affinity-size-numeric)	string (uint64)	The total size of volumes configured to have affinity for that tier. The numeric property shows the unformatted value in blocks.

## tier-statistics

This basetype is used by `show tier-statistics` and `show pool-statistics`.

**Table 128 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 (tier-numeric)	string (uint32)	<ul style="list-style-type: none"><li>• N/A (0)</li><li>• Performance (1): The highest storage tier, which uses SSDs (high speed).</li><li>• Standard (2): The tier that uses enterprise-class spinning SAS disks (10K/15K RPM).</li><li>• Archive (4): The lowest storage tier, which uses midline spinning SAS disks (&lt;10K RPM, high capacity).</li><li>• Read Cache (8): The tier that provides read cache for a storage pool.</li></ul>
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 128 tier-statistics properties (continued)**

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 4MB 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 4MB 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 129 tier-summary properties**

Name	Type	Description
serial-number	string	The serial number of the pool.
pool	string	The name of the pool.
tier (tier-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>N/A (0)</li> <li>Performance (1): The highest storage tier, which uses SSDs (high speed).</li> <li>Standard (2): The tier that uses enterprise-class spinning SAS disks (10K/15K RPM).</li> <li>Archive (4): The lowest storage tier, which uses midline spinning SAS disks (&lt;10K RPM, high capacity).</li> <li>Read Cache (8): The tier that provides read cache for a storage pool.</li> </ul>
tier-hist-statistics	string	Embedded; see tier-hist-statistics.
readcache-hist-statistics	string	Embedded; see readcache-hist-statistics.

## time-settings-table

This basetype is used by `show controller-date`.

**Table 130 time-settings-table properties**

Name	Type	Description
date-time (date-time-numeric)	string (uint32)	Date and time, in the format <year>-<month>-<day> <hour>:<minutes>:<seconds> (UTC), reported by the controller being accessed. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
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. <ul style="list-style-type: none"> <li>Enabled: NTP is enabled.</li> <li>Disabled: NTP is disabled.</li> </ul>
ntp-address	string	NTP server IP address, or 0.0.0.0 if not set.

## timezones

This basetype is used by `show timezones`.

**Table 131 timezones properties**

Name	Type	Description
timezone	string	The timezone name (area/location).

## unhealthy-component

This basetype is used by all commands that show component health.

**Table 132 unhealthy-component properties**

Name	Type	Description
component-type (component-type-numeric)	string (uint32)	Component type. <ul style="list-style-type: none"> <li>• super-cap (0): Supercapacitor pack</li> <li>• MC (1): Management Controller</li> <li>• port (2): Host port</li> <li>• controller (3): Controller module</li> <li>• expansion module (4)</li> <li>• PSU (5): Power supply unit</li> <li>• disk (6)</li> <li>• enclosure (7)</li> <li>• disk group (8)</li> <li>• fan (9)</li> <li>• memory card (10)</li> <li>• sensor (11)</li> <li>• disk slot (12)</li> <li>• network port (13)</li> <li>• SAS port (14)</li> <li>• virtual pool (15)</li> <li>• virtual disk group (16)</li> <li>• volume (17)</li> <li>• volume (19): Source volume</li> <li>• snapshot (20)</li> <li>• host (21)</li> <li>• volume map (22)</li> <li>• system (23)</li> <li>• unknown (24)</li> <li>• fan module (26)</li> <li>• expander (27)</li> </ul>
component-id	string	Component identifier.
basetype	string	Component basetype.
primary-key	string	Durable ID of the component.
health (health-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>• OK (0)</li> <li>• Degraded (1)</li> <li>• Fault (2)</li> <li>• Unknown (3)</li> <li>• N/A (4)</li> </ul>
health-reason	string	If Health is not OK, a message describes the reason for the health state.
health-recommendation	string	If Health is not OK, a message describes recommended actions to resolve the issue.

## unwritable-cache

This basetype is used by `show unwritable-cache`.

**Table 133** 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.

## update-server

This basetype is used by `show update-server`.

**Table 134** update-server properties

Name	Type	Description
url	string	The URL of the update server.
proxy-state (proxy-state numeric)	string (uint32)	Shows whether the proxy is enabled or disabled. <ul style="list-style-type: none"><li>• Disabled (0)</li><li>• Enabled (1)</li></ul>
proxy-host	string	The proxy's hostname or IP-address.
proxy-port	string	The proxy's port number, if set.
proxy-user	string	The username to access the proxy, if set.
last-check (last-check-numeric)	string (uint32)	The date and time when the system last contacted the update server. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
last-status (last-status numeric)	string (uint32)	The status of the last attempt to contact the update server.

## update-status-process-step

This basetype is used by `show firmware-update-status`.

**Table 135** update-status-process-step properties

Name	Type	Description
process-step (process-step-numeric)	string (uint32)	Current step in the firmware update process. <ul style="list-style-type: none"><li>• N/A (0)</li><li>• Check Bundle Integrity (1)</li><li>• Health Check (2)</li><li>• Transfer to Partner (3)</li><li>• Partner Prep Codeload (4)</li><li>• Partner reboot (5)</li><li>• Partner update controller (6)</li><li>• Partner update expander (7)</li><li>• Partner update CPLD (8)</li><li>• Local update controller (9)</li><li>• Local update expander (10)</li><li>• Local update CPLD (11)</li><li>• Local reboot (12)</li><li>• Cleanup (13)</li><li>• Upload (14)</li><li>• GetMCLocalLogs (15)</li></ul>
status (status-numeric)	string (uint32)	Status of the process step. <ul style="list-style-type: none"><li>• Pending (0)</li><li>• OK (1)</li><li>• In-Progress (2)</li><li>• Error (3)</li><li>• N/A (4)</li></ul>
message (message-numeric)	string (uint32)	Message describing the status of the process step. <ul style="list-style-type: none"><li>• Pending (0)</li><li>• Success (1)</li><li>• In-Progress (2)</li><li>• Error (3)</li><li>• Timed Out Confirming Versions (4)</li><li>• N/A (5)</li></ul>



## update-status-summary

This basetype is used by `show firmware-update-status`.

**Table 136** update-status-summary properties

Name	Type	Description
controller-id (controller-id-numeric)	string (uint32)	<ul style="list-style-type: none"><li>• B (0): Controller B.</li><li>• A (1): Controller A.</li></ul>
activity (activity-numeric)	string (uint32)	Type of update activity. <ul style="list-style-type: none"><li>• N/A (0)</li><li>• System update (1)</li><li>• Controller update (2)</li><li>• Partner firmware update (3)</li><li>• Firmware upload (4)</li></ul>
start-time	string	Time when the update started.
completion-time	string	Time when the update completed.
estimated-time-to-completion	string	Estimated time to complete an in-progress update.
percentage-completed	string	Percentage complete of an in-progress update.
completion-status (completion-status-numeric)	string (uint32)	Activity status. <ul style="list-style-type: none"><li>• Success (0)</li><li>• In-Progress (1)</li><li>• Fail (2)</li></ul>
bundle-version	string	Firmware bundle version.
update-status-process-step	Embedded; see <code>update-status-process-step</code> .	

## usergroups

This basetype is used by `show user-groups`.

**Table 137** usergroups properties

Name	Type	Description
usergroupname	string	The user group name.
roles	string	<ul style="list-style-type: none"><li>• <code>monitor</code>: User group can view but not change system settings.</li><li>• <code>standard</code>: User group can view and change system settings except: configuring local users; configuring LDAP; performing write operations through FTP or SFTP; performing file uploads from the SMU; using the <code>restore defaults</code> command.</li><li>• <code>manage</code>: User group can view and change system settings.</li><li>• <code>diagnostic</code>: For use by or with direction from technical support.</li></ul>
usergroup-type	string	The user group type: LDAP.
usergroup-locale	string	The display language.
interface-access-WBI	string	<ul style="list-style-type: none"><li>• <code>x</code>: User group can use the web-browser interface (the SMU).</li><li>• Blank: User group cannot access this interface.</li></ul>
interface-access-CLI	string	<ul style="list-style-type: none"><li>• <code>x</code>: User group can use the command-line interface.</li><li>• Blank: User group cannot access this interface.</li></ul>

**Table 137 usergroups properties (continued)**

Name	Type	Description
interface-access-FTP	string	<ul style="list-style-type: none"> <li>• x: User group can use the SFTP interface.</li> <li>• Blank: User group cannot access this interface.</li> </ul>
interface-access-SMIS	string	Not supported.
storage-size-base	uint8	<p>The base for entry and display of storage-space sizes:</p> <ul style="list-style-type: none"> <li>• 2: Sizes are shown as powers of 2, using 1024 as a divisor for each magnitude.</li> <li>• 10: Sizes are shown as powers of 10, using 1000 as a divisor for each magnitude.</li> </ul> <p>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.</p>
storage-size-precision	uint8	The number of decimal places (1 to 10) for display of storage-space sizes.
storage-size-units	string	<p>The unit for display of storage-space sizes.</p> <ul style="list-style-type: none"> <li>• Auto: Lets the system determine the proper unit for a size.</li> <li>• MB: Megabytes.</li> <li>• GB: Gigabytes.</li> <li>• TB: Terabytes.</li> </ul> <p>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 0.11709TB is instead shown as 117.1GB.</p>
temperature-scale	string	<ul style="list-style-type: none"> <li>• Fahrenheit: Temperatures are shown in degrees Fahrenheit.</li> <li>• Celsius: Temperatures are shown in degrees Celsius.</li> </ul>
timeout	uint32	Time in seconds that the session can be idle before it automatically ends. Valid values are 120 to 43200 seconds (2 to 720 minutes).

## users

This basetype is used by `show users`.

**Table 138 users properties**

Name	Type	Description
username	string	User name.
roles	string	<ul style="list-style-type: none"> <li>• monitor: User group can view but not change system settings.</li> <li>• standard: User group can view and change system settings except: configuring local users; configuring LDAP; performing write operations through FTP or SFTP; performing file uploads from the SMU; using the <code>restore defaults</code> command.</li> <li>• manage: User group can view and change system settings.</li> <li>• diagnostic: For use by or with direction from technical support.</li> </ul>
user-type (user-type-numeric)	string (uint32)	<p>The user's level of technical expertise. This parameter does not affect access to commands.</p> <ul style="list-style-type: none"> <li>• Novice (1)</li> <li>• Standard (2)</li> <li>• Advanced (3)</li> <li>• Diagnostic (4)</li> </ul>

**Table 138 users properties (continued)**

Name	Type	Description
user-locale (user-locale-numeric)	string (uint32)	The display language. <ul style="list-style-type: none"> <li>• English (0)</li> <li>• Spanish (3)</li> <li>• French (4)</li> <li>• German (5)</li> <li>• Italian (6)</li> <li>• Japanese (7)</li> <li>• Korean (8)</li> <li>• Dutch (9)</li> <li>• Chinese-simplified (11)</li> <li>• Chinese-traditional (12)</li> </ul>
interface-access-WBI	string	<ul style="list-style-type: none"> <li>• x: User group can use the web-browser interface (the SMU).</li> <li>• Blank: User group cannot access this interface.</li> </ul>
interface-access-CLI	string	<ul style="list-style-type: none"> <li>• x: User group can use the command-line interface.</li> <li>• Blank: User group cannot access this interface.</li> </ul>
interface-access-FTP	string	<ul style="list-style-type: none"> <li>• x: User group can use the FTP or SFTP interface.</li> <li>• Blank: User group cannot access this interface.</li> </ul>
interface-access-SMIS	string	Not supported.
interface-access-SNMP	string	<ul style="list-style-type: none"> <li>• x: The user group can access the SNMPv3 interface.</li> <li>• Blank: User cannot access this interface.</li> </ul>
storage-size-base	uint8	The base for entry and display of storage-space sizes: <ul style="list-style-type: none"> <li>• 2: Sizes are shown as powers of 2, using 1024 as a divisor for each magnitude.</li> <li>• 10: Sizes are shown as powers of 10, using 1000 as a divisor for each magnitude.</li> </ul> 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 to 10) for display of storage-space sizes.
storage-size-units (storage-size-units-numeric)	string (uint32)	The unit for display of storage-space sizes. <ul style="list-style-type: none"> <li>• auto (0): Lets the system determine the proper unit for a size.</li> <li>• MB (1): Megabytes.</li> <li>• GB (2): Gigabytes.</li> <li>• TB (3): Terabytes.</li> </ul> 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 0.11709TB is instead shown as 117.1GB.
temperature-scale	string	<ul style="list-style-type: none"> <li>• Fahrenheit: Temperatures are shown in degrees Fahrenheit.</li> <li>• Celsius: Temperatures are shown in degrees Celsius.</li> </ul>
timeout	uint32	Time in seconds that the session can be idle before it automatically ends. Valid values are 120 to 43200 seconds (2 to 720 minutes).
authentication-type	string	For an SNMPv3 user, this specifies whether to use a security authentication protocol. Authentication uses the user password. <ul style="list-style-type: none"> <li>• none: No authentication.</li> <li>• MD5: MD5 authentication.</li> <li>• SHA: SHA-1 authentication.</li> </ul>
privacy-type	string	For an SNMPv3 user, this specifies whether to use a security encryption protocol. <ul style="list-style-type: none"> <li>• none: No encryption.</li> <li>• DES: Data Encryption Standard.</li> <li>• AES: Advanced Encryption Standard.</li> </ul>

**Table 138 users properties (continued)**

Name	Type	Description
password	string	User password. For a standard user the password is represented by eight asterisks. For an SNMPv3 user this is the authentication password.
default-password-changed (default-password-changed-numeric)	string (uint32)	Shows whether the default password for the user has been changed. <ul style="list-style-type: none"> <li>• False (0)</li> <li>• True (1)</li> </ul>
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 <code>interface-access-SNMP</code> property is enabled, this specifies the IP address of the host that will receive SNMP traps.
trap-port	string	The SNMP trap destination port of the host for an SNMPv3 user that can receive trap notifications.

## versions

This basetype is used by `show configuration` and `show versions`.

**Table 139 versions properties**

Name	Type	Description
sc-cpu-type	string	Storage Controller processor type.
bundle-version	string	Firmware bundle version.
bundle-status (bundle-status-numeric)	string (uint32)	Firmware bundle status. The numeric property shows a corresponding numeric value.
bundle-version-only	string	Firmware bundle version only.
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 ASIC Controller 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 (fw-default-platform-brand-numeric)	string (uint32)	Default platform brand of the Management Controller firmware. The numeric property shows a corresponding numeric value.
ec-fw	string	Expander Controller firmware version.
pld-rev	string	Complex Programmable Logic Device (CPLD) firmware version.
pm-cpld-version	string	Not supported.
prm-version	string	CPLD Power Reset Manager (PRM) version.

**Table 139 versions properties (continued)**

Name	Type	Description
hw-rev	string	Controller hardware version.
him-rev	string	Host interface module revision.
him-model	string	Host interface module model.
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	<ul style="list-style-type: none"> <li>&lt;version&gt;: Customization Toolkit (CTK) version applied to system.</li> <li>No CTK Version: No CTK version has been applied to this system.</li> </ul>
mcos-version	string	Management Controller operating system version.
gem-version	string	Expander Controller GEM firmware package version.
pubs-version	string	CLI help version.
translation-version	string	CLI help translation version.

## volume-groups

This basetype is used by `show volume-groups`.

**Table 140 volume-groups properties**

Name	Type	Description
durable-id	string	Volume group ID.
group-name	string	The name of the volume group in the format <code>volume-group.*</code> , where <code>*</code> represents all volumes in the group.
serial-number	string	The serial number of the volume group.
type (type-numeric)	string (uint32)	The group type: Volume (0).
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 <code>volumes</code> .	

## volume-names

This basetype is used by `show volume-names`.

**Table 141 volume-names properties**

Name	Type	Description
volume-name	string	Volume name.
serial-number	string	Volume serial number.
volume	string	For internal use only.

## volume-reservations

This basetype is used by `show volume-reservations`.

**Table 142** 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 (reservation-active-numeric)	string (uint32)	<ul style="list-style-type: none"><li>Free (0): The volume is not reserved.</li><li>Reserved (1): The volume has been reserved by a host.</li></ul>
pgr-generation	uint32	The generation of the volume reservation, shown as a hexadecimal value.
host-id	string	<ul style="list-style-type: none"><li>For an FC initiator, its WWPN.</li><li>For a SAS initiator, its WWPN.</li><li>For an iSCSI initiator, its node name (typically the IQN).</li></ul>
port	string	The controller host-port identifiers.
reserve-key	string	The reservation key, shown as a hexadecimal value.
reserve-scope (reserve-scope-numeric)	string (uint32)	The reservation scope: Logical Unit (0).
reserve-type (reserve-type-numeric)	string (uint32)	The reservation type. <ul style="list-style-type: none"><li>Undefined (0): The volume has no persistent reservations.</li><li>Write Exclusive (1): Write commands are only allowed for a single reservation holder.</li><li>Exclusive Access (3): Certain access (read, write) commands are only allowed for a single reservation holder.</li><li>Write Exclusive - Registrants Only (5): Write commands are only allowed for registered hosts. There is a single reservation holder.</li><li>Exclusive Access - Registrants Only (6): Certain access (read, write) commands are only allowed for registered hosts. There is a single reservation holder.</li><li>Write Exclusive - All Registrants (7): Write commands are only allowed for registered hosts. There is a single reservation holder.</li><li>Exclusive Access - All Registrants (8): Certain access (read, write) commands are only allowed for registered hosts. There is a single reservation holder.</li></ul>

## volume-statistics

This basetype is used by `show volume-statistics`.

**Table 143** 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 (bytes-per-second-numeric)	string (uint64)	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. The numeric property shows the unformatted value in blocks.

**Table 143 volume-statistics properties (continued)**

Name	Type	Description
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 (data-read-numeric)	string (uint64)	Amount of data read since these statistics were last reset or since the controller was restarted. The numeric property shows the unformatted value in blocks.
data-written (data-written-numeric)	string (uint64)	Amount of data written since these statistics were last reset or since the controller was restarted. The numeric property shows the unformatted value in blocks.
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.
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 (reset-time-numeric)	string (uint32)	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. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
start-sample-time (start-sample-time-numeric)	string (uint32)	Date and time, in the format <year>-<month>-<day> <hour>:<minutes>:<seconds>, when sampling started for the iops and bytes-per-second values. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
stop-sample-time (stop-sample-time-numeric)	string (uint32)	Date and time, in the format <year>-<month>-<day> <hour>:<minutes>:<seconds>, when sampling stopped for the iops and bytes-per-second values. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.

## volume-view

This basetype is used by `show maps`.

**Table 144** 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.
url	string	For internal use only.
volume-serial	string	The serial number of the volume.
volume-name	string	Volume name.
volumes-url	string	For internal use only.
volume-view-mappings	Embedded	see volume-view-mappings.

## volume-view-mappings

This basetype is used by `show maps`.

**Table 145** 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.
mapped-id	string	The ID of the mapping target, such as an initiator.
ports	string	<ul style="list-style-type: none"><li>The controller host ports to which the mapping applies.</li><li>Blank if not mapped or mapped as <code>no-access</code>.</li></ul>
lun	string	<ul style="list-style-type: none"><li>The LUN that identifies the volume to a host.</li><li>Blank if not mapped or mapped as <code>no-access</code>.</li></ul>
access (access-numeric)	string (uint32)	Type of host access to the volume. <ul style="list-style-type: none"><li><code>not-mapped (0)</code>: Not mapped.</li><li><code>no-access (1)</code>: No access (masked).</li><li><code>read-only (2)</code>: Read only.</li><li><code>read-write (3)</code>: Read and write.</li></ul>
identifier	string	<ul style="list-style-type: none"><li>For an FC initiator, its WWPN.</li><li>For a SAS initiator, its WWPN.</li><li>For an iSCSI initiator, its node name (typically the IQN).</li><li>all other initiators: The volume's default mapping.</li></ul>
initiators-url	string	For internal use only.
nickname	string	<ul style="list-style-type: none"><li>For a host, its name in the format <code>host-name.*</code>, where the <code>*</code> represents all initiators in the host.</li><li>For a host group, its name in the format <code>host-group.*.*</code>, where the first <code>*</code> represents all hosts in the host group and the second <code>*</code> represents all initiators in those hosts.</li><li>For an initiator, its nickname.</li><li>Blank if not set or for all other initiators.</li></ul>
host-profile (host-profile-numeric)	string (uint32)	<ul style="list-style-type: none"><li>Standard (0): Default profile.</li><li>HP-UX (1): The host uses Flat Space Addressing.</li><li>OpenVMS (2): The host does not allow LUN 0 to be assigned to a mapping.</li></ul>



# volumes

This basetype is used by `show volumes` and `show volume-groups`.

**Table 146** volumes properties

Name	Type	Description
<code>durable-id</code>	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.
<code>url</code>	string	For internal use only.
<code>virtual-disk-name</code>	string	The name of the pool that contains the volume.
<code>storage-pool-name</code>	string	The name of the pool that contains the volume.
<code>storage-pools-url</code>	string	Pool URL.
<code>volume-name</code>	string	Volume name.
<code>size</code> (size-numeric)	string (uint64)	Volume capacity, formatted to use the current base, precision, and units. The numeric property shows the unformatted value in blocks.
<code>total-size</code> (total-size-numeric)	string (uint64)	The total size of the volume. The numeric property shows the unformatted value in blocks.
<code>allocated-size</code> (allocated-size-numeric)	string (uint64)	The amount of space currently allocated to a volume, or the . The numeric property shows the unformatted value in blocks.
<code>storage-type</code> (storage-type-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Virtual (1): The volume is in a virtual pool.</li> </ul>
<code>volume-usage-type</code> (volume-usage-type-numeric)	string (uint32)	The purpose of the volume. <ul style="list-style-type: none"> <li>Database: The volume is used for database applications.</li> <li>Virtualization: The volume is used as a datastore for a virtual machine.</li> <li>Email: The volume is used primarily to hold email or similar content.</li> <li>Files: The volume is used as a file share.</li> <li>Other: The usage type is not described by the other choices.</li> <li>Unspecified: The usage type is not set.</li> </ul>
<code>preferred-owner</code> (preferred-owner-numeric)	string (uint32)	Controller that owns the volume during normal operation. <ul style="list-style-type: none"> <li>B (0): Controller B.</li> <li>A (1): Controller A.</li> </ul>
<code>owner</code> (owner-numeric)	string (uint32)	Either the preferred owner during normal operation or the partner controller when the preferred owner is offline. <ul style="list-style-type: none"> <li>B (0): Controller B.</li> <li>A (1): Controller A.</li> </ul>
<code>serial-number</code>	string	Volume serial number.
<code>write-policy</code> (write-policy-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>write-through (0): 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.</li> <li>write-back (1): 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.</li> </ul>

**Table 146 volumes properties (continued)**

Name	Type	Description
cache-optimization (cache-optimization-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>standard (0): 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.</li> <li>cache-hit (4): This controller cache mode of operation is optimized for workloads that are localized—that is, a substantial percentage of all accesses are hits in the controller's cache. In this mode, the cache is kept coherent with the partner controller.</li> </ul>
read-ahead-size (read-ahead-size-numeric)	string (uint32)	<p>The volume's read-ahead cache setting.</p> <ul style="list-style-type: none"> <li>Maximum (-2147483648)</li> <li>Stripe (-2): 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 512KB, even though they are not striped.</li> <li>Adaptive (-1): Adaptive read-ahead is enabled, which allows the controller to dynamically calculate the optimum read-ahead size for the current workload.</li> <li>Disabled (0): Read-ahead is disabled.</li> <li>512 KB (524288)</li> <li>1 MB (1048576)</li> <li>2 MB (2097152)</li> <li>4 MB (4194304)</li> <li>8 MB (8388608)</li> <li>16 MB (16777216)</li> <li>32 MB (33554432)</li> </ul>
volume-type (volume-type-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>snapshot (3): Snapshot volume.</li> <li>base (15): Base volume.</li> </ul>
volume-class (volume-class-numeric)	string (uint32)	standard (0): Standard volume.
tier-affinity (tier-affinity-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>No Affinity (0): 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.</li> <li>Archive (1): 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.</li> <li>Performance (2): 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.</li> </ul>
snapshot	string	Shows whether the volume is a snapshot.
snapshot-retention-priority (snapshot-retention-priority-numeric)	string (uint32)	<p>The retention priority for snapshots of the volume.</p> <ul style="list-style-type: none"> <li>never-delete (0): Snapshots will never be deleted.</li> <li>high (1): Snapshots may be deleted after all eligible medium-priority snapshots have been deleted.</li> <li>medium (2): Snapshots may be deleted after all eligible low-priority snapshots have been deleted.</li> <li>low (3): Snapshots may be deleted.</li> </ul> <p>Snapshots that are mapped or are not leaves of a volume's snapshot tree are not eligible for automatic deletion.</p>
volume-qualifier (volume-qualifier-numeric)	string (uint32)	N/A (0): Not applicable.

**Table 146 volumes properties (continued)**

<b>Name</b>	<b>Type</b>	<b>Description</b>
blocksize	uint32	The size of a block, in bytes.
blocks	uint64	The number of blocks, whose size is specified by the <code>blocksize</code> 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.
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.
creation-date-time (creation-date-time-numeric)	string (uint32)	The date and time, in the format <year>-<month>-<day> <hour>:<minutes>:<seconds> (UTC), when the volume was created. The numeric property shows the value as seconds elapsed since January 1, 1970 00:00.
volume-description	string	<ul style="list-style-type: none"> <li>For HP-UX, a text value (set in-band by a host application) that identifies the volume.</li> <li>For OpenVMS, a numeric value (set with the <code>create volume</code> or <code>set volume</code> command) that identifies the volume to an OpenVMS host.</li> <li>Blank by default.</li> </ul>
wwn	string	World Wide Name of the volume.
progress (progress-numeric)	string (uint32)	For a volume-copy operation, the percent complete (0% to 99%). The numeric property shows the unformatted value.
container-name	string	Name of the pool that contains the volume.
container-serial	string	Serial number of the pool that contains the volume.
allowed-storage-tiers (allowed-storage-tiers-numeric)	string (uint32)	Not supported.
threshold-percent-of-pool	string	For internal use only.
reserved-size-in-pages	uint32	For internal use only.
allocate-reserved-pages-first (allocate-reserved-pages-first-numeric)	string (uint32)	For internal use only.
zero-init-page-on-allocation (zero-init-page-on-allocation-numeric)	string (uint32)	For internal use only.
large-virtual-extents (large-virtual-extents-numeric)	string (uint32)	Shows whether the system will try to allocate pages in a sequentially optimized way to reduce I/O latency and improve performance. <ul style="list-style-type: none"> <li>Disabled (0)</li> <li>Enabled (1)</li> </ul>

**Table 146 volumes properties (continued)**

Name	Type	Description
raidtype (raidtype-numeric)	string (uint32)	The RAID level of the disk group. <ul style="list-style-type: none"> <li>RAID0 (0)</li> <li>RAID1 (1)</li> <li>MSA-DP+ (2)</li> <li>RAID5 (5)</li> <li>NRAID (6)</li> <li>RAID10 (10)</li> <li>RAID6 (11)</li> </ul>
pi-format (pi-format-numeric)	string (uint32)	Disabled.
cs-replication-role	string	<ul style="list-style-type: none"> <li>Copy Source: The volume is the source for a volume copy operation.</li> <li>Copy Destination: The volume is the destination for a volume copy operation.</li> <li>Primary: The volume is the primary volume in a replication set.</li> <li>Secondary: The volume is the secondary volume in a replication set.</li> <li>Blank: Not applicable.</li> </ul>
cs-copy-dest (cs-copy-dest-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Off (0): Not applicable.</li> <li>On (1): The volume is the destination for a volume copy operation.</li> </ul>
cs-copy-src (cs-copy-src-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Off (0): Not applicable.</li> <li>On (1): The volume is the source for a volume copy operation.</li> </ul>
cs-primary (cs-primary-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Off (0): Not applicable.</li> <li>On (1): The volume is the primary volume in a replication set.</li> </ul>
cs-secondary (cs-secondary-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>Off (0): Not applicable.</li> <li>On (1): The volume is the secondary volume in a replication set.</li> </ul>
metadata-in-use (metadata-in-use-numeric)	string (uint64)	Amount of pool metadata currently being used by the volume. The numeric property shows the unformatted value in blocks.
health (health-numeric)	string (uint32)	<ul style="list-style-type: none"> <li>OK (0)</li> </ul>
health-reason	string	If Health is not OK, a message describes the reason for the health state.
health-recommendation	string	If Health is not OK, a message describes recommended actions to resolve the 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.

## workload

This basetype is used by `show workload`.

**Table 147 workload properties**

Name	Type	Description
current-ssd-space (current-ssd-space-numeric)	string (uint64)	Current SSD capacity allocated to the pool. The numeric property shows the unformatted value in blocks.
pool	string	The pool for which the calculations are based: A or B.

**Table 147 workload properties (continued)**

<b>Name</b>	<b>Type</b>	<b>Description</b>
calc-type	string	Either Peak or Average.
io-type	string	Shows whether calculations are based on either Reads, Writes, or the Combined total of reads and writes.
pct-target-a (pct-target-a-numeric)	string (uint32)	Low target percentage of capacity. The numeric property shows the unformatted value.
pct-target-b (pct-target-b-numeric)	string (uint32)	Medium target percentage of capacity. The numeric property shows the unformatted value.
pct-target-c (pct-target-c-numeric)	string (uint32)	High target percentage of capacity. The numeric property shows the unformatted value.
heatmaps	Embedded; see heatmaps.	

# 5 Support and other resources

## Accessing Hewlett Packard Enterprise Support

- For live assistance, go to the Contact Hewlett Packard Enterprise Worldwide website:  
<https://www.hpe.com/info/assistance>
- To access documentation and support services, go to the Hewlett Packard Enterprise Support Center website:  
<https://www.hpe.com/support/hpesc>

### Information to collect

- Technical support registration number (if applicable)
- Product name, model or version, and serial number
- Operating system name and version
- Firmware version
- Error messages
- Product-specific reports and logs
- Add-on products or components
- Third-party products or components

## Accessing updates

- Some software products provide a mechanism for accessing software updates through the product interface. Review your product documentation to identify the recommended software update method.

- To download product updates:

### **Hewlett Packard Enterprise Support Center**

<https://www.hpe.com/support/hpesc>

### **Hewlett Packard Enterprise Support Center: Software downloads**

<https://www.hpe.com/support/downloads>

### **My HPE Software Center**

<https://www.hpe.com/software/hpesoftwarecenter>

- To subscribe to eNewsletters and alerts:  
<https://www.hpe.com/support/e-updates>
- To view and update your entitlements, and to link your contracts and warranties with your profile, go to the Hewlett Packard Enterprise Support Center **More Information on Access to Support Materials** page:  
<https://www.hpe.com/support/AccessToSupportMaterials>

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❗ **IMPORTANT** Access to some updates might require product entitlement when accessed through the Hewlett Packard Enterprise Support Center. You must have an HPE Account set up with relevant entitlements.

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## Remote support

Remote support is available with supported devices as part of your warranty or contractual support agreement. It provides intelligent event diagnosis, and automatic, secure submission of hardware event notifications to Hewlett Packard Enterprise, which initiates a fast and accurate resolution based on the service level of your product. Hewlett Packard Enterprise strongly recommends that you register your device for remote support.

If your product includes additional remote support details, use search to locate that information.

### **HPE Get Connected**

<https://www.hpe.com/services/getconnected>

### **HPE Pointnext Tech Care**

<https://www.hpe.com/services/techcare>

### **HPE Complete Care**

<https://www.hpe.com/services/completecure>

## Customer self repair

Hewlett Packard Enterprise customer self repair (CSR) programs allow you to repair your product. If a CSR part needs to be replaced, it will be shipped directly to you so that you can install it at your convenience. Some parts do not qualify for CSR. Your Hewlett Packard Enterprise authorized service provider will determine whether a repair can be accomplished by CSR. For more information about CSR, contact your local service provider.

## Warranty information

To view the warranty information for your product, see the links provided below:

### **HPE ProLiant and IA-32 Servers and Options**

<https://www.hpe.com/support/ProLiantServers-Warranties>

### **HPE Enterprise and Cloudline Servers**

<https://www.hpe.com/support/EnterpriseServers-Warranties>

### **HPE Storage Products**

<https://www.hpe.com/support/Storage-Warranties>

### **HPE Networking Products**

<https://www.hpe.com/support/Networking-Warranties>

## Regulatory information

To view the regulatory information for your product, view the *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at the Hewlett Packard Enterprise Support Center:

<https://www.hpe.com/support/Safety-Compliance-EnterpriseProducts>

### **Additional regulatory information**

Hewlett Packard Enterprise is committed to providing our customers with information about the chemical substances in our products as needed to comply with legal requirements such as REACH (Regulation EC No 1907/2006 of the European Parliament and the Council). A chemical information report for this product can be found at:

<https://www.hpe.com/info/reach>

For Hewlett Packard Enterprise product environmental and safety information and compliance data, including RoHS and REACH, see:

<https://www.hpe.com/info/ecodata>

For Hewlett Packard Enterprise environmental information, including company programs, product recycling, and energy efficiency, see:

<https://www.hpe.com/info/environment>

## Documentation feedback

Hewlett Packard Enterprise is committed to providing documentation that meets your needs. To help us improve the documentation, use the **Feedback** button and icons (located at the bottom of an opened document) on the Hewlett Packard Enterprise Support Center portal (<https://www.hpe.com/support/hpesc>) to send any errors, suggestions, or comments. All document information is captured by the process.



# A Settings changed by restoring defaults

This page summarizes the system settings that result from using the `restore defaults` command.

**Table 148 System information settings**

Setting	Value
System name	Uninitialized Name
System contact	Uninitialized Contact
System location	Uninitialized Location
System information	Uninitialized Info

**Table 149 Management protocols settings**

Setting	Value
CLI/Telnet	Disabled
CLI/SSH	Enabled
SLP	Enabled
FTP	Disabled
SFTP	Enabled
SNMP	Disabled
WBI/HTTP	Disabled
WBI/HTTPS	Enabled
Debug	Disabled
Ciphers setting	Default cipher strings

**Table 150 User settings**

Setting	Value
Users	All configured users are deleted and replaced with default user definitions and default settings: User: <code>setup</code> ; Password: press ENTER

**Table 151 Miscellaneous settings (1)**

Setting	Value
CLI session timeout	Preserved
Tasks and schedules	Preserved
Management Controller debug logs	Preserved
Management Controller event logs	Preserved
Storage Controller debug logs	Preserved
Storage Controller event logs	Preserved
Time/date and NTP settings	Preserved
Network IP settings	Preserved
IPv6 network settings	Preserved
DNS management hostname	Preserved
DNS name servers	Preserved
DNS search domains	Preserved

**Table 152 SNMP settings**

Setting	Value
SNMP trap notification level	None
SNMP trap host IPs	0.0.0.0
SNMP read community	public
SNMP write community	private

**Table 153 SMTP settings**

Setting	Value
Email notification	Disabled
Email notify filter	None
Email addresses	None
Email server	None
Email domain	None
Email sender	None
Log destination	None
Include logs	Disabled
Persistent alerts	Enabled
Event notification	None
Alert notification	All
Proxy setting	Cleared

**Table 154 LDAP settings**

Setting	Value
LDAP parameters	Cleared
LDAP settings	Disabled (server IP defaulted to 0.0.0.0)
User groups	Cleared
Audit log	Preserved

**Table 155 Syslog settings**

Setting	Value
Syslog parameters	Cleared
Syslog settings	Disabled (host IP defaulted to 0.0.0.0)

**Table 156 Miscellaneous settings (2)**

Setting	Value
Alert condition history	Preserved
Alerts	Preserved
SSL/SSH certificates	Preserved
Licenses	Preserved
Disk group metadata	Preserved

**Table 157 Host port settings**

Setting	Value
FC link speed	Auto
FC topology	Point-to-point
SAS fanout (Y cable) support	Enabled

**Table 158 Disk spin down settings**

Setting	Value
Disk spin down	Disabled

**Table 159 Advanced settings**

Setting	Value
Disk group background scrub	Enabled
Partner firmware upgrade	Enabled
Utility priority	High
SMART	Enabled
Dynamic spare configuration	Enabled
Enclosure polling rate	5 seconds
Host control of caching	Disabled
Sync cache mode	Immediate
Missing LUN response	Illegal Request
Controller failure	Enabled
Supercap failure	Enabled
Power supply failure	Disabled
Fan failure	Disabled
Temperature exceeded	Disabled
Partner notify	Enabled
Auto write back	Enabled
Inactive drive spin down	Disabled
Inactive drive spin down delay	15 minutes
Managed logs	Disabled
Auto stall recovery	Enabled (for failover/failback, not I/O)
Restart on CAPI fail	Enabled
Default mapping	Disabled
Slow disk detection	Enabled
Scrub schedule	Disabled

**Table 160 FDE settings**

Setting	Value
FDE settings	Preserved

**Table 161 Replication settings**

Setting	Value
Peer connections	Preserved
Replication sets	Preserved
CHAP records	Preserved

**Table 162 Enclosure settings**

Setting	Value
Name	Cleared
Location	Cleared
Rack number	0
Rack position	0

**Table 163 iSCSI port settings**

Setting	Value
IP	Preserved
IP version	Preserved
Netmask	Preserved
Gateway	Preserved
Router (IPv6 only)	Preserved

**Table 164 Other iSCSI settings**

Setting	Value
CHAP enabled	Preserved
iSNS	Preserved
Jumbo frames	Preserved

**Table 165 Host settings**

Setting	Value
Host and initiator nicknames and profiles	Preserved
Host groups	Preserved

**Table 166 Volume settings**

Setting	Value
Volume identifying information	Preserved
Volume groups	Preserved

**Table 167 Pool settings**

Setting	Value
Thresholds	Preserved
Overcommit	Preserved
Limits and policy	Preserved
Snapshot space thresholds	Preserved

**Table 168 Miscellaneous settings (3)**

<b>Setting</b>	<b>Value</b>
CLI parameters	CLI parameters are kept on a per-user basis. All configured users are deleted and replaced with default user definitions and default settings as detailed in the Users section of this table.
Debug log parameters	Each parameter is reset to its default as documented for the <code>set debug-log-parameters</code> CLI command.
Volume snapshot retention priority	Preserved
Volume cache settings	Preserved
Expander PHY settings	Controller module root expander PHY settings are cleared
Volume tier affinity	Preserved
Device identification LED status	Cleared

## B API commands

This appendix describes CLI commands that must be run in API mode, not console mode.

### add certificate

#### Description

Verifies a security certificate is in X.509 format and uploads it into the storage system's file system.

Added certificates are not immediately active. After uploading a certificate, to activate it run the `activate certificate` command.

---

**!** **IMPORTANT** This command is only available via the HTTPS API; it is not available via the SSH CLI. For information about using the API, see ["Using a script to access the CLI" on page 15](#).

---

#### Request attributes

<b>Minimum role</b>	manage
<b>Request method</b>	POST
<b>Path</b>	/api/addcertificate
<b>Authentication</b>	Required and managed via <code>sessionKey</code> header
<b>Content-Type</b>	multipart/form-data

#### Parameters

Key	Value	Content type	Description
cert	<path>	text/plain	Path to the PEM-encoded SSL certificate file to upload.
cert-name	<name>	text/plain	Optional. A name for the certificate. Input rules: <ul style="list-style-type: none"><li>The value is case sensitive.</li><li>The value can have a maximum of 32 bytes.</li><li>The value must be alphanumeric. No special characters are allowed except: . - _</li></ul> If this parameter is omitted, a name is autogenerated in the format <code>CERT_&lt;controller-ID&gt;_&lt;yyymmddhhmmss&gt;</code> .
controller	a b	text/plain	Optional. The controller for which the certificate is being added. If this parameter is omitted, the value is considered to be the controller being accessed.
identity	<username>	text/plain	Optional. The username registered with a WPA authentication server.

#### Examples

Using cURL, add a user SSL certificate to controller A.

```
curl --location --request POST 'https://10.235.221.117/api/addcertificate' \  
--header 'sessionKey: d93697c89fe75d94c3c2c7180eb5050e' \  
--form 'cert="-----BEGIN CERTIFICATE-----  
MIIFRDCCAYygAwIBAgICEBcwDQYJKoZIhvcNAQELBQAwVDELMAkGA1UEBhMCSU4x  
DDAKBgNVBAGMA01BSDEQMA4GA1UECgwHc2VhZ2F0ZTEEMMAoGA1UECwwDZWZMRcw  
...  
fY6RYf40TV5Ztg+SgYTq+FwfyrtI5TO9kPBkGPWjkpE3xR8E76FqLsnOnr1DcKJo  
TxF4/t/ulT9Iisi3qiiJKW/APkZvbkI28WjfvotHa3yhFutb80XDsugNH2vZn8l
```

```

WtZVDMSSg7U=
-----END CERTIFICATE-----
";type=text/plain' \
--form 'cert-name="rgwsd";type=text/plain' \
";type=text/plain' \
--form 'identity="idt";type=text/plain' \
--form 'controller="a";type=text/plain'

```

Using cURL, add a trust SSL certificate to controller A.

```

curl --location --request POST 'https://10.235.221.117/api/addcertificate' \
--header 'sessionKey: d93697c89fe75d94c3c2c7180eb5050e' \
--form 'cert="-----BEGIN CERTIFICATE-----
MIIFRDCCAyygAwIBAgICEBcwDQYJKoZIhvcNAQELBQAwVDELMakGA1UEBhMCSU4x
DDAKBgNVBAGMA01BSDEQMA4GA1UECgwHc2VhZ2F0ZTEMMMAoGA1UECwwDZWZMRcw
...
fY6RYf40TV5Ztg+SgYTq+FwfyrtI5TO9kPBkGPWjkeE3xR8E76FqLsnOnr1DcKJo
Txf4/t/ulT9Iisi3qiiJKW/APkZvbkI28WjfvotHa3yhFutb80XD sugNH y2vZn8l
WtZVDMSSg7U=
-----END CERTIFICATE-----
";type=text/plain' \
--form 'cert-name="trustcert";type=text/plain' \
--form 'identity="idt";type=text/plain' \
--form 'controller="a";type=text/plain'

```

### See also

- activate certificate
- create certificate-signing-request
- remove certificate
- show certificates

# Glossary

## **2U12**

An enclosure that is two rack units in height and can contain 12 disks.

## **2U24**

An enclosure that is two rack units in height and can contain 24 disks.

## **AES**

Advanced Encryption Standard.

## **AFA**

All-flash array (AFA). A storage system that uses only SSDs, without tiering.

## **all-flash array**

All-flash array (AFA). A storage system that uses only SSDs, without tiering.

## **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.

## **array**

Synonym for storage system.

## **ASC/ASCQ**

Additional Sense Code/Additional Sense Code Qualifier. Information on sense data returned by a SCSI device.

## **auto-write-through**

Auto-write-through (AWT). A setting that specifies when the RAID controller cache mode automatically changes from write-back to write-through.

## **automated tiered storage**

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.

## **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.

## **AWT**

Auto-write-through (AWT). 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**

Synonym for 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 enclosure.

**child volume**

The snapshot of a parent volume in a snapshot tree.

**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.

**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.

**controller A (or B)**

A short way of referring to controller module A (or B).

**controller enclosure**

An enclosure that can contain 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 nonvolatile memory; host, expansion, network, and service ports; and midplane connectivity.

**CPLD**

Complex programmable logic device.

**CRC**

Cyclic Redundancy Check.

**CRU**

Customer-replaceable unit. See customer FRU.

**CSV**

Comma-separated values. A format to store tabular data in plain-text form.

**customer FRU**

A product module that can be ordered as a SKU and replaced in an enclosure by customers or by qualified service personnel, without having to send the enclosure to a repair facility.

**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 pool is deallocating pages from its volumes because they no longer need the space to store data.

**default mapping**

Access settings for a volume that apply to all current and future initiators and use a single LUN.

**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 that provides storage capacity. The number of disks that a disk group can contain is determined by its RAID level.

**disk spin down**

Disk spin down (DSD). A power-saving feature for spinning disks that monitors disk activity and spins down inactive disks based on user-selectable policies.

**DNS**

Domain Name System.

**drain**

The automatic movement of active volume data from a virtual disk group to other disk-group members within the same pool.

**drive enclosure**

Synonym for expansion enclosure. See also EBOD, JBOD.

**drive spin down**

Disk spin down (DSD). A power-saving feature for spinning disks that monitors disk activity and spins down inactive disks based on user-selectable policies.

**DSD**

Disk spin down (DSD). A power-saving feature for spinning disks that monitors disk activity and spins down inactive disks based on user-selectable policies.

**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.

**EBOD**

Expanded Bunch of Disks. Expansion enclosure attached to a controller enclosure.

**EC**

Expander Controller (EC). A processor (located in the SAS expander in each IOM) that controls the SAS expander and provides SES functionality. See also EMP.

**EEPROM**

Electrically erasable programmable ROM.

**eMMC**

Electro-magnetic memory card. Also referred to as memory card, non-volatile memory.

**EMP**

Enclosure management processor (EMP). An Expander Controller subsystem that provides SES data such as temperature, power supply and fan status, and the presence or absence of disks.

**enclosure**

A physical storage device that contains I/O modules, disks, and other FRUs.

**enclosure management processor**

Enclosure management processor (EMP). An Expander Controller subsystem that provides SES data such as temperature, power supply and fan status, and the presence or absence of disks.

**ESD**

Electrostatic discharge.

**Expander Controller**

Expander Controller (EC). A processor (located in the SAS expander in each IOM) that controls the SAS expander and provides SES functionality. See also EMP.

**expansion enclosure**

An enclosure that can contain two expansion modules. Expansion enclosures can be connected to a controller enclosure 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. In an expansion enclosure, the upper expansion module is designated A and the lower one is designated B.

**explicit mapping**

Access settings for a volume to a specific initiator, host, or host group using a unique LUN.

**failback**

Synonym for 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.

**FC**

Fibre Channel interface protocol.

**FC-AL**

Fibre Channel Arbitrated Loop. The FC topology in which devices are connected in a one-way loop.

**FDE**

Full Disk Encryption (FDE). 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.

**FQDN**

Fully qualified domain name.

**FRU**

Field-replaceable unit. See service FRU.

**Full Disk Encryption**

Full Disk Encryption (FDE). A feature that secures all the user data on a storage system. See also lock key, passphrase, repurpose, SED.

**GEM**

Generic Enclosure Management. The firmware responsible for managing enclosure 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.

**HBA**

Host bus adapter. A device that facilitates I/O processing and physical connectivity between a host and the storage system.

**HDD**

Hard disk drive.

**host**

A user-defined object that represents a server to which the storage system is attached, and is used to define a mapping relationship to storage.

**host group**

A user-defined set of hosts for ease of management, such as for volume-attachment operations.

**host port**

A port on a controller module that interfaces to a server, either directly or through a network switch.

**I/O Manager**

An SNMP MIB term for a controller module.

**I/O module**

Input/output module (I/O module, IOM). An IOM can be either a controller module or an expansion module.

**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.

**IOM**

Input/output module (I/O module, IOM). 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 interface protocol.

**iSNS**

Internet Storage Name Service.

**JBOD**

"Just a bunch of disks." An expansion enclosure attached to a server.

**LBA**

Logical block address. The address used for specifying the location of a block of data.

**LDAP**

Local directory access protocol.

**LDAPS**

LDAP over SSL.

**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.

**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**

Fibre Channel Arbitrated Loop. The FC topology in which devices are connected in a one-way loop.

**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**

Management Controller (MC). A processor (located in a controller module) that is responsible for human-computer interfaces, such as a WBI, and computer-computer interfaces, such as SNMP, and interacts with the Storage Controller.

**map**

Settings that specify whether a volume is presented as a storage device to a host, and how the host can access the volume. Mapping settings include an access type and a LUN that identifies the volume to the host.

**MC**

Management Controller (MC). A processor (located in a controller module) that is responsible for human-computer interfaces, such as a WBI, and computer-computer interfaces, such as SNMP, and interacts with the Storage Controller.

**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 enclosure.

**mount**

To enable access to a volume from a host OS. Synonyms for this action include present and map.

**MSA-DP+**

A RAID-based data protection level that maximizes flexibility, provides built in spare capacity, and allows for very fast rebuilds, large storage pools, and simplified expansion.

**network port**

The Ethernet port on a controller module through which its Management Controller is connected to the network.

**NRAID**

Non-RAID, nonstriped mapping to a single disk.

**NTP**

Network time protocol.

**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 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**

Partner firmware update (PFU). The automatic update of the partner controller when the user updates firmware on one controller.

**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.

**PFU**

Partner firmware update (PFU). 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**

A container for volumes that is composed of one or more virtual disk groups.

**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.

**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 the primary storage system.

**provisioning**

The process of creating storage volumes, mapping them to initiators or hosts, and configuring data-protection options.

**RAID head**

Synonym for controller enclosure.

**RBOD**

"RAID bunch of disks." See controller enclosure.

**read cache**

A special virtual disk group, comprised of SSDs, that can be added to a pool for the purpose of speeding up read access to data stored on spinning disks elsewhere in the pool.

**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.

**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 FC or iSCSI links.

**replication set**

A container that houses the internal support for performing replication. 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 set failover**

The replication set's secondary system has allowed direct access to the secondary volume or volume group because the primary system is not operational. In this state no replications will occur, even if the primary system becomes operational and communication is restored. The secondary volume can be mapped and accessed for use, including rollback to the contents of any manually created or snapshot-history snapshot.

**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.

**repurpose**

A method by which all data in a storage 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.

**SAS**

Serial Attached SCSI (Small Computer System Interface).

**SATA**

Serial Advanced Technology Attachment.

**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 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 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.

**service FRU**

A product module that can be replaced in an enclosure by qualified service personnel only, without having to send the enclosure to a repair facility.

**SES**

SCSI Enclosure Services. The protocol that allows the initiator to communicate with the enclosure using SCSI commands.



**SFF**

Small form factor.

**SFTP**

SSH File Transfer Protocol. A secure secondary interface for tasks such as installing firmware updates, downloading logs, and installing security certificates and keys. All data sent between the client and server will be encrypted.

**SHA**

Secure Hash Algorithm.

**shelf**

Synonym for enclosure.

**shipkit**

The package containing an enclosure, accessories, and related materials that a customer receives.

**SLAAC**

Stateless address autoconfiguration.

**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.

**SMU**

Storage Management Utility is the web-browser interface (WBI), the web application that is embedded in each controller module and is the primary management interface for the storage system.

**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 the source volume. A snapshot can be mapped and written to. 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.

**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**

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.

**Storage Management Utility**

Storage Management Utility is the web-browser interface (WBI), the web application that is embedded in each controller module and is the primary management interface for the storage system.

**storage system**

A controller enclosure, optionally with connected expansion enclosures. 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).

**TCP**

Transmission Control Protocol.

**thin provisioning**

A virtual-storage feature that allows actual storage for a 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; Standard, which uses enterprise-class spinning SAS disks; Archive, which uses midline spinning SAS disks.

**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**

Synonym for enclosure.

**UDP**

User Datagram Protocol.

**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. Synonyms include unrepresent and unmap.

**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.

**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 SMU and CLI interfaces.

**virtual**

The storage-class designation for logical components such as volumes that use paged-storage technology to virtualize data storage. See paged storage.

**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 copy**

An independent copy (clone) of the data in a virtual volume. The capability to copy volumes makes use of snapshot functionality.

**volume group**

A user-defined group of volumes for ease of management, such as for host-attachment operations.

**VPD**

Vital Product Data. Data held on an EEPROM in an enclosure or FRU that is used by GEM to identify and control the component.

**WBI**

Storage Management Utility is the web-browser interface (WBI), the web application that is embedded in each controller module and is the primary management interface for the storage system.

**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.

# Index

## A

### alerts

- acknowledging 181
- clearing 54
- description 27
- setting email parameters 201
- showing active alerts 276
- showing condition history 274

### API

- enabling/disabling output 186
- example command input and output 21
- JSON script example 18
- Perl script example 15
- Python script example 17
- scripting guidelines 20
- showing all property metadata for objects 132
- using JSON output 19
- using XML output 19
- XML optimization 22

### array

- See system 14

### audit log

- showing 279

### auto-stall recovery

- enabling/disabling 175

## B

base for size representations 26

bytes per character 23

## C

### cache

- clearing unwritable data 55
- enabling/disabling auto-write-back 175
- enabling/disabling host access to 175
- setting parameters for volumes 267
- showing amount of unwritable data 432
- showing settings for the system 281
- showing settings for volumes 281

### certificates

- activating 38
- removing a user-supplied 145
- showing 284

## CHAP

- changing a record 182
- creating record to authenticate login requests 68
- deleting records 103
- showing records 288

characters versus bytes 23

## CLI

- accessing 14
- base setting 290
- brief mode setting 290
- command syntax 23
- enabling/disabling brief mode 186
- enabling/disabling pager mode 186
- exiting 124
- locale setting 290
- output format setting 290
- output modes 14
- pager mode setting 290
- precision setting 291
- scripting commands 15
- scripting guidelines 20
- setting base 186
- setting locale 186
- setting output mode 186
- setting parameters 186
- setting precision 186
- setting prompt 235
- setting session timeout 186
- setting temperature scale 186
- setting units 186
- showing parameters 290
- showing user sessions 406
- temperature scale setting 291
- units setting 291
- using commands interactively 14

### command-line interface

- See CLI 14

### commands

- automatic completion 25
- by category 28
- editing 25
- history 25
- keyboard shortcuts 25
- removed 33

confirmation prompts 14

- controller module
  - recovering from simulated failure 466
- controllers
  - date and time settings 294
  - enabling/disabling failure trigger 175
  - forcing partner to fail 128
  - notifying partner when auto-write-through is triggered 175
  - resetting statistics 158
  - setting date and time 189
  - showing inquiry data 355
  - showing settings and status 297
  - showing shutdown status 408
  - showing statistics 295
- D**
- debug interface
  - enabling/disabling 236
- debug log
  - setting message types to include 191
  - showing settings 301
- default mapping 176
- defaults
  - restoring system 169
- disk channels
  - rescanning 155
- disk groups
  - aborting scrub 37
  - adding 40
  - dequarantine 120
  - enabling/disabling background scrub for disks in disk groups 175
  - expanding 125
  - remove from quarantine 120
  - removing 146
  - scrubbing to find and fix errors 173
  - setting name 195
  - setting parameters 195
  - setting spare capacity for MSA-DP+ 195
  - showing settings and status 304
  - showing statistics 302
  - syntax 24
  - trusting for emergency data recovery 459
- disks
  - adding spare 49
  - clearing metadata from leftover 56
  - enabling/disabling identification LED 225
  - enabling/disabling SMART 175, 196
  - enabling/disabling spin down for available and global spare 175
  - enabling/disabling spin down for available or global spare 196
  - erasing 122
  - forcing rediscovery of 155
  - removing spare 151
  - resetting error statistics 159
  - resetting statistics 160
  - securely erasing an FDE-capable 193
  - setting parameters 196
  - setting spin-down delay for available and global spare 175, 196
  - showing settings 309
  - showing settings and status 316
  - showing statistics 311
  - syntax 23
- DNS
  - clearing parameters 58
  - resetting management hostname to the default 161
  - setting management hostname 198
  - setting parameters 199
  - showing management hostname 324
  - showing settings 325
- dynamic spares
  - enabling/disabling 175
- E**
- email/SMTP
  - setting parameters 201
  - showing settings 326
  - testing notifications 457
- EMP polling rate
  - setting 175
- enclosure
  - setting parameters 204
- enclosures
  - enabling/disabling identification LED 225
  - forcing rediscovery of 155
  - showing settings and status 328
- event log
  - clearing 59
  - description 26
  - showing 332
- event notification
  - setting email parameters 201
- expansion port links
  - showing health 402

explicit mapping [176](#)

## F

fan module

- enabling/disabling failure trigger [175](#)
- showing status [338](#)

FDE

- clearing lock keys [61](#)
- repurposing a disk [193](#)
- repurposing the system [210](#)
- securely erasing a disk [193](#)
- securely erasing all disks [210](#)
- securing all disks [210](#)
- setting import key [207](#)
- setting lock key [208](#)
- setting system state [210](#)
- showing settings and status [340](#)

firmware

- activating [39](#)
- checking system readiness for upgrade [51](#)
- enabling/disabling partner update [175](#)
- showing bundles [341](#)
- showing update status [343](#)
- showing versions [438](#)

FRUs

- showing [344](#)
- showing versions [438](#)

FTP

- enabling/disabling [236](#)

## H

hardware

- showing versions [438](#)

help

- viewing [25](#), [129](#)

host groups

- adding hosts [45](#)
- creating [72](#)
- deleting [105](#)
- removing hosts [148](#)
- setting name [213](#)
- showing [348](#)
- syntax [25](#)

host links

- resetting [162](#)

host PHYs

- showing statistics [350](#)

host ports

- enabling/disabling CHAP for iSCSI [221](#)
- enabling/disabling fanout cable support [214](#)
- enabling/disabling iSNS for iSCSI [221](#)
- enabling/disabling jumbo frames for iSCSI [221](#)
- resetting [162](#)
- resetting statistics [163](#)
- setting alternate iSNS address for iSCSI [221](#)
- setting default router address for iSCSI [214](#)
- setting FC connection mode [214](#)
- setting gateway address for iSCSI [214](#)
- setting IP address for iSCSI [214](#)
- setting IP version for iSCSI [214](#), [221](#)
- setting iSNS address for iSCSI [221](#)
- setting link speed for FC [214](#)
- setting link speed for iSCSI [221](#)
- setting loop IDs for FC [214](#)
- setting netmask address for iSCSI [214](#)
- setting parameters [214](#)
- setting parameters for iSCSI [221](#)
- showing settings and status [381](#)
- showing statistics [351](#)

hosts

- adding initiators [46](#)
- creating [70](#)
- deleting ungrouped [106](#)
- enabling/disabling access to cache [175](#)
- removing initiators [149](#)
- setting nickname [70](#), [212](#)
- setting profile [70](#), [212](#)
- syntax [25](#)
- testing communication with remote [133](#)

HTTP

- enabling/disabling [236](#)

HTTPS

- enabling/disabling [236](#)

## I

initiators

- deleting all manually created [107](#)
- deleting nickname [107](#)
- deleting nicknames of all discovered [107](#)
- setting nickname [218](#)
- setting profile [218](#)
- showing [353](#)
- showing mappings [363](#)
- syntax [25](#)

- IPv6
  - adding a static address [47](#)
  - removing a static address [150](#)
  - setting gateway IP address [219](#)
  - setting network parameters [219](#)
  - showing network settings [357](#)
  - specifying to automatically configure addresses using DHCPv6 or SLAAC [219](#)
  - specifying to manually configure static addresses [219](#)
- IPv6 addresses
  - showing [356](#)
- iSCSI
  - showing settings [358](#)
- L**
- LDAP
  - setting parameters [223](#)
  - showing settings [360](#)
- leftover disks
  - clearing metadata [56](#)
- licensed features
  - showing [361](#)
- M**
- managed logs
  - enabling/disabling [175](#)
  - setting email parameters [201](#)
  - testing notifications [457](#)
- Management Controllers
  - restarting [167](#)
- mappings
  - showing [363](#)
- metrics
  - querying retained [134](#)
  - showing available types [366](#)
  - starting retention of dynamic [454](#)
  - stopping retention of dynamic [455](#)
- midplane
  - show abbreviated serial number [420](#)
- missing LUN response
  - setting [175](#)
- N**
- network ports
  - enabling/disabling DHCP [226](#)
  - enabling/disabling response to broadcast ping [226](#)
  - setting gateway IP address [226](#)
  - setting IP address [226](#)
  - setting IP subnet mask [226](#)
  - setting parameters [226](#)
  - showing settings and status [369](#)
- notifications
  - testing email [457](#)
  - testing managed-log [457](#)
  - testing SNMP [457](#)
  - testing syslog [457](#)
- NTP
  - configuring [189](#)
  - setting parameters [228](#)
  - showing settings and status [371](#)
- O**
- output mode
  - API [14](#)
  - console [14](#)
- P**
- peer connections
  - creating [73](#)
  - deleting [108](#)
  - querying [137](#)
  - setting parameters [231](#)
  - showing [372](#)
- pinging a remote host to test communication [133](#)
- pools
  - deleting [109](#)
  - resetting statistics [164](#)
  - setting parameters for a virtual [233](#)
  - setting snapshot space usage [246](#)
  - showing settings and status [374](#)
  - showing statistics [377](#)
  - syntax [24](#)
- ports
  - showing health for expansion [402](#)
  - syntax [24](#)
- power supplies
  - enabling/disabling failure trigger [175](#)
  - showing [385](#)
- protocols
  - enabling/disabling [236](#)
  - showing settings [387](#)
- provisioning
  - showing settings [389](#)

- proxy server
  - enabling/disabling [238](#)
  - showing settings and status [392](#)

## Q

- quarantined disk group
  - resolving [120](#)

## R

- Redfish
  - add event subscriber [43](#)
  - changing settings for an event subscriber [206](#)
  - delete event subscriber [104](#)
  - show event subscribers [330](#)

- redundancy mode
  - showing [393](#)

- regulatory/safety compliance [591](#)

- remote systems
  - changing credentials stored locally [240](#)
  - creating [75](#)
  - deleting [111](#)
  - running a command on [144](#)
  - showing settings and status [395](#)

- replication sets
  - aborting [36](#)
  - changing settings [241](#)
  - clearing queue [62](#)
  - creating [76](#)
  - deleting [112](#)
  - recovering [140](#)
  - replicating volumes [153](#)
  - resuming replication [170](#)
  - showing settings and status [397](#)
  - showing snapshot history [400](#)
  - suspending replication [456](#)

- restart on CAPI failure
  - enabling/disabling [175](#)

- restarting Management Controllers [167](#)

- restarting Storage Controllers [168](#)

## S

- SAS expander
  - clearing status and counters [60](#)
  - showing status [335](#)

- schedules
  - changing parameters [244](#)

- creating to run tasks automatically [80](#)
- deleting [113](#)
- showing [403](#)

- SCSI MODE SELECT command
  - setting handling of [175](#)

- SCSI SYNCHRONIZE CACHE command
  - setting handling of [175](#)

- security certificate
  - creating or removing [66](#)

- security ciphers
  - resetting [157](#)
  - setting [184](#)
  - showing [289](#)

- sensors
  - showing status [405](#)

- services
  - enabling/disabling [236](#)

- SFTP
  - enabling/disabling [236](#)
  - setting port [236](#)

- shutting down Storage Controllers [453](#)

- size representations [26](#)

- SLP
  - enabling/disabling [236](#)

- snapshots
  - creating [82](#)
  - deleting all for a volume [102](#)
  - deleting specified [114](#)
  - resetting to current data in source volume [165](#)
  - setting space usage [246](#)
  - showing [409](#)
  - showing space usage [412](#)

- SNMP
  - enabling/disabling [236](#)
  - setting parameters [248](#)
  - showing settings [414](#)
  - testing notifications [457](#)

- SSH
  - enabling/disabling [236](#)
  - setting port [236](#)

- statistics
  - resetting all [156](#)
  - resetting controller [158](#)
  - resetting disk [160](#)
  - resetting disk error [159](#)
  - resetting host port [163](#)
  - resetting pool [164](#)



- resetting volume 166
- showing controller 295
- showing disk 311
- showing disk group 302
- showing host PHY 350
- showing host port 351
- showing pool 377
- showing tier 429
- showing volumes 445
- Storage Controllers
  - restarting 168
  - shutting down 453
- supercapacitors
  - enabling/disabling failure trigger 175
- synchronize-cache mode
  - setting 175
- syntax, command 23
- syslog
  - setting parameters 250
  - showing settings 416
  - testing notifications 457
- system
  - configuration limits 419
  - restarting 168
  - restoring defaults 169
  - setting advanced parameters 175
  - setting contact 252
  - setting description 252
  - setting location 252
  - setting name 252
  - setting parameters 252
  - showing advanced settings 270
  - showing configuration 292
  - showing I/O workload 451
  - showing information 417
  - showing provisioning 389
  - showing settings 419
- system settings
  - restoring defaults 593

**T**

- tasks
  - creating 83
  - deleting 115
  - setting parameters 253
  - showing 421
- technical support 590
- Telnet
  - enabling/disabling 236
- temperature
  - enabling/disabling CM shutdown 175
- tiers
  - showing 427
  - showing statistics 429
- timezones
  - showing 431
- trusting a disk group for emergency data recovery 459

**U**

- update server
  - changing settings 255
  - checking status 53
  - clearing proxy settings 63
  - showing settings and status 433
- user groups
  - creating 90
  - deleting 117
  - setting parameters 261
  - showing 434
- users
  - creating 86
  - deleting 116
  - password rules 25
  - setting parameters for the current session or permanently 257
  - setting password 230
  - showing 436
  - showing active sessions 406
  - showing domain information 468
- utility priority
  - setting 175

**V**

- versions
  - showing firmware and hardware 438
- volume groups
  - adding volumes 50
  - creating 97
  - deleting 118
  - removing volumes 152
  - setting name 269
  - showing 440
  - syntax 24

## volumes

- aborting copy [35](#)
- changing mappings [130](#)
- copying [64](#)
- creating [93](#)
- creating multiple with the same settings [98](#)
- deleting [119](#)
- expanding [127](#)
- mapping to initiators [130](#)
- releasing persistent reservations [143](#)
- replicating [153](#)
- resetting statistics [166](#)
- rolling back to the data in a snapshot [171](#)
- setting cache parameters [267](#)
- setting parameters [264](#)
- showing amount of unwritable cache data [432](#)
- showing in-progress copy operations [439](#)
- showing mappings [363](#)
- showing names and serial numbers [442](#)
- showing persistent reservations [443](#)
- showing settings and status [447](#)
- showing statistics [445](#)
- syntax [24](#)
- unmapping [467](#)

## W

### workload

- showing system I/O [451](#)