

English



Fujitsu Software BS2000

Storage Manager (StorMan) Managing virtualized storage resources

Administrator and User Guide

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StorMan V10.4.0

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Storage Manager

Comments... Suggestions... Corrections...

The User Documentation Department would like to know your opinion on this manual. Your feedback helps us to optimize our documentation to suit your individual needs.

Feel free to send us your comments by e-mail to: bs2000services@fujitsu.com

Certified documentation according to DIN EN ISO 9001:2015

To ensure a consistently high quality standard and user-friendliness, this documentation was created to meet the regulations of a quality management system which complies with the requirements of the standard DIN EN ISO 9001:2015.

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1 Introduction

- [Functional overview](#)
- [Changes upon the recent manual](#)
- [Documentation](#)
- [Documentation guide for different scenarios](#)
- [Notational conventions](#)

1.1 Functional overview

The main scope of Storage Manager (further on referenced as StorMan) is information, monitoring, integration and dynamic management of storage resources:

- Integrated Storage Management for
 - SE Manager on BS2000 SE servers
- Common and stable interfaces for
 - Integration in BS2000 (SHC-OSD)
 - Integration with server management software such as openSM2
- Encapsulation of the backend complexity of
 - Storage-vendor-specific interfaces

The following figure provides an overview of the architectural layers:

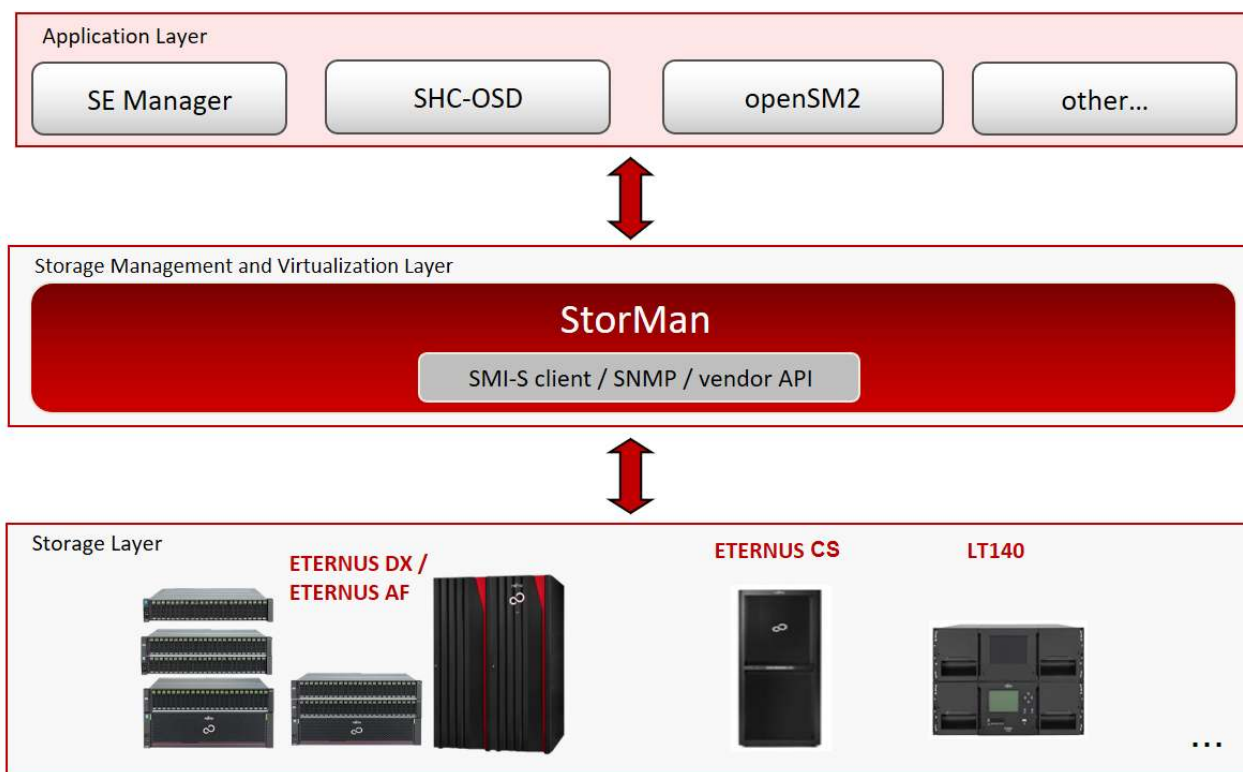


Figure 1: Overview

StorMan supports different interfaces to manage the storage systems. The base technology of StorMan is SMI-S (Storage Management Initiative Specification), the SNIA (Storage Networking Industry Association) standard for storage management. However, additional to SMI-S vendor-specific APIs and SNMP are used for integration.

StorMan offers Information and monitoring for storage systems:

- Information about logical and physical components
- Status monitoring
- Statistical and performance metrics

Additionally, StorMan provides important functionality for:

- Replication service: local replication (based on snap and/or clone technology) and remote replication
- Storage cluster support

1.2 Changes upon the recent manual

The manual of StorMan V10.4.0 was generally updated and due to the discontinuation of M2000 V6.4 support symplified and cleaned.

1.3 Documentation

You will find a complete description of StorMan (e.g. concept, architecture, installation, CLI functions) in the StorMan manual.

The complete reference of WebUI functions you will find online in the StorMan help system which you can call context sensitive from the StorMan WebUI.

Additional product information

Current information, version and hardware dependencies and instructions for installing and using a product version are contained in the associated Release Notice.

These Release Notices are available at <https://bs2manuals.ts.fujitsu.com>.

1.4 Documentation guide for different scenarios

For general information about StorMan refer to chapter ["Functions and Architecture"](#).

For the BS2000 product SHC-OSD the complete integration of StorMan is done by SHC-OSD internally. Refer to ["SHC-OSD" manual \[1\]](#) for further details.

For integration with SE servers, StorMan is delivered and installed by default as an add-on pack in the SE Manager (SEM) on M2000. For further details, please refer to ["Installation by the SE Manager"](#).

To manage ETERNUS DX/AF storage systems by SHC-OSD from BS2000 StorMan, the configuration of storage systems needs to be set up via StorMan.

Description of the StorMan tasks:

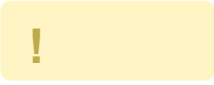
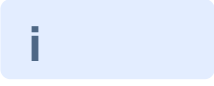
- For configuration of storage resources to be managed by StorMan refer to chapter ["Setting up StorMan configurations"](#)
- To replicate storage devices on ETERNUS DX/AF storage systems refer to ["Replication tasks"](#).

Description of the StorMan interfaces:

- The StorMan WebUI is fully integrated in the SE-Manager (SEM). The complete reference of WebUI functions you will find online in the StorMan help system which you can call context sensitive from the StorMan WebUI.
- For the syntax description of CLI commands (reserved for authorized user) refer to chapter ["Description of StorMan CLI"](#).

1.5 Notational conventions

The following fonts and symbols are used in this manual to indicate different types of information:

Font/Symbol	Indicates	Example
AaBbCc123	System outputs are written in this typewriter font.	http port 5988
AaBbCc123	Commands entered by the user are written in typewriter font bold	
<i>Italic text</i>	Program interface functions and menus are written like this.	Select the menu <i>Add new host</i>
“ ”	Manual, chapter and section titles are enclosed by double inverted commas.	See chapter 3, “Installation”
>	The enter symbol indicates an action that the operator must perform (e.g. enter something on the keyboard).	> Click the <i>Attach</i> button.
	Indicates warnings.	
	Indicates important information about product operation.	

The following fonts and symbols are used in the CLI syntax description:

Font/Symbol	Indicates	Example
AaBbCc123	Syntax elements of function call are written in this typewriter font.	storcfg
<i>Italic text</i>	Variables are written in this typewriter font	<i>function</i> or <i>hostname</i>
{ }	Braces enclose alternatives; one of the possible values shown within the braces must be entered.	{-name <i>host</i> -ip <i>ip</i> }
	A bar serves to separate alternative parameters or values.	-name <i>hostname</i> -ip <i>ip</i>
[]	Square brackets enclose optional parameters, i.e parameters which may be omitted.	[-interface <i>type</i>]
[, ...]	This entry after a value signifies that a list of values can be specified.	-addip <i>ip</i> [, ...]

2 Functions and Architecture

- Functional structure
 - Storage information and monitoring
 - Statistics and Performance
 - Replication
 - Storage Cluster
- Architecture
 - General
 - Storage layer
 - Authorization
 - Communication and security
 - Repository
 - High availability
 - Error handling

2.1 Functional structure

From the structural point of view, StorMan consists of multiple functional components:

- Storage information and monitoring
- Statistics and performance monitoring
- Storage system based replication functions
- Storage cluster

Please refer to Storage Manager (StorMan) Release Notes on <https://bs2manuals.ts.fujitsu.com> for further details on supported storage systems.

2.1.1 Storage information and monitoring

The storage information and monitoring features supported cover:

- Information about logical and physical components
- Information about LUN masking and host configuration in the storage system
- Monitoring of status for storage systems, replications and storage cluster

2.1.2 Statistics and Performance

The statistics and performance features supported are required for monitoring storage arrays as used by openSM2.

2.1.3 Replication

The replication features cover the information and management of local and remote mirroring functions implemented in the storage systems and based on volume level replication.

These features are provided by StorMan's WebUI (More Information can be found in the integrated StorMan online help) and as CLI (see the chapter "[Description of StorMan CLI](#)").

Local Replication

The Local Replication covers the information and management of local mirroring functions within the storage system.

Following features are supported:

- Detailed Information and monitoring
- Local mirroring based on full volume copies and mirrors (clones)
- Local mirroring based on difference based technologies (snaps)

Remote Replication

The Remote Replication covers the information and management of remote mirroring functions between two storage systems.

The Remote Replication features support the management for Remote mirroring based on full volume copies in synchronous or asynchronous mode. Storages can be in the same or in different locations.

Following features are supported:

- Detailed Information and monitoring
- Remote replication of full volumes and mirrors

2.1.4 Storage Cluster

The Storage Cluster features cover the information and management of the ETERNUS DX/AF feature "Storage Cluster Option".

These features are provided by StorMan's WebUI (More Information can be found in the integrated StorMan online help) and as CLI (see the chapter "[Description of StorMan CLI](#)").

Please refer to ETERNUS SF documentation for the full range of Storage Cluster configuration and management.

StorMan supports the following functions:

- Detailed information and monitoring
- Manual failover and failback functions

2.2 Architecture

- [General](#)
- [Storage layer](#)
- [Authorization](#)
- [Communication and security](#)
- [Repository](#)
- [High availability](#)
- [Error handling](#)

2.2.1 General

The following chapter covers the main lines of StorMan's architecture. The core part, i.e. the StorMan server, incorporates the virtualization layer and the storage specific layer.

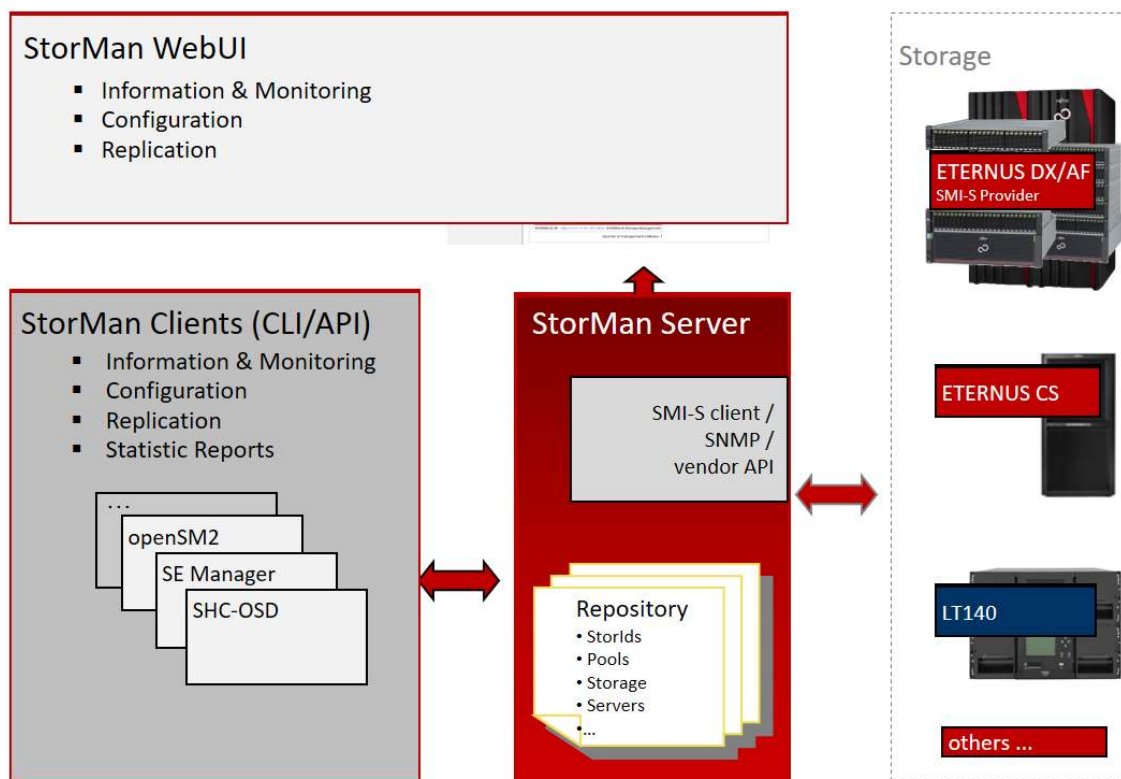


Figure 2: Architecture

The functions on the StorMan client side are provided as CLIs (Command line interfaces) and graphical interface (WebUI).

The StorMan server is installed and runs as a service on one or more Management Units of SE servers depending on caller and storage application requirements.

2.2.2 Storage layer

StorMan functions are mapped to the corresponding interface calls, called by StorMan accordingly. According to their registration StorMan will call the corresponding vendor specific interfaces.

Standardization: SMI-S

SMI-S is a SNIA standard in the domain of storage management.

The main functions for storage management used by StorMan are defined in SMI-S and provided by storage vendors (e.g. Fujitsu).

Vendor specific interfaces

StorMan additionally supports further interfaces of storage vendors (e.g. proprietary CLIs or SNMP) in its storage layer, e.g. to monitor Tape Storage.

2.2.3 Authorization

StorMan-Rollen im SE Manager

To be authorized for the usage of StorMan a user of the SE Manager (SEM) needs to be equipped with the one of the roles STORMAN/STORAGE-Administrator or STORMAN/STORAGE-Information.

Theses authorize to the following functionalities:

- **STORMAN/STORAGE-Administrator** – The owner of this role is authorized to use all available StorMan functions.
- **STORMAN/STORAGE-Information** – The owner of this role is for all information functionality including performance and statistics data. The role does not allow to make changes.

In general SEM users "*service*", "*admin*" and the role "*Administrator*" are also allowed to use all available StorMan functionality.

SMI-S Provider

Access to the SMI-S providers and the storage systems is normally restricted to authorized personnel and protected by user and password as defined for the specific storage system.

2.2.4 Communication and security

The core communication is based on socket connections between StorMan client and StorMan server (port 4178). Using the CLI functions the communication handling is encapsulated in the CLI call, terminated by defined return codes. These are in general internal socket connections of client and server within the same MU.

The communication between SHC-OSD on the BS2000 system and StorMan server is optionally secured by SSL encryption, depending on the setting in SHC-OSD parameter file.

The communication between StorMan and the SMI-S providers is secured by SSL encryption for ETERNUS DX/AF (https port 5989).

2.2.5 Repository

Configuration data is contained in an internally consistent repository.

The repository is located in the following directory:

- `/var/opt/SMAWstor/StorMan/repository`

2.2.6 High availability

High availability has to be provided by all components of a storage configuration: StorMan server, StorMan client and SMI-S providers.

StorMan server

The StorMan server is designed as a single server and can therefore be considered as a single point of failure for Storage Management.

High availability is provided in the following way:

- The StorMan server is automatically restarted on the same server in case of failure.
- The SE Manager provides StorMan start and stop functionality and functionality to check the StorMan status.
- For BS2000 configuration with SHC-OSD more redundant StorMan server can be configured to support the automatic failover from one StorMan server to another.

2.2.7 Error handling

Management tasks are critical for the calling application. A stable reaction and detailed return information are guaranteed for the caller of StorMan functions terminated with errors or timed out by the called storage system.

An internal logging function logs all activities of the StorMan server in a specific log file. The log files are primarily used for diagnostic purposes for StorMan.

3 System requirements

The specific system requirements for hardware and software are documented in the Release Notes <https://bs2manuals.ts.fujitsu.com> .

Additionally some requirements apply as documented below.

Discovery and Management

For the discovery and management StorMan requires a connection to the management instance of the storage system.

For ETERNUS DX/AF systems, StorMan uses the connection to the SMI-S provider which is part of the Firmware. No additional software has to be installed. The SMI-S provider has to be enabled on the storage system.

Access to the SMI-S provider is restricted to authorized users as described in the Fujitsu ETERNUS SMI-S provider Release Notes.

ETERNUS CS is discovered by SSH and CLI, user and password are necessary. ETERNUS LT is discovered via SNMP, it can be chosen between SNMPv1 with community oder SNMPv3 with user and password.

Statistical and performance data

If statistical and performance data are required, the option 'Performance Information' must be enabled on the ETERNUS DX/AF system.

4 Functions for Fujitsu BS2000 SE Servers

- [Overview](#)
- [Active Management](#)
- [Information and Monitoring](#)
- [Listing of unmanaged Storage Systems](#)
- [Server Information](#)
- [Links to Storage Management Software](#)
- [Central logging](#)
 - [SE Audit Logging](#)
 - [SE Event Logging](#)
 - [StorMan Logging](#)
- [Network considerations](#)
 - [StorMan client to StorMan server connections](#)
 - [Connections from StorMan server to Internal and External Storage](#)

4.1 Overview

StorMan is part of the official delivery package for SE Server. It is therefore pre-installed when the SE Server is delivered.

As an add-on package, StorMan can be managed and updated independently.

The SEM functions (SE Manager functions) for add-on packages manage the installation/uninstallation of StorMan via SEM. StorMan does not require activation, it is automatically active after successful installation.

SEM also provides functions for starting, stopping, and displaying the status of add-on packages, including StorMan.

StorMan supports Storage Management for SE Servers:

- Disk Storage
- Tape Storage
- Linkage to Storage Management Software

The functional level of the support depends on the storage type and the available interfaces.

- Active management support for Disk Storage as provided by StorMan (SMI-S)
- Information and monitoring for Tape Storage and Disk Storage based on proprietary, vendor specific interfaces as integrated by StorMan
- Listing of storage systems not managed by StorMan after registration (storage systems without administration interface or not supported by StorMan)

4.2 Active Management

Active Management for storage systems is supported as documented. Extensions for new HW models and FW versions are provided.

The management instances (e.g. SMI-S provider) for storage systems must be registered first by the StorMan WebUI specifying the storage model or by CLI `storcfg provider -add`.

4.3 Information and Monitoring

StorMan provides flexible and generic support for storage systems based on vendor specific storage interfaces.

The storage systems to be monitored have to be registered in StorMan first.

This can be done by WebUI specifying the model of the Storage system together with its access data.

- **Support for ETERNUS CS**

StorMan provides information and monitoring functions for ETERNUS CS based on the CLI of ETERNUS CS.

The registration in StorMan is done for each monitored ETERNUS CS system via WebUI.

For registration of the system the IP address, user and password are required.

StorMan needs a unique System Name for the monitoring of the ETERNUS CS. This is set via the WebUI:

Configuration-> System Definition->Modify -> System Name

- **Support for ETERNUS LT**

StorMan provides information and monitoring functions for ETERNUS LT based on SNMP.

The registration in StorMan is done for each monitored ETERNUS LT system via WebUI.

For registration of the system the IP address and SNMP access data are required.

4.4 Listing of unmanaged Storage Systems

StorMan provides the option to list storage systems that are not managed by StorMan in the StorMan WebUI Storage System Overview. No monitoring or management is provided for these systems, just static information is maintained in the StorMan repository, to deliver a complete view of the storage environment.

Functions to add/remove/modify/show storage systems to StorMan repository are provided for this purpose.

4.5 Server Information

StorMan automatically discovers the SUs, AUs and MUs of SE servers with their FC HBA information. Based on this information StorMan informs about the server to storage connections of the SE Server and provides both a storage oriented and a server oriented view on the storage resources.

AUs on the SE server are also automatically discovered. However if no FC HBA information is available, it may be added manually later on.

The SE server information is discovered automatically during StorMan installation and can be updated anytime by WebUI.

4.6 Links to Storage Management Software

StorMan is able to maintain links to URLs of Storage Management SW in its repository. Storage Management SW can be registered and unregistered in StorMan for this purpose. This function provides easy and direct access to external Storage Management SW from the StorMan WebUI.

The functions are provided by WebUI.

4.7 Central logging

StorMan as add-on pack supports the logging concept in M2000. Please refer to MU / SEM documentation [\[3\]](#) and [\[4\]](#) for details.

StorMan logging is enabled by default.

4.7.1 SE Audit Logging

In M2000 StorMan supports the SE Audit logging. Significant changes initiated by StorMan WebUI or CLI are logged as component 'StorMan'.

The following StorMan actions are logged:

- start / stop StorMan -> done by M2000 as centralized function
- add / remove / modify management instances
- create / terminate / modify replication pairs
- add / remove / modify server

4.7.2 SE Event Logging

In M2000 StorMan supports the SE Event logging. Significant storage related events detected by StorMan are logged as component 'StorMan'.

The following events are logged:

- start / stop StorMan
- errors during StorMan start
- changing of the storage management instance status
- changes of the storage system status
- changes of storage cluster status and phase

4.7.3 StorMan Logging

StorMan uses its proprietary StorMan Logging facility in `/var/opt/SMAWstor/StorMan/log/` for diagnostic purpose.

The setting of all logging parameters is done by WebUI or CLI `storparam` and is kept in the initialization file `smserver.ini`.

Parameter **MaxTraceFileSize**

StorMan supports a maximum file size in MB for logging files.

The parameter `TraceFileMaxAge` defines the number of days that the log files are kept.

The default value when running is `TraceFileSize = 100` (means 100 MB).

Example:

```
TraceFileSize = 100 means 100 days
```

The effect of the parameter:

- All log-files are zipped if the specified file size is reached or latest at date change.

Parameter **TraceFileMaxAge**

StorMan supports a maximal retention time for logging files.

The parameter `TraceFileMaxAge` defines the number of days that the log files are kept.

The default value when running is `TraceFileMaxAge = 90` (means 90 days).

Example:

```
TraceFileMaxAge = 7 means 7 days
```

The effect of the parameter:

- All log-files and zip-files with content older than the number of days specified by `TraceFileMaxAge` are removed (i.e. all files starting with `stormanTrace*`).

4.8 Network considerations

- [StorMan client to StorMan server connections](#)
- [Connections from StorMan server to Internal and External Storage](#)

4.8.1 StorMan client to StorMan server connections

StorMan client to server connections support socket connections with IPv6 and IPv4 in secure and none secure mode.

The communication on M2000 is secure (openssl encryption) by default.

WebUI connections to M2000 are secured via https.

4.8.2 Connections from StorMan server to Internal and External Storage

Common

For the provider configuration in StorMan the IP-Address together with authentication data is specified. StorMan supports IPv4 and IPv6. The network connection itself between M2000 and Storage System is not relevant for StorMan. However, the firewall settings must allow the access.

Internal Storage

Internal Disk Storage

- ETERNUS DX / AF series
have one full LAN management port (MNT). Therefore connection to both private and public network is not possible in parallel (Additional service port e.g. for AIS connect is available).
There are 2 options (recommended option 2):
 - Option 1: Connect to internal Control LAN:
No management access from public Admin LAN is possible. Therefore the complete management must be done by SE Administrator only
 - Option 2: Connect to public Admin LAN:
Management access via public Admin LAN only and by SE Administrator (StorMan)

Internal Tape Storage

- ETERNUS LT series
have one LAN management port. There are 2 options:
 - Connect to private Management Network:
No management access from public Admin LAN. Therefore the complete management must be done by SE Administrator only
 - Connect to public Management Network:
Management access via public Admin LAN only and by SE Administrator (StorMan)

External Storage

All external Storage (Disk and Tape) must be accessible via public Admin LAN.

5 Manage StorMan in SE Manager

- [Installing StorMan](#)
- [Uninstalling StorMan](#)
- [Upgrade StorMan](#)
- [Starting and stopping StorMan](#)

5.1 Installing StorMan

The SE manager provides the management functions for add-on packs in the *Update* tab of the *Service -> Units -> [<se server> (SE<model>) -> <unit> (MU)* menu:

As first step start "Upload add-on package" to upload the StorMan software from from the StorMan CD, a local or a network drive to M2000. The name of the StorMan iso image delivered for M2000 is:

```
MV.STORMAN-<version>.iso
```

If you are uploading from the StorMan CD, you may find the StorMan iso image in directory `.../M2000`.

After the upload is completed the add-on pack `STORMAN-<version>` is displayed and the installation of StorMan can be started by clicking the Install icon.

After successful installation the SE Manager displays the add-on pack with the status "installed".

If an earlier version of StorMan is already installed, it must be deinstalled first. Please refer to section "[Uninstalling StorMan](#)".

5.2 Uninstalling StorMan

The SE manager provides the management functions for add-on packs in the *Update* tab of the *Service -> Units -> [<se server> (SE<model>) -> <unit> (MU)* menu.

(To uninstall StorMan on M2000 use these features (refer to SE Manager help and the "[Operation and Administration](#)" manual [3]).

Uninstallation removes the complete CLI and WebUI features of StorMan.

There are backup files and configuration files which are not removed by the uninstall process:

- In the directory `/var/opt/SMAWstor/StorMan/config/` the configuration file `smserver.ini` is not removed.
- In the directory `/var/opt/SMAWstor/StorMan/backup/` all backup files are not removed to make sure that your data is not lost with the deinstallation.
- In the directory `/var/opt/SMAWstor/StorMan/repository/` the StorMan repository containing the complete configuration managed by StorMan is not removed.
- In the directory `/var/opt/SMAWstor/StorMan/log/` the StorMan logging files are not removed.

5.3 Upgrade StorMan

StorMan must be deinstalled before upgrading to a higher StorMan version.

The StorMan backup and configuration files are not deleted during deinstallation.

Data in place upgrades for StorMan configurations from previous to current StorMan version is supported “on the fly”:

During the upgrade process configuration data are kept in place and the StorMan repository is upgraded automatically.

i Please note that downgrading to a lower StorMan version is not supported with the same repository. For this reason it is recommended to create a backup of StorMan repository using `stormandb -dump` or StorMan WebUI function 'Generate diagnostic data' before starting the upgrade.

When upgrading the StorMan Version the following steps are recommended:

1. Create a backup of your StorMan repository (pls. see above):
This backup is needed if a downgrade to a previous StorMan may become necessary.
2. Make sure your application is not using StorMan during the upgrade.
3. Deinstall current StorMan version
4. Start StorMan installation
5. Check StorMan installation success with SE Manager (or with CLI `storcheck`).
6. Check the correct StorMan parameter settings after successful upgrade in the WebUI (or in the `smserver.ini` file).

5.4 Starting and stopping StorMan

The StorMan service is configured and started automatically by installation.

Upon startup, StorMan reads its configuration file. The server is configured to listen on port 4178.

Starting and stopping StorMan is supported by SEM via the *Service -> Units -> [<se server> (SE<model>) -> <unit> (MU)* menu. Please refer to "[Operation and Administration](#)" manual [3].

6 The graphical user interface - StorMan WebUI

The StorMan WebUI is integrated directly into the SE Manager and appears immediately after installation under the Hardware -> Storage menu.

For more information, please refer to the integrated StorMan help system in the StorMan WebUI.

Further information about the integrated help system can be found in the "[Operation and Administration](#)" manual [3].

7 Setting up StorMan configurations

- [Overview](#)
- [Setting up StorMan configurations using the WebUI](#)
- [Setting up StorMan configurations using the CLI](#)
 - [Specify one or more Storage Management Instances](#)
 - [Discover storage systems](#)
 - [Detect storage configuration changes](#)
 - [Remove a storage system](#)
- [StorMan configuration file](#)
- [Diagnostic aids](#)
 - [StorMan](#)
 - [SMI-S Provider](#)

Overview

The configuration functions are available via the StorMan WebUI, integrated into the SE Manager (SEM), and the CLI. Basic functions are available via both interfaces; some functions can only be executed via the CLI.

CLI access is supported for the M2000 users "service" and "admin," as well as for M2000 users with the "Administrator" role.

For information on setting up or modifying StorMan configurations using the StorMan WebUI, consult the integrated StorMan help system.

For information on setting up or modifying StorMan configurations using the StorMan CLI, see the chapter "[Setting up StorMan configurations using the CLI](#)".

A description of the CLI commands can be found in the chapter "[Description of StorMan CLI](#)".

0.1 Setting up StorMan configurations using the WebUI

For information on setting up a StorMan configuration via the WebUI, please refer to the WebUI's integrated StorMan help system.

0.1 Setting up StorMan configurations using the CLI

This section is a description based on the StorMan CLI.

For details about the CLI commands, refer to chapter "[Description of StorMan CLI](#)".

0.0.1 Specify one or more Storage Management Instances

StorMan needs a Management Instance that delivers informations about a certain storage system and provides management functions. This Management Instance is e.g. a SMI-S provider for ETERNUS DX/AF systems.

For this purpose execute the command:

```
storcfg provider -add -ip ip [-provideruser myUser -providerpwd myPassword] -  
storagemodel myStorageModel
```

to specify the IP address and the access information (user/password) for the management instance.

The discovery of the storage systems managed by this instance is starting automatically.

i At least one management instance must be defined in StorMan configuration for each managed storage system. Management via remote connected storage systems is not supported.

0.0.2 Discover storage systems

The first discovery for the storage system starts automatically, immediately after successfully adding the SMI-S provider. Discovery may also be restarted with the command

```
storcfg provider -discover -ip ip
```

This checks the connection to the provider and starts a discovery of storage systems. The complete discovery of the storage systems and their configuration by the provider is also running periodically. The background discovery may take some minutes depending on number and configuration of the connected storage systems (from 15 seconds up to a few minutes per storage system).

Verify the results with

```
storcfg system -show
```

0.0.3 Detect storage configuration changes

StorMan is able to detect configuration changes in the storage system automatically by means of the provider. However a discover process can be triggered by StorMan, e.g.:

- For one storage system use
`storcfg system -discover -system system`
- For all storage systems visible to a management instanz use
`storcfg provider -discover -ip ip-of-the-provider`

0.0.4 Remove a storage system

A storage system that is no longer managed by StorMan should be removed from StorMan configuration.

- To remove a storage system use:
`storcfg system -rem -system system`
- you should also remove the provider :
`storcfg provider -rem -ip ip-of-the-provider`

0.1 StorMan configuration file

Configuration settings for the StorMan server are contained in the `smserver.ini` file in directory `/var/opt/SMAWstor/StorMan/config`.

The file is initialized as follows:

```
[StorMan]
#
#=====
#       StorMan server initialisation file: smserver.ini
#=====
#
#
# ----- StorMan parameters -----
#
# -- Timeout value for connect to providers in seconds:
# value range: <1 - 6000>
# default value: 10
#ProviderConnectTimeOut = 10
#
# -- Timeout value for StorMan client calls in seconds:
# value range: >= 0, 0 indicates unlimited
# default value: 600
#ClientCallTimeOut = 600
#
#
# -- support of authorization:
# values:
# 0 authorization disabled
# 1 authorization necessary, show allowed
# 2 authorization necessary, for show too
# default value: 2
#AuthorizationLevel = 2
#
#
# ----- Trace Levels -----
#
# -- maximum level to trace
# values:
# <0 trace all
# 0 trace severe errors only
# 1 trace errors too
# 2 trace even warnings
# 3 trace information
# 4 trace debug
# 5 trace extended debug
# default value: 4
#Debug = 4
#
# -- maximum number of days to preserve traces
# default value: 0 means unlimited
#TraceFileMaxAge = 0
#
# -- trace communication:
# only for enabled debugging (MaxTraceLevel >= 4)
# values:
# 0 trace off
```

```
# 1 trace tcp/ip
# 2 trace messages
# 4 trace provider tcp/ip
# 8 trace provider messages
# add the values to enable the traces
# default value: 0
#DebugCom = 0
#
# -- trace communication and debugging info of worker threads
# values:
# 0 trace off
# 1 trace worker
# 2 trace system updater
# 4 trace mirror updater
# 8 trace provider status updater
# 16 trace statistics collector
# 32 trace main thread
# 64 trace indication handler
# 128 trace script updater
# 256 trace volume updater
# 512 trace cluster updater
# add the values to enable/disable the traces
# default value: 0
#TraceWorker = 0
```

Some parameters can be modified by using WebUI or the `storparam` CLI as described in section "[storparam](#)":

i All entries in the configuration file are optimized for StorMan and care should be taken if they are changed. In particular, entries not mentioned here should not be changed.

Files signed with `*.orig` are default backup files.

0.1 Diagnostic aids

- [StorMan](#)
- [SMI-S Provider](#)

0.0.1 StorMan

StorMan provides a number of files containing important information for troubleshooting and for diagnosis.

i All required functions and settings to provide diagnostic support including the download of the zipped complete log files are available on StorMan WebUI.

Authorized user (service und admin) may use the StorMan CLI as documented below.

To ensure the best possible support in case of problems, you are recommended to recreate the problem after setting the highest debug level on the StorMan server for the duration of recreation process by StorMan CLI:

```
storparam -debug 5
```

More detailed logging information you may get using the parameters `-debugcom` and `-traceworker` of the StorMan CLI `storparam`.

Please use the StorMan CLI to provide the current configuration data:

```
stormandb -dump
```

All diagnostic data will be packed to TAR archive by StorMan CLI:

```
storadmin getlogs
```

The resulting file is located at:

- `/var/opt/SMAWstor/StorMan/log/stormanLogs_<uname>_YYYY.MM.DD_HHMMSS.tar.gz`

i Please note that `storadmin getlogs` automatically removes previously created diagnostic information (zipped tar archive) before collecting diagnostic information. Therefore previously created StorMan log files should be saved if needed, before calling `storadmin getlogs`.

To remove all log files use (this should be done after saving the results to save disk space)

```
storadmin remlogs
```

StorMan writes eventually occurring cores to the following directory: `/var/crash/core/storman`

0.0.2 SMI-S Provider

Please refer to the Release Notes of the specific vendor for general diagnostic information regarding the support of SMI-S providers.

1 Replication tasks

The management of replication functions includes:

- local replication based on full volume copies (clones and mirrors)
- local replication based on pointer based technologies (snaps)
- remote replication based on full volume copies in synchronous and asynchronous mode

Information and active replication management is supported by CLI and WebUI.

The following section is a description based on the StorMan CLI and shows some typical actions to administrate volume level replications.

i Please note that not all functions are supported for all storage systems according to their availability by the storage vendor or model specific implementation.

The corresponding WebUI functions are described in the WebUI's help system (refer to section "[Using Help](#)").

1.1 Working with full local (clones and mirrors)

- [Creating local replication pairs](#)
- [Suspending replication volumes](#)
- [Restarting replication pairs](#)
- [Swapping the source volume - replication volume attributes](#)
- [Terminating a replication pair](#)
- [Information about replication pairs](#)

1.1.1 Creating local replication pairs

To start a clone session for local replication or for migration purpose a clone pair is created. After starting the session, the synchronization process from source volume to target volume is started.

```
stormirror -create -mirrortype full -source storid -target storid  
           -waitforsync
```

A local replication for a mirror is started with `-mirrortype full` by default, a local replication session for a clone is started with `-mirrortype fullcopy`.

1.1.2 Suspending replication volumes

To use the replication volume of a mirror pair by a second host or application independently, the replication volume has to be suspended. This action is not required and not supported for clones (`-mirrortype fullcopy`).

```
stormirror -suspend -source storid -target storid
```

The consistency of data at the point in time of activation must be assured by the application:

When specifying the parameter `-consistent` the CLI `stormirror` performs a consistent suspend over all replication pairs specified by the list.

The consistency is assured by the provider.

1.1.3 Restarting replication pairs

After finishing independent processing of the target volume the replication pair can be restarted. By restarting all modifications done on the target volume are discarded and the changes on the source volume are copied to the target volume.

```
stormirror -restart -source storid -target storid
```

1.1.4 Swapping the source volume - replication volume attributes

The attributes of original and replication volumes can be exchanged. This can be done by using the `-swap` option. As result the former original volume becomes the new clone volume and the former clone volume becomes the original volume. The replication relationship of the pair is kept but the replication direction is inverted.

```
stormirror -swap -source storid -target storid
```

Swapping is not supported for clones with `-mirrortype fullcopy`.

1.1.5 Terminating a replication pair

A replication pair can be terminated to stop the replication relationship between source volume and target volume. Both volumes can be used independently further on.

```
stormirror -terminate -source storid -target storid
```

1.1.6 Information about replication pairs

The command

```
stormirror -show [ -storid storid ]
```

shows the information about a specific volume specified by its storid and all its replication related information.

1.2 Working with snapshots

- [Creating snapshot pairs](#)
- [Restoring the source volume from the snap volume](#)
- [Terminating a snap pair](#)
- [Information about snap pairs](#)

1.2.1 Creating snapshot pairs

To start a snap session a snap pair is created by assigning a snap volume to a source volume. The snapshot is directly activated and made accessible to the host at creation time. Afterwards a host or application may use the snap volume independent to the source volume.

```
stormirror -create -mirrortype snap -source storid -target snapstorid
```

1.2.2 Restoring the source volume from the snap volume

In case that all changes on the source volume should be discarded, the snap volume can be restored to the source volume. The snap volume remains accessible by host.

```
stormirror -restore -source storid -target storid
```

1.2.3 Terminating a snap pair

A snap pair can be terminated to stop the snap session between source volume and snapshot. Both volumes can be used independently further on.

```
stormirror -terminate -source storid -target storid
```

1.2.4 Information about snap pairs

The command

```
stormirror -show [ -storid storid ]
```

shows the information about a specific volume specified by its storid and all its mirroring related information.

1.3 Working with remote mirrors (synchronous and asynchronous)

- [Creating remote mirror pairs](#)
- [Suspending remote target volumes](#)
- [Restarting remote mirror pairs](#)
- [Swapping the source - target attributes](#)
- [Terminating a remote mirror pair](#)
- [Information about remote mirror pairs](#)

1.3.1 Creating remote mirror pairs

To start a remote mirror session between two connected storage systems of the same model a remote mirror pair is created. After starting the session the synchronization from source volume to target volume is started. The remote target volume is no longer accessible to host.

```
stormirror -create -mirrortype full -replica remote -source storid  
           -target storid -waitforsync
```

1.3.2 Suspending remote target volumes

To use a remote target volume by a second host or application independent to the source volume the remote mirror has to be suspended.

```
stormirror -suspend -source storid -target storid
```

The consistency of data at the point in time of activation must be assured by the application.

1.3.3 Restarting remote mirror pairs

After finishing independent processing of the remote target volume the remote mirror pair can be restarted. By restarting all modifications done on the target volume are discarded and the changes on the source volume are resynchronized to the target volume. The target volume is no longer accessible by host.

```
stormirror -restart -source storid -target storid
```

1.3.4 Swapping the source - target attributes

In case that the attributes of source and target volumes should be changed, this can be done with the swap option. As result the former source volume becomes the new target volume and the former target volume becomes the source volume. The remote mirroring relationship of the pair is kept but the mirroring direction is inverted.

```
stormirror -swap -source storid -target storid
```

1.3.5 Terminating a remote mirror pair

A remote mirror pair can be terminated. As a result the mirroring relationship between source volume and target volume is stopped. Both volumes can be used independently further on.

```
stormirror -terminate -source storid -target storid
```

1.3.6 Information about remote mirror pairs

The command

```
stormirror -show -storid storid
```

shows the information about a specific volume specified by its storid and all its mirroring related information.

2 Statistics and performance tasks

The statistic and performance features supported are suitable for monitoring of storage arrays.

The statistic and performance monitoring features are provided on volume (LUN) level, namely the following:

- reads per second
- writes per second
- MB read per second
- MB write per second
- Response times for read and write IOs
- Cach Hit Rates for read and write IOs
- Average IO times for reads and writes

These features are available only for internal use (in particular openSM2).

2.1 Evaluation

As StorMan's `storstat` interface is providing counters and sampled metrics in conjunction with the time stamp representing the absolute collection time for the statistics. The calling application has to calculate and normalize the values to obtain the metrics per second.

This can be achieved by periodical calls in time intervals (t_n, t_m) calculating the rates for the $\text{delta} = t_m - t_n$.

1. To calculate the IO and MB values per second please use the following method:

$$\text{ReadIOs per second} = \frac{\text{delta(ReadIOs)}}{\text{delta(StatisticTime) [s]}}$$

2. To calculate the average read (or write) times for ETERNUS DX/AF please use the following method:

$$\text{AverageReadTime [s]} = \frac{\text{delta(SampledReadsTime)}}{\text{delta(SampledReadsCounter)}}$$

$$\text{AverageWriteTime [s]} = \frac{\text{delta(SampledWritesTime)}}{\text{delta(SampledWritesCounter)}}$$

i An evaluation tool has to assure to get statistical data at least once during one sample interval (default values: 3 min for ETERNUS DX/AF).

2.2 Getting statistics

The `storstat` command delivers statistical data (refer to "[storstat](#)").

On ETERNUS DX/AF:

- The measurement must be started on the storage system itself (WebUI)
- The statistical data are delivered as absolute values, there is no sample interval

Statistical data for volumes

- Execute the command

```
storstat volume -get -system *308
```

to get the statistic data for all volumes of storage systems with serial number *308 (wildcard specification).

Statistical data for the complete storage system

- Execute the command

```
storstat all -get -system *9005
```

to get all available statistic data of storage systems with serial number *9005 (wildcard specification).

3 Description of StorMan CLI

This chapter covers all the StorMan features related to StorMan administration and storage provisioning provided on CLI level.

i Please note, that for SE servers on M2000 the CLI is reserved for authorized personnel (service and administrator) only.

3.1 General

- Common CLI aspects
 - Parameter file
 - Format parameter
 - Help function
 - Additional common aspects
- Common enumeration values
- Common supported value ranges

3.1.1 Common CLI aspects

Some common CLI aspects are centrally specified in this section.

3.1.1.1 Parameter file

The CLI can read additional command parameters from a file. This can be useful especially for connection parameters that do not change, or if the command line is too short to specify all required parameters. This file must be specified as

```
-file file
```

The file will be interpreted as a list of specified parameters prior to all other parameters in the command line.

The `-file` option is not designed to contain multiple commands; only additional parameters for a single command can be specified.

Lines beginning with # in such a file are interpreted as comments and therefore ignored.

The `-file` option is not mentioned in the syntax diagrams of the individual commands.

3.1.1.2 Format parameter

If the `-show` or `-get` function of a command is specified, the output format can be selected by specifying the `-format` parameter.

`-format format`

Specifies the output format.

Permitted values: `std` (default) | `short` | `medium` | `xml` | `xmlp`.

`std` selects a multi-line output: Each attribute of an object is displayed on a separate line. This is also the default output format.

`short` displays only the id / name of an object on a separate line.

`medium` displays the id / name and some basic properties of an object on a separate line. The value is not supported by `storstat`.

`xml` writes the output in xml format in a single line.

`xmlp` writes the output in xml format, but in a multi-line format for better human readability (pretty print).

3.1.1.3 Help function

An internal help function is supported for every command by the `-help` option.

3.1.1.4 Additional common aspects

- If a parameter is specified more than once, the last value will be used.
- Parameters are not case-sensitive. Parameter values are case-sensitive except when specified otherwise. StorIDs and Pool IDs are stored as input with case (for display) but treated without case in all internal search functions.
- If a specified parameter is not supported, the command is rejected.

3.1.2 Common enumeration values

All StorMan commands use a common set of enumerations for input parameters and output values. These enumerations are only provided for show functions with parameter `-format xml/xmlp`. These are described below:

StorMan connection types

The enumeration `STORMAN_CONNECTION_TYPE` represents possible connection type values.

Value	Meaning
<code>STORMAN_CONNECTION_TYPE_ANY</code>	No specific storage type requested
<code>STORMAN_CONNECTION_TYPE_FC</code>	connected by FC
<code>STORMAN_CONNECTION_TYPE_ISCSI</code>	connected by iSCSI
<code>STORMAN_CONNECTION_TYPE_SAS</code>	connected by SAS (serial attached SCSI)
<code>STORMAN_CONNECTION_TYPE_FCoE</code>	connected by FCoE
<code>STORMAN_CONNECTION_TYPE_NAS</code>	NAS connected Storage

StorMan storage models

The enumeration `STORMAN_STORAGE_MODEL` represents a list of supported storage system models.

Value	Meaning
<code>STORMAN_STORAGE_MODEL_ANY</code>	No specific model requested
<code>STORMAN_STORAGE_MODEL_ETERNUS</code>	ETERNUS DX / AF storage system
<code>STORMAN_STORAGE_MODEL_OTHER</code>	Storage system monitored by specific scripts
<code>STORMAN_STORAGE_MODEL_USER</code>	Storage system registered manually

StorMan volume status

The enumeration `STORMAN_VOLUME_STATUS` represents a list of supported of volume status.

Value	Meaning
<code>STORMAN_VOLUME_STATUS_ANY</code>	No specific status requested
<code>STORMAN_VOLUME_STATUS_UNKNOWN</code>	State of volume is not known
<code>STORMAN_VOLUME_STATUS_READY</code>	Storage volume is in status <code>READY</code>
<code>STORMAN_VOLUME_STATUS_NOT_READY</code>	Storage volume is in status <code>NOT_READY</code>
<code>STORMAN_VOLUME_STATUS_READ_ONLY</code>	Storage volume is in status <code>READ_ONLY</code>
<code>STORMAN_VOLUME_STATUS_ERROR</code>	Storage volume is in status <code>ERROR</code>

StorMan RAID levels

The enumeration `STORMAN_RAID_LEVEL` represents a list of supported raid levels.

Value	Meaning
<code>STORMAN_RAID_LEVEL_ANY</code>	No specific RAID requested
<code>STORMAN_RAID_LEVEL_UNKNOWN</code>	Unknown RAID level
<code>STORMAN_RAID_LEVEL_DISK</code>	No RAID level
<code>STORMAN_RAID_LEVEL_0</code>	Striped
<code>STORMAN_RAID_LEVEL_1</code>	mirrored disk
<code>STORMAN_RAID_LEVEL_10</code>	mirrored disk with striping
<code>STORMAN_RAID_LEVEL_3</code>	striping with parity
<code>STORMAN_RAID_LEVEL_5</code>	striping with distributed parity
<code>STORMAN_RAID_LEVEL_6</code>	striping with 2 distributed parities

StorMan mirror volume usage

The enumeration `STORMAN_MIRROR_VOLUME` represents a list of supported values for the usage of a volume in mirroring relationships.

Value	Meaning
<code>STORMAN_MIRROR_VOLUME_NONE</code>	Not used for mirroring
<code>STORMAN_MIRROR_VOLUME_ORIG_LOCAL</code>	Used as original in local mirroring relationship
<code>STORMAN_MIRROR_VOLUME_MIRROR_LOCAL</code>	Used as local mirror
<code>STORMAN_MIRROR_VOLUME_ORIG_REMOTE</code>	Used as original in remote mirroring relationship
<code>STORMAN_MIRROR_VOLUME_MIRROR_REMOTE</code>	Used as remote mirror
<code>STORMAN_MIRROR_VOLUME_UNKNOWN</code>	Unknown mirroring relationship
<code>STORMAN_MIRROR_VOLUME_ANY</code>	No specific mirroring requested

StorMan mirror type usage

The enumeration `STORMAN_MIRROR_TYPE` represents a list of supported values for the mirroring type.

Value	Meaning
<code>STORMAN_MIRROR_TYPE_NONE</code>	No mirror type
<code>STORMAN_MIRROR_TYPE_SNAP</code>	Used as snap
<code>STORMAN_MIRROR_TYPE_FULL</code>	Used as full mirror
<code>STORMAN_MIRROR_TYPE_FULL_COPY</code>	Used as clone
<code>STORMAN_MIRROR_TYPE_UNKNOWN</code>	Unknown mirror information

StorMan mirror replica usage

The enumeration `STORMAN_MIRROR_REPLICA` represents a list of supported values for the replica location.

Value	Meaning
<code>STORMAN_MIRROR_REPLICA_NONE</code>	No replica
<code>STORMAN_MIRROR_REPLICA_LOCAL</code>	Used as local replica
<code>STORMAN_MIRROR_REPLICA_REMOTE</code>	Used as remote replica

StorMan mirror remote replication mode

The enumeration `STORMAN_REMOTE_COPY_MODE` represents a list of supported values for the remote replication mode.

Value	Meaning
<code>STORMAN_REMOTE_COPY_MODE_UNKNOWN</code>	Unknown remote replication mode
<code>STORMAN_REMOTE_COPY_MODE_ANY</code>	Remote replication mode not specified
<code>STORMAN_REMOTE_COPY_MODE_SYNC</code>	Synchronous remote replication mode
<code>STORMAN_REMOTE_COPY_MODE_ASYNC</code>	Asynchronous, consistent remote replication mode
<code>STORMAN_REMOTE_COPY_MODE_ASYNC_STACK</code>	Asynchronous stack mode (ETERNUS DX/AF)
<code>STORMAN_REMOTE_COPY_MODE_ASYNC_THROUGH</code>	Asynchronous through mode (ETERNUS DX/AF)

StorMan mirror pair status

The enumeration `STORMAN_MIRROR_PAIR_STATUS` represents a list of supported of volume status.

Value	Meaning
<code>STORMAN_MIRROR_PAIR_STATUS_INITIALIZING</code>	Mirror pair is in initialization
<code>STORMAN_MIRROR_PAIR_STATUS_INITIALIZED</code>	Mirror pair is initialized
<code>STORMAN_MIRROR_PAIR_STATUS_FAILED</code>	Mirror pair is broken after a failure
<code>STORMAN_MIRROR_PAIR_STATUS_TERMINATING</code>	Mirror pair is in termination
<code>STORMAN_MIRROR_PAIR_STATUS_RESTOREING</code>	Mirror pair is restoring to original
<code>STORMAN_MIRROR_PAIR_STATUS_RESYNCING</code>	Mirror pair is resyncing to mirror
<code>STORMAN_MIRROR_PAIR_STATUS_SPLIT</code>	Mirror pair is split but out of synch, the mirror is accessible from host
<code>STORMAN_MIRROR_PAIR_STATUS_SPLIT_AND_SYNC</code>	Mirror pair is split and synchronized, the mirror is accessible from host
<code>STORMAN_MIRROR_PAIR_STATUS_SUSPENDED</code>	Mirror pair is suspended, the mirror is not accessible from host
<code>STORMAN_MIRROR_PAIR_STATUS_FAILED_OVER</code>	Mirror pair is failed over, only the mirror is accessible from host.
<code>STORMAN_MIRROR_PAIR_STATUS_SYNCHRONIZING</code>	Mirror pair is synchronizing
<code>STORMAN_MIRROR_PAIR_STATUS_SYNCHRONIZED</code>	Mirror pair is synchronized, the mirror is not accessible from host
<code>STORMAN_MIRROR_PAIR_STATUS_NOT_APPLICABLE</code>	Mirror pair status is not applicable to the pair
<code>STORMAN_MIRROR_PAIR_STATUS_WAIT_FOR_SYNC</code>	Mirror pair is waiting for synchronization
<code>STORMAN_MIRROR_PAIR_STATUS_PARTITIONED</code>	Mirror pair is partitioned
<code>STORMAN_MIRROR_PAIR_STATUS_BROKEN</code>	Mirror pair is broken
<code>STORMAN_MIRROR_PAIR_STATUS_SPLIT_NOT_CONSISTENT</code>	Mirror pair is split during a synchronization process, the mirror is accessible from host, but data is not consistent

3.1.3 Common supported value ranges

All StorMan commands have some common parameters with a defined range of supported values specified below:

Value	Meaning and supported values
ip hostip	<p>IP address:</p> <p>a string of 4 decimal numbers delimited by '.' each in the range from 0 to 255 or ipV6</p>
hostname	<p>host name:</p> <p>a string containing alphabetic characters ('A', 'B',... 'Z', 'a', 'b',... 'z', numbers and other signs except: '\', '/', '*', '?', '"', '<', '>', ' ', ' ').</p> <p>Internally it is not case-sensitive.</p>
storid	<p>storage ID (storID):</p> <p>a string starting with an alphabetic character ('A', 'B', ..., 'Z', 'a', 'b', ..., 'z') followed by up to 254 characters, numbers, '+', '-', '_' or '.'</p> <p>It should not start with prefix 'SM_' (regardless of case) as this is reserved for internal use.</p> <p>Internally it is not case-sensitive</p>
wwpn	<p>WWPN:</p> <p>a string of 16 or 32 hexadecimal numbers delimited by ':', '-' or without delimiter</p>

The wildcard '*' is supported for alphabetic character strings as specified in the CLI description. Generally it can be used at any place of the string.

On Linux systems strings that do not contain only letters and numbers, must be enclosed in quotation marks (eg "#all").

3.2 storadmin

The `storadmin` command provides specific functions to administrate StorMan on Linux platforms (including M2000):

- `storadmin configsrv` collects host information and saves it to StorMan repository for SE Server Units and Application Units (on M2000 only)
- `storadmin getlogs` collects diagnostic information in an archive
- `storadmin remlogs` removes all internal log files

The `storadmin` functions are available for administrator and service accounts.

3.2.1 storadmin getlogs

Collects all diagnostic information in a g-zipped tar archive.

The resulting file is located at:

- `/var/opt/SMAWstor/StorMan/log/stormanLogs_<hostname>_YYYY.MM.DD_HHMMSS.tar.gz`

For service support the resulting file can be located at a directory specified by special parameter `-targetdir`. If specifying `-targetdir` the resulting file should be removed after usage.

Syntax

```
storadmin getlogs [-targetdir]
```

3.2.2 storadmin remlogs

Removes all internal log files.

Syntax

```
storadmin remlogs
```

3.3 storauth

The `storauth` command is used to manage the StorMan user authentication and StorMan roles.

i The CLI `storauth` is supported for M2000 V6.4 only. As of M2000 V6.5 user and role administration is managed by SE Manager.

```
storauth object -function -functionparam ...
```

The first parameter specifies the object group of the repository that is configured:

First parameter <i>object</i>	Object
user	StorMan user

The second parameter specifies the function. Most commands support at least the following functions:

Second parameter <i>function</i>	Meaning
-add	adds an object to the repository
-mod	modifies the properties of an object
-rem	removes an object from the repository
-show	shows the attributes of one or more object(s)

If the `-show` function is specified, the output format can be selected by specifying the `-format` parameter.

3.3.1 storauth user

`storauth user` is used to manage StorMan user authentication. This command is restricted to the administrator of StorMan.

After initialization, this command should be used to restrict the access for StorMan server.

```
storauth user -function -functionparam  
...
```

Functions

The *-function* parameter supplies one of the following functions:

`-add`

defines a new user and his authorization in the StorMan administration

`-mod`

modifies the attributes of an existing StorMan user

`-rem`

removes a StorMan user from the administration

`-show`

displays information related to StorMan users

3.3.1.1 storauth user -add

Adds a new user to the StorMan administration and defines its access password. Additionally it assigns the StorMan roles that entitle the StorMan user for a specific set of functions and StorMan pools (storage resources).

Syntax

```
storauth user -add -name user [-passwd passwd] -role role
```

Parameters

`-name user`

Specifies the new StorMan user.

`-passwd passwd`

Specifies the password for the new StorMan user. On M2000 no password is specified for the StorMan user.

`-role role`

Specify the predefined StorMan role (`StorAdmin` or `Info`).

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful.
3	STORMAN_VER_NOT_SUPP	Version not supported.
7	STORMAN_INV_PARAMETERS	Specified parameters invalid.
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server
16	STORMAN_FAULT	Unexpected error in function.
20	STORMAN_ALREADY_EXISTS	Object already exists in repository
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid

3.3.1.2 storauth user -mod

Modifies the attributes and authorization of a user already contained in the StorMan repository.

This command is restricted to the administrator i.e. StorMan users disposing of the role StorAdmin. Only the function to change the user's own password is supported for every StorMan user.

If a parameter is not specified, the corresponding attribute is not changed.

Syntax

```
storauth user -mod -name user [-passwd passwd ] [-newpasswd newpasswd ][-newrole
role]
```

Parameters

-name *user*

Specifies the StorMan user to be modified.

-passwd *passwd*

Specifies the password of the StorMan user to be modified. On M2000 no password is specified for the StorMan user.

-newpasswd *newpasswd*

Specifies a new password for the specified StorMan user.

-newrole *role*

Specify a new role for the StorMan user (*StorAdmin* or *Info*). Any eventually existing StorMan role is replaced by the new one.

StorMan role *StorAdmin* cannot be replaced if there is only one StorMan user with this role.

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful.
3	STORMAN_VER_NOT_SUPP	Version not supported.
7	STORMAN_INV_PARAMETERS	Specified parameters invalid.
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server
16	STORMAN_FAULT	Unexpected error in function.
18	STORMAN_NOT_FOUND	Specified host could not be found.
20	STORMAN_ALREADY_EXISTS	Object already exists in repository
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid

3.3.1.3 storauth user -rem

Removes a StorMan user from the StorMan user administration. All StorMan roles to the StorMan user are removed too. This command is restricted to the administrator i.e. StorMan users disposing of the role `StorAdmin`.

Syntax

```
storauth user -rem -name user
```

Parameters

`-name user`

Specifies the StorMan user to be removed from StorMan.

Removing the last StorMan user with StorMan role `StorAdmin` is inhibited as long as there is still any other user in StorMan administration.

After removing the last user `storadmin` the complete StorMan functions are available again for all connecting StorMan servers. No more authorization checks are done.

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful.
3	STORMAN_VER_NOT_SUPP	Version not supported.
7	STORMAN_INV_PARAMETERS	Specified parameters invalid.
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server
16	STORMAN_FAULT	Unexpected error in function.
18	STORMAN_NOT_FOUND	Specified host could not be found.
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid

3.3.1.4 storauth user -show

Displays information related to the specified StorMan user.

Syntax

```
storauth user -show [ -name user ] [ -format format ]
```

Parameters

`-name user`

Selects the StorMan user to be listed. If `-name` is not specified:

- if the caller of the command has the role `storadmin` : all StorMan users are shown .
- if the caller of the command has the role `storinfo` : only the callers userid is shown.

All parameters above can be specified partially using '*' as wildcard.

`-format format`

Specifies the output format. Refer to the description of the "[Format parameter](#)".

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful.
3	STORMAN_VER_NOT_SUPP	Version not supported.
7	STORMAN_INV_PARAMETERS	Specified parameters invalid.
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server
16	STORMAN_FAULT	Unexpected error in function.
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid

Example

Output for user with `-format std` (default)

```
storauth user -show -name my*
```

```
user      myself
roles:
  StorAdmin
```

Output for user with `-format xmlp`

```
storauth user -show -name s* -format xmlp
```

```
<Response>
  <ReturnCode>
    <Code>STORMAN_OK</Code>
    <CodeNumber>0</CodeNumber>
    <Text>successful</Text>
    <SubCode>0</SubCode>
    <SubCodeText>STORMAN_SUB_NONE</SubCodeText>
    <MessageID>53850</MessageID>
  </ReturnCode>
  <Result>
    <Authorizations>
      <Authorization>
        <User>service</User>
        <Roles>
          <Role>STORMAN_USER_ROLE_STOR_ADMIN</Role>
        </Roles>
      </Authorization>
      <Authorization>
        <User>storadm</User>
        <Roles>
          <Role>STORMAN_USER_ROLE_INFO</Role>
        </Roles>
      </Authorization>
    </Authorizations>
  </Result>
</Response>
```

3.4 storcheck

Checks the availability of the StorMan server. The check covers the availability of the StorMan server itself, its database, and if at least one of the configured management instances (CIM-OMs, SMI-S provider) is accessible.

The result message of the check is directed to stdout and the exit code is set (see return codes below).

Syntax

```
storcheck
```

Parameters

Return codes

Error Code	Text	Error Type
0	OK	Everything OK
1	StorMan not reachable	The StorMan server is not reachable
2	No Database	The StorMan server is running but the database has failed
3	No Provider	The StorMan server is running and the database is up but no provider is reachable
7	STORMAN_INV_PARAMETERS	Specified parameters invalid
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid

3.5 storcfg

The `storcfg` command is used to configure the StorMan repository.

```
storcfg object -function -functionparam ...
```

The first parameter specifies the object group of the repository that is configured:

First parameter <i>object</i>	Object
host	hosts / servers in the configuration
provider	management instance (e.g. CIM Object Manager)
system	storage systems managed by StorMan
volume	logical volumes

The second parameter specifies the function. Most commands support at least the following functions:

Second parameter <i>function</i>	Meaning
-add	adds an object to the repository
-discover	starts a discovery for the object to update the configuration
-mod	modifies the properties of an object
-rem	removes an object from the repository
-show	shows the attributes of one or more object(s)

If the `-show` function is specified, the output format can be selected by specifying the `-format` parameter.

3.5.1 storcfg host

`storcfg host` is used to manage host information in a StorMan configuration. The host information is required to display a storage volume with its server to storage connections. The host information provides a server oriented view on the storage resources.

```
storcfg host -function -functionparam ...
```

Functions

The `-function` parameter supplies one of the following functions:

`-add`

adds a new host to the StorMan repository

`-mod`

modifies the attributes of a host already contained in StorMan repository

`-rem`

removes a host from the StorMan repository

`-show`

displays information related to hosts

3.5.1.1 storcfg host -add

Adds a new host to the StorMan repository.

Syntax

```
storcfg host -add { -name hostname | -ip ip[,...] } [ -wwpn wwpn[,...] ] [ -iqn iqn
[,...] ]
```

Parameters

`-name hostname`

Specifies the name of the host.

Refer to the common description of "hostname" in chapter ["Common supported value ranges"](#).

`-ip ip[,...]`

Specifies a list of IP addresses delimited by comma. If no hostname is specified, one of the IP addresses is used as unique identifier.

`-wwpn wwpn[,...]`

Specifies a list of WWPNs delimited by comma.

At least one of the parameters `-name` or `-ip` must be specified and have a non-empty value.

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful
3	STORMAN_VER_NOT_SUPP	Version not supported
7	STORMAN_INV_PARAMETERS	Specified parameters invalid
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server
16	STORMAN_FAULT	Unexpected error in function
20	STORMAN_ALREADY_EXISTS	Object already exists in repository
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid

3.5.1.2 storcfg host -mod

Modifies the attributes of a host already contained in the StorMan repository.

If a parameter is not specified, the corresponding attribute is not changed.

Syntax

```
storcfg host -mod {-name hostname | -ip ip | -wwpn wwpn | -iqn iqn}
                  [ -newname hostname ]
                  { -newip ip[,...] | -addip ip | -remip ip }
                  { -newwwpn wwpn[,...] | -addwwpn wwpn | -remwwpn wwpn
                  }
                  { -newiqn iqn[,...] | -addiqn iqn | -remiqn iqn }
```

Parameters

`-name hostname`

Identifies the host by its name which is used as a unique identifier.

`-ip ip`

Identifies the host by an IP address belonging to the host which is used as a unique identifier.

`-wwpn wwpn`

Identifies the host by a WWPN belonging to the host which is used as a unique identifier.

`-iqn iqn`

Identifies the host by a IQN belonging to the host which is used as a unique identifier.

Exactly one of the parameters `-name`, `-ip`, `-wwpn` or `-iqn` must be specified to identify the host.

`-newname hostname`

Specifies the new name of the host. If the `-newname` is specified without a value, the name is removed.

Refer to the common description of "hostname" in chapter "[Common supported value ranges](#)".

`-newip ip[,...]`

Specifies a list of IP addresses delimited by comma. The previous IP addresses of the host are replaced by the specified list. i.e. if the specified list is empty, it results in a host with no IP addresses.

`-addip ip[,...]`

Assigns a single IP address to the host.

`-remip ip`

Deassigns a single IP address from the host.

`-newwwpn wwpn[,...]`

Assigns a list of WWPNs delimited by comma to assign to the host. Specifies a list of wwpns delimited by comma. The previous wwpns of the host are replaced by the specified list. i.e. if the specified list is empty, it results in a host with no wwpns.

`-addwwpn wwpn`

Assigns a single WWPN to the host.

`-remwwpn wwpn`

Deassign a single WWPN from the host.

Only one of the parameters `-newip`, `-addip` or `-remip` can be specified to modify the IP address assignment to the host. Combined input of these parameters is rejected with `STORMAN_INV_PARAMETERS`. If a specified IP address is already assigned to a different host, the (re)assignment of this IP address is rejected with return code `STORMAN_ALREADY_EXISTS`.

Only one of the parameters `-newwwpn`, `-addwwpn` or `-remwwpn` can be specified to modify the WWPN assignment to the host. Combined input of these parameters is rejected with `STORMAN_INV_PARAMETERS`. If a specified WWPN is already assigned to a different host, the (re)assignment of this WWPN is rejected with return code `STORMAN_ALREADY_EXISTS`.

host, the (re)assignment of this IQN is rejected with return code `STORMAN_ALREADY_EXISTS`.

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful
3	STORMAN_VER_NOT_SUPP	Version not supported
7	STORMAN_INV_PARAMETERS	Specified parameters invalid
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server
16	STORMAN_FAULT	Unexpected error in function
18	STORMAN_NOT_FOUND	Specified host could not be found
20	STORMAN_ALREADY_EXISTS	Object already exists in repository
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid

3.5.1.3 storcfg host -rem

Removes a host from the StorMan repository. If this host is also acting as a provider, it is also removed from repository.

Syntax

```
storcfg host -rem {-name hostname | -ip ip | -wwpn wwpn | -iqn iqn}
```

Parameters

`-name hostname`

Identifies the host by its name. This parameter supports wildcards (*).

`-ip ip`

Identifies the host by an IP address belonging to the host.

`-wwpn wwpn`

Identifies the host by a WWPN belonging to the host.

Exactly one of the parameters `-name`, `-ip` or `-wwpn` must be specified with a non-empty value to identify the host.

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful
3	STORMAN_VER_NOT_SUPP	Version not supported
7	STORMAN_INV_PARAMETERS	Specified parameters invalid
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server
16	STORMAN_FAULT	Unexpected error in function
18	STORMAN_NOT_FOUND	Specified host could not be found
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid

3.5.1.4 storcfg host -show

Displays information related to the specified hosts.

Syntax

```
storcfg host -show { -name hostname | -ip ip | -wwpn wwpn | -iqn iqn } [ -format format ]
```

Parameters

`-name hostname`

Selection by the name of the host.

`-ip ip`

Selection by the IP address of the host.

`-wwpn wwpn`

Selection by the WWPN of a host

All parameters above can be specified partially using * as wildcard. Using only * selects all hosts with this specific attribute supplied, regardless of its value.

`-format format`

Specifies the output format. Refer to the description of the ["Format parameter"](#).

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful
3	STORMAN_VER_NOT_SUPP	Version not supported
7	STORMAN_INV_PARAMETERS	Specified parameters invalid
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server
16	STORMAN_FAULT	Unexpected error in function
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid

Examples

1. Output for hosts with `-format std` (default)

```
storcfg host -show -name d*
```

```
hostID type name
hostID      D021ZE01
hostname    D021ZE01
hosttype    SU390
host model  SE SERVER SU700
OS          BS2000 OSD/BC V11.0A
FQDN        D021ZE01.abg.fsc.net
SE Server   SE-Server-2
SE Model    SE700
SE Unit model SU700
no IPs found
WWPNs:
    00C90FF003000000
    0100000000000000
    5000000000000000
    7061737377640000
    B84F030000000000
    E0C70FF000000000
    E0D17D16627F0000
    F02B9F17627F0000
    F8F0F040C1F040F0
no IQNs found
```

2. Output for hosts with `-format medium`

```
storcfg host -show -name d* -format medium
```

```
D021ZE01 WWPNs:00C90FF003000000,0100000000000000,5000000000000000
```

3. Output for hosts with `-format xmlp`

```
storcfg host -show -name d* -format xmlp
```

```
<Response>
  <ReturnCode>
    <Code>STORMAN_OK</Code>
    <CodeNumber>0</CodeNumber>
    <Text>successful</Text>
    <SubCode>0</SubCode>
    <SubCodeText>STORMAN_SUB_NONE</SubCodeText>
    <AdditionalInformation/>
    <MessageID>4307</MessageID>
    <ConnectionID>55525B9BAC7A3</ConnectionID>
  </ReturnCode>
  <Result>
    <Hosts>
      <Host>
        <HostName>D021ZE01</HostName>
        <HostType>SU390</HostType>
        <HostModel>SE SERVER SU700</HostModel>
        <HostOs>BS2000 OSD/BC V11.0A</HostOs>
        <HostFQDN>D021ZE01.abg.fsc.net</HostFQDN>
        <HostSEServer>SE-Server-2</HostSEServer>
        <HostSEModel>SE700</HostSEModel>
        <SeUnitModel>SU700</SeUnitModel>
        <HostSEEnsemble/>
        <IsInternalCim>>false</IsInternalCim>
        <IsActionAllowed>>true</IsActionAllowed>
        <IPs>
        </IPs>
        <WWPNs>
          <WWPN>00C90FF003000000</WWPN>
          <WWPN>0100000000000000</WWPN>
          <WWPN>5000000000000000</WWPN>
          <WWPN>7061737377640000</WWPN>
          <WWPN>B84F030000000000</WWPN>
          <WWPN>E0C70FF000000000</WWPN>
          <WWPN>E0D17D16627F0000</WWPN>
          <WWPN>F02B9F17627F0000</WWPN>
          <WWPN>F8F0F040C1F040F0</WWPN>
        </WWPNs>
        <IQNs>
        </IQNs>
        <ConnectedStorageSystems>
        </ConnectedStorageSystems>
      </Host>
    </Hosts>
  </Result>
</Response>
```

3.5.2 storcfg provider

`storcfg provider` is used to manage one or more providers as management instances for storage systems in the StorMan repository.

```
storcfg provider -function -functionparam  
...
```

Functions

The *-function* parameter supplies one of the following functions:

`-add`

adds a new provider information to the StorMan repository

`-mod`

modifies the attributes of an provider in the StorMan repository

`-rem`

removes the provider information from the StorMan repository

`-discover`

requests to discover the available storage systems

`-show`

displays information related to the providers

3.5.2.1 storcfg provider -add

Adds the a providers information to the StorMan repository. The discovery process for the related storage system(s) is started automatically and will periodically refresh the configuration in the background.

Syntax

```
storcfg provider -add -ip ip -provideruser user -providerpwd pwd -storagemodel myModel
```

Parameters

`-ip ip`

Specifies the IP address of the host the provider is running on.

Refer to the common description of `ip` in section "[Common supported value ranges](#)".

`-provideruser user`

Specifies the user for the connection to the provider.

`-providerpwd pwd`

Specifies the password for the connection (default: none).

At least the parameter `-ip` must be specified. If no host with the specified `ip` exists in the StorMan repository, a new host is added.

The `provideruser` and `providerpwd` can be specified for the StorMan repository with the function `storcfg provider -add` or `storcfg provider -mod`. For FUJITSU embedded SMI-S provider `provideruser/providerpwd` should be a user name and password with role "software" or "admin" defined in the storage system, when active management of the storage system is required.

`-storagemodel myStorageModel`

Specifies the type of disk or tape storage system. The default value is `ETERNUS_DX/AF`.

These additional values are supported: `ETERNUS_CS8000`, `ETERNUS_LT`, `ETERNUS_LT140`.

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful
2	STORMAN_NOT_COMPLETE	Function only partly completed
3	STORMAN_VER_NOT_SUPP	Version not supported
7	STORMAN_INV_PARAMETERS	Specified parameters invalid
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server
16	STORMAN_FAULT	Unexpected error in function
20	STORMAN_ALREADY_EXISTS	Object already exists in repository
22	STORMAN_RESOURCE_NOT_AVAILABLE	Provider or database not available
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid

3.5.2.2 storcfg provider -mod

Modifies the attributes of an provider in the StorMan repository.

If a parameter is not specified, the corresponding attribute is not changed.

The parameters `ip` uniquely identifies the provider which is to be modified.

A discovery process for the related storage system(s) is started automatically and will periodically refresh the configuration in the background.

To change the name or IP address of the provider, please use the function `storcfg host -mod`.

Syntax

```
storcfg provider -mod -ip ip [ -newuser user ] [ -newpwd pwd ]]
```

Parameters

`-ip ip`

Specifies the IP address of the host the provider is running on.

`-newuser user`

Specifies the new user for the connection to the provider.

`-newpwd pwd`

Specifies the new password for the connection.

At least the parameter `-ip` must be specified to select the provider.

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful
2	STORMAN_NOT_COMPLETE	Function only partly completed
3	STORMAN_VER_NOT_SUPP	Version not supported
7	STORMAN_INV_PARAMETERS	Specified parameters invalid
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server
16	STORMAN_FAULT	Unexpected error in function
18	STORMAN_NOT_FOUND	Specified host was not found
22	STORMAN_RESOURCE_NOT_AVAILABLE	Provider or database not available

36	STORMAN_AUTH_FAILED	User / password for StorMan not valid
----	---------------------	---------------------------------------

3.5.2.3 storcfg provider -rem

Removes the provider from the StorMan repository. The storage arrays and their corresponding pools managed by the removed provider are not removed from the repository as a further provider may be added for management. The provider is specified by the parameter *ip*.

Syntax

```
storcfg provider -rem -ip ip
```

Parameters

-ip ip

Specifies the IP address of the host the provider is running on.

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful
3	STORMAN_VER_NOT_SUPP	Version not supported
7	STORMAN_INV_PARAMETERS	Specified parameters invalid
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server
16	STORMAN_FAULT	Unexpected error in function
18	STORMAN_NOT_FOUND	Specified host was not found
22	STORMAN_RESOURCE_NOT_AVAILABLE	Provider or database not available
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid

3.5.2.4 storcfg provider -discover

Connects to the provider and starts an update process in the background to get or update all the configuration data of the managed storage systems. The background function may take some time depending on the number of connected storage systems and their complexity.

The parameter `ip` identifies the provider. If it's omitted, all providers of the StorMan repository are updated.

Syntax

```
storcfg provider -discover -ip ip
```

Parameters

`-ip ip`

Specifies the IP address of the host the provider is running on.

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful
3	STORMAN_VER_NOT_SUPP	Version not supported
7	STORMAN_INV_PARAMETERS	Specified parameters invalid
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server
16	STORMAN_FAULT	Unexpected error in function
18	STORMAN_NOT_FOUND	Specified host was not found
22	STORMAN_RESOURCE_NOT_AVAILABLE	Provider or database not available
25	STORMAN_CIMOM_AUTH_FAILED	User / password for provider not valid.
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid

3.5.2.5 storcfg provider -show

Displays information about providers.

Syntax

```
storcfg provider -show [ -system system ] [ -ip ip ] [ -showsystems ] [ -format  
format ]
```

Parameters

`-system system`

Specifies the storage system name and selects the provider(s) managing the respective storage system(s). This parameter supports wildcards (*). If the parameter system is not specified, all providers in the StorMan repository are displayed, unless a special provider is selected by -ip.

`-ip ip`

Selects the provider by its IP address. If parameter ip and system are not specified, all providers in the StorMan repository are displayed.

`-showsystems`

additionally lists all storage systems managed by the selected provider.

`-format format`

Specifies the output format. Refer to the description of the "[Format parameter](#)".

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful
3	STORMAN_VER_NOT_SUPP	Version not supported
7	STORMAN_INV_PARAMETERS	Specified parameters invalid
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server
16	STORMAN_FAULT	Unexpected error in function
18	STORMAN_NOT_FOUND	Specified host was not found
22	STORMAN_RESOURCE_NOT_AVAILABLE	Provider or database not available
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid

Examples

1. Output for provider with `-format std` (default)

```
storcfg provider -show
```

```
provider 172.17.67.121
hostname
IP          172.17.67.121
user        root
connection  OK
interface   SMI-S
storage     ETERNUS_DX/AF
vendor      FUJITSU
version     V05L86-0000
```

2. Output for provider with `-format medium`

```
storcfg provider -show -format medium
```

```
192.1.0.0 connection=Ok version=V05L00-0000
```

3. Output for provider with-format=xmlp

```
storcfg provider -show -format xmlp
```

```
<Response>
  <ReturnCode>
    <Code>STORMAN_OK</Code>
    <CodeNumber>0</CodeNumber>
    <Text>successful</Text>
    <SubCode>0</SubCode>
    <SubCodeText>STORMAN_SUB_NONE</SubCodeText>
    <AdditionalInformation/>
    <MessageID>1</MessageID>
    <ConnectionID>58F0AC3DB7650</ConnectionID>
  </ReturnCode>
  <Result>
    <Providers>
      <Provider>
        <HostName/>
        <IP>172.17.67.121</IP>
        <OwnIP/>
        <PortHttp/>
        <PortHttps>5989</PortHttps>
        <User>root</User>
        <SnmpCommunity/>
        <InteropNamespace>interop</InteropNamespace>
        <CliRefreshTime/>
        <AuthorizationType>2</AuthorizationType>
        <CliInitSuccessful>>false</CliInitSuccessful>
        <ConnectStatusValue>4</ConnectStatusValue>
        <ConnectStatus>STORMAN_PROVIDER_CONNECT_OK</ConnectStatus>
        <InterfaceType>STORMAN_INTERFACE_TYPE_SMIS</InterfaceType>
        <StorageModel>ETERNUS_DX/AF</StorageModel>
        <Vendor>FUJITSU</Vendor>
        <VersionString>V05L86-0000</VersionString>
        <IsProxyProvider>no</IsProxyProvider>
        <DiscoverPending>>false</DiscoverPending>
        <StorageSystems>
          </StorageSystems>
        </Provider>
      </Providers>
    </Result>
  </Response>
```

3.5.3 storcfg system

`storcfg system` is used to manage the storage systems in the StorMan repository.

The `-add` function is not supported because storage systems are automatically added to the StorMan repository only as a result of a `storcfg provider -add | -discover` call.

```
storcfg system -function -functionparam ...
```

Functions

The `-function` parameter supplies one of the following functions:

`-rem`

removes the storage system from the StorMan repository

`-discover`

requests to rediscover the storage system, i.e. to completely update the configuration data of the specified storage system

`-show`

displays information related to the storage systems

3.5.3.1 storcfg system -rem

Removes the storage system from the StorMan repository.

If pools are defined for the storage system concerned, they are also completely removed from the StorMan repository together with their logical volumes. Therefore the contents of the pools (logical volumes and their assigned storIDs) can no longer be managed by StorMan.

The configuration of the storage system and its assignment to servers is not touched by this function.

Syntax

```
storcfg system -rem -system system
```

Parameters

-system system

Specifies the system name of the storage system to be removed. This parameter is mandatory and supports wildcards (*).

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful
3	STORMAN_VER_NOT_SUPP	Version not supported
7	STORMAN_INV_PARAMETERS	Specified parameters invalid
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server
16	STORMAN_FAULT	Unexpected error in function
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid

3.5.3.2 storcfg system -discover

StorMan starts a discovery of the storage system (i.e. the complete configuration data of the specified storage system is updated).

The discovery is processed by the appropriate provider in StorMan's configuration

Syntax

```
storcfg system -discover -system system
```

Parameters

`-system system`

Specifies the system name of the storage system to discover. This parameter is mandatory and does **not** support wildcards (*).

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful
3	STORMAN_VER_NOT_SUPP	Version not supported
7	STORMAN_INV_PARAMETERS	Specified parameters invalid
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server
16	STORMAN_FAULT	Unexpected error in function
18	STORMAN_NOT_FOUND	Matching object could not be provided
21	STORMAN_FCT_NOT_POSSIBLE	Function not supported
22	STORMAN_RESOURCE_NOT_AVAILABLE	Provider or database not available
25	STORMAN_CIMOM_AUTH_FAILED	User / password for provider not valid

3.5.3.3 storcfg system -show

Displays information related to the storage systems.

Selection criteria for the `-show` function can be specified using the parameters described below.

Syntax

```
storcfg system -show [ -system system ] [ -model model ]  
                    [ -name name ] [ -type type ]  
                    [ -providerip providerip ]  
                    [ -unmanaged ] [ -managed managed ] [ -showstoragepools ]  
                    [ -showports ] [ -showraidtypes ] [ -showremote ]  
                    [ -showenvironment ] [ -showclusters ] [ -format format ]
```

Parameters

`-system system`

Specifies the system name of the storage system (default: *). Wildcards (*) are supported.

`-name name`

Specifies the name of the storage system. This may be the customized name given by the administration or the name in the network.

`-type type`

Select the storage systems by its type. If the parameter `-type` is omitted no selection is done (default).

Supported values of `-type`:

- `disk`: deliver Disk Storage (e.g. ETERNUS DX)
- `tape`: deliver Tape Storage (e.g. ETERNUS CS)

`-model model`

Only for `-type disk`: Specifies the model of the storage system.

Supported values: `eternus` | `symmetrix` | `any` (default).

`-providerip providerip`

Select the storage systems by the IP address of the managing provider.

`-unmanaged`

Displays only storage systems without an active management instance.

`-managed managed`

Displays only storage systems with an active management instance.

Permitted values: `active` | `monitor` | `manual`. If the parameter `-managed` is omitted no selection is done (default).

`active` displays storage systems supporting active management (replication, ...)

`monitor` displays storage systems supporting only information functions and monitoring.

`manual` displays storage systems only statically configured in StorMan configuration.

`-showstoragepools`

Displays also the storage pools of the storage systems with `-format std`. The xml output always contains these information.

`-showports`

Displays also the storage port information of the storage systems with `-format std`. The xml output always contains these information.

`-showraidtypes`

Displays also the RAID types supported by the storage systems with `-format std`. The xml output always contains these information.

`-showremote`

Displays all remote connected storage systems to the storage system specified by parameter `-system`.

`-showenvironment`

Displays also the physical component information (e.g. controller, power supplies, fans, etc.) with `-format std`. The xml output always contains these information.

`-showclusters`

Displays information about storage clusters:

- Without specifying additional parameters, the storage cluster information will be displayed for the specified storage system.
- In combination with the `-showports` parameter, the cluster specific information will be displayed for each storage port of the specified storage system.

`-format format`

Specifies the output format. Refer to the description of the ["Format parameter"](#).

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful
3	STORMAN_VER_NOT_SUPP	Version not supported
7	STORMAN_INVPARAMETERS	Specified parameters invalid
16	STORMAN_FAULT	Unexpected error in function
18	STORMAN_NOT_FOUND	Matching object could not be provided
22	STORMAN_RESOURCE_NOT_AVAILABLE	Provider or database not available
25	STORMAN_CIMOM_AUTH_FAILED	User / password for provider not valid
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid

Examples

1. Output for storage systems with `-format=std` (default)

```
storcfg system -show -system 4621347002
```

Fehler beim Rendern des Makros 'code': Ungültiger Wert für den Parameter 'com.atlassian.confluence.ext.code.render.InvalidValueException'

```
storage system name = 4621347002
  serial number      = 4621347002
  custom name        = DX500 S3-01
  storage vendor     = FUJITSU
  storage model      = ETERNUS DX
  storage model name = ETERNUS DX500 S3
  version            = V10L70-5000
  cache size         = 64 GB
  physical disks     = 48
  logical volumes    = 857
  preferred provider = 172.17.67.121
  configuration state = OK
```

2. Output for storage systems `-format=xmlp`

```
storcfg system -show -system 4621347002 -showports -showstoragepools
  -showraidtypes -format xmlp
```

Fehler beim Rendern des Makros 'code': Ungültiger Wert für den Parameter 'com.atlassian.confluence.ext.code.render.InvalidValueException'

```
<Response>
  <ReturnCode>
    <Code>STORMAN_OK</Code>
    <CodeNumber>0</CodeNumber>
```

```
<Text>successful</Text>
<SubCode>0</SubCode>
<SubCodeText>STORMAN_SUB_NONE</SubCodeText>
<AdditionalInformation/>
<MessageID>270</MessageID>
<ConnectionID>5553667FBD6D0</ConnectionID>
</ReturnCode>
<Result>
  <StorageSystems>
    <StorageSystem>
      <StorageSystemName>4621347002</StorageSystemName>
      <StorageSerialNumber>4621347002</StorageSerialNumber>
      <StorageSystemID>DX00002A2AAA</StorageSystemID>
      <StorageVendor>STORMAN_STORAGE_VENDOR_FUJITSU</StorageVendor>
      <Vendor>FUJITSU</Vendor>
      <StorageModel>STORMAN_STORAGE_MODEL_ETERNUS</StorageModel>
      <EternusModelType>STORMAN_ETERNUS_MODEL_DX500_S3</EternusModelType>
      <EternusModelTypeCode>14</EternusModelTypeCode>
      <StorageModelName>ETERNUS DX500 S3</StorageModelName>
      <StorageType>STORMAN_STORAGE_TYPE_DISK</StorageType>
      <LinkUI>172.17.67.121</LinkUI>
      <Features>29694</Features>
      <StorageFeatures>29694</StorageFeatures>
      <DataProviderType>STORMAN_STORAGE_PROVIDER_TYPE_INTERNAL
        </DataProviderType>
      <DataProviderTypeCode>1</DataProviderTypeCode>
      <StorageWWNN>500000E0DA804700</StorageWWNN>
      <RemoteSAP>00ETERNUSDXMS3ET503SAU####OJ4621347002##</RemoteSAP>
      <OSName/>
      <OSVersion>V10L70-000G</OSVersion>
      <CacheSize>68719476736</CacheSize>
      <CacheSizeNormalized>64 GB</CacheSizeNormalized>
      <NumOfPhysDisks>48</NumOfPhysDisks>
      <NumOfVolumes>857</NumOfVolumes>
      <NumberOfSpareDevices>2</NumberOfSpareDevices>
      <NumberOfUnmangedVolumes>857</NumberOfUnmangedVolumes>
      <ConfigID>86952+293</ConfigID>
      <ConfigIDVolumes>86952</ConfigIDVolumes>
      <ConfigIDClusters>86952</ConfigIDClusters>
      <CopyIndicationCount>179</CopyIndicationCount>
      <ConfigState>BOX_CONFIG_STATE_NOT_SCANNED_IN_SESSION</ConfigState>
      <ConfigStateNum>2</ConfigStateNum>
      <IsActionAllowed>>true</IsActionAllowed>
      <PreferredProvider>172.17.67.121</PreferredProvider>
      <EnclosureCount>3</EnclosureCount>
      <Product>ETERNUSDXMS3 (ET503SAU)</Product>
      <Contact>Werner</Contact>
      <Location>DC6a_168 Pos 16</Location>
      <CustomName>DX500 S3-01</CustomName>
```

```
<Version>V10L70-000G</Version>
<SCSIVendor>FUJITSU</SCSIVendor>
<TotalManagedSpace>20565338357760</TotalManagedSpace>
<TotalManagedSpaceNormalized>18.70 TB</TotalManagedSpaceNormalized>
<RemainingManagedSpace>7392738803712</RemainingManagedSpace>
<RemainingManagedSpaceNormalized>6.72 TB
    </RemainingManagedSpaceNormalized>
<RemainingUnmanagedSpace>5281736032256</RemainingUnmanagedSpace>
<RemainingUnmanagedSpaceNormalized>4.80 TB
    </RemainingUnmanagedSpaceNormalized>
<GUID/>
<SupportsReplication>>true</SupportsReplication>
<IsUnifiedStorage>>false</IsUnifiedStorage>
<OwningServer/>
<EditableFields>
</EditableFields>
<RemoteCopyModes>
    <RemoteCopyMode>sync</RemoteCopyMode>
    <RemoteCopyMode>async</RemoteCopyMode>
    <RemoteCopyMode>asyncstack</RemoteCopyMode>
</RemoteCopyModes>
<SupportedRaidTypes>
    <SupportedRaidType>UNPROTECTED</SupportedRaidType>
    <SupportedRaidType>RAID0</SupportedRaidType>
    <SupportedRaidType>RAID1</SupportedRaidType>
    <SupportedRaidType>RAID1+0</SupportedRaidType>
    <SupportedRaidType>RAID5</SupportedRaidType>
    <SupportedRaidType>RAID5+0</SupportedRaidType>
    <SupportedRaidType>RAID6</SupportedRaidType>
    <SupportedRaidType>RAID6-FR</SupportedRaidType>
    <SupportedRaidType>RAID0_TPP</SupportedRaidType>
    <SupportedRaidType>RAID1_TPP</SupportedRaidType>
    <SupportedRaidType>RAID1+0_TPP</SupportedRaidType>
    <SupportedRaidType>RAID5_TPP</SupportedRaidType>
    <SupportedRaidType>RAID6_TPP</SupportedRaidType>
    <SupportedRaidType>RAID6-FR_TPP</SupportedRaidType>
</SupportedRaidTypes>
<StoragePools>
    <StoragePool>
        <PoolName>
            Primordial Storage pool for FUJITSU storage system
        </PoolName>
        <InstanceID>FUJITSU:PSP</InstanceID>
        <Status>STORMAN_STORAGE_POOL_STATUS_OK</Status>
        <EnabledSize>40703405064192</EnabledSize>
        <EnabledSizeNormalized>37.02 TB</EnabledSizeNormalized>
        <FreeSize>5281736032256</FreeSize>
        <FreeSizeNormalized>4.80 TB</FreeSizeNormalized>
        <PercentFull>87</PercentFull>
```

```
<PoolUsage>DMTF_STORAGE_POOL_USAGE_UNRESTRICTED</PoolUsage>
<PoolType>STORMAN_STORAGE_POOL_TYPE_PRIMORDIAL</PoolType>
<StatusString/>
<OwningController/>
<RaidType/>
<NumDisks/>
<NumSpares/>
<DiskType>N.A.</DiskType>
<LowSpaceWarningThreshold>0</LowSpaceWarningThreshold>
<AlarmStatus/>
<AttentionLevelRange/>
<WarningLevelRange/>
<SevereLevelRange/>
<BasicStoragePoolNames>
</BasicStoragePoolNames>
<BasicStoragePoolIDs>
</BasicStoragePoolIDs>
<OperationalStatus>OK</OperationalStatus>
<OperationalStatusDetailList>
</OperationalStatusDetailList>
</StoragePool>
<StoragePool>
  <PoolName>RG900_00</PoolName>
  <InstanceID>FUJITSU:RSP0000</InstanceID>
  ...
  ...
</StoragePool>
</StoragePools>
<RemoteSystems>
</RemoteSystems>
<StoragePorts>
  <StoragePort>
    <PortID>500000E0DA804720</PortID>
    <PortName>FCP_CM00CA00P00</PortName>
    <ConnectionType>STORMAN_CONNECTION_TYPE_FC</ConnectionType>
    <Mode>STORMAN_PORT_MODE_RA</Mode>
    <ControllerName>CM00</ControllerName>
    <DeviceID>FCP_CM00CA00P00</DeviceID>
    <Speed>4 GB/s</Speed>
    <MaxSpeed>16 GB/s</MaxSpeed>
    <RemoteMirroringEnabled>STORMAN_BOOL_TRUE
      </RemoteMirroringEnabled>
    <ChassisID/>
    <AdapterNumber/>
    <PortNumber>0</PortNumber>
    <CeID/>
    <CMSlotNumber>0</CMSlotNumber>
    <CASlotNumber>0</CASlotNumber>
    <NasIP/>
```

```
<IsSCGPort>>false</IsSCGPort>
<StorageClusterName/>
<RemotePorts>
  <RemotePort>
    <StorageSystemName>4631528004</StorageSystemName>
    <StorageSerialNumber>4631528004</StorageSerialNumber>
    <StorageCustomName>DX8700-S3-01</StorageCustomName>
    <StorageConfigStateNum>2</StorageConfigStateNum>
    <PortID>500000E0DAC19AD3</PortID>
    <PortName>FCP_CM13CA00P03</PortName>
    <ConnectionStatus>Up</ConnectionStatus>
    <ChassisID/>
    <AdapterNumber/>
    <PortNumber>3</PortNumber>
    <CeID>1</CeID>
    <CMSlotNumber>1</CMSlotNumber>
    <CASlotNumber>0</CASlotNumber>
  </RemotePort>
  <RemotePort>
    <StorageSystemName>4631508013</StorageSystemName>
    <StorageSerialNumber>4631508013</StorageSerialNumber>
    ....
    ....
  </RemotePort>
</RemotePorts>
<StorageClusterPorts>
</StorageClusterPorts>
<OperationalStatus>OK</OperationalStatus>
<OperationalStatusDetailList>
</OperationalStatusDetailList>
</StoragePort>
<StoragePort>
  <PortID>500000E0DA804721</PortID>
  <PortName>FCP_CM00CA00P01</PortName>
  <ConnectionType>STORMAN_CONNECTION_TYPE_FC</ConnectionType>
  <Mode>STORMAN_PORT_MODE_CA</Mode>
  <ControllerName>CM00</ControllerName>
  <DeviceID>FCP_CM00CA00P01</DeviceID>
  <Speed>8 GB/s</Speed>
  <MaxSpeed>16 GB/s</MaxSpeed>
  <RemoteMirroringEnabled>STORMAN_BOOL_FALSE
    </RemoteMirroringEnabled>
  <ChassisID/>
  <AdapterNumber/>
  <PortNumber>1</PortNumber>
  <CeID/>
  <CMSlotNumber>0</CMSlotNumber>
  <CASlotNumber>0</CASlotNumber>
  <NasIP/>
```

```
<IsSCGPort>>false</IsSCGPort>
<StorageClusterName/>
<RemotePorts>
</RemotePorts>
<StorageClusterPorts>
</StorageClusterPorts>
<OperationalStatus>OK</OperationalStatus>
<OperationalStatusDetailList>
</OperationalStatusDetailList>
</StoragePort>
<StoragePort>
  <PortID>500000E0DA804722</PortID>
  <PortName>FCP_CM00CA00P02</PortName>
  ....
  ....
</StoragePort>
</StoragePorts>
<PhysicalDisks>
</PhysicalDisks>
<Controllers>
  <Controller>
    <DeviceName>CM00</DeviceName>
    <DisplayName>CE# CM#0</DisplayName>
    <CardType>STORMAN_CONTROLLER_CARD_TYPE_STD</CardType>
    <Manufacturer>FUJITSU</Manufacturer>
    <MemoryOnBoard>34359738368</MemoryOnBoard>
    <Model>Unknown</Model>
    <SerialNumber>PP135001QF</SerialNumber>
    <Version>A1</Version>
    <PhysicalPosition>0</PhysicalPosition>
    <CMSlotNumber>0</CMSlotNumber>
    <CeID/>
    <ChassisID/>
    <PartNumber>CA07555-D801</PartNumber>
    <IP>172.17.67.121</IP>
    <MACAdress>B0ACFAA382EF</MACAdress>
    <ControllerWWNN>500000E0DA804700</ControllerWWNN>
    <OperationalStatus>OK</OperationalStatus>
    <OperationalStatusDetailList>
    </OperationalStatusDetailList>
  </Controller>
  <Controller>
    <DeviceName>CM01</DeviceName>
    <DisplayName>CE# CM#1</DisplayName>
    ...
    ...
  </Controller>
</Controllers>
<Enclosures>
```

```
</Enclosures>
<BackendControllers>
</BackendControllers>
<PCIeFlashModules>
</PCIeFlashModules>
<RecBuffers>
</RecBuffers>
<PowerSupplies>
</PowerSupplies>
<Batterys>
</Batterys>
<Fans>
</Fans>
<BootUtilityDevices>
</BootUtilityDevices>
<StorageClusters>
  <StorageCluster>
    <StorageClusterName>DX500_1-DX500_2</StorageClusterName>
    <AutoFailover>>false</AutoFailover>
    <AutoFailback>>true</AutoFailback>
    <ReadMode>>false</ReadMode>
    <Phase>STORMAN_SCG_PHASE_NORMAL</Phase>
    <HaltFactor>STORMAN_SCG_FACTOR_NONE</HaltFactor>
    <Status>STORMAN_SCG_STATUS_NORMAL</Status>
    <PercentSynced/>
    <PartnerStorageSystemName>
      00ETERNUSDXMS3ET503SAU####004621349005##
    </PartnerStorageSystemName>
    <PartnerRemoteSAP/>
    <PairGroupStorageSystemName>
      00ETERNUSDXMS3ET503SAU####004621349005##
    </PairGroupStorageSystemName>
    <Type>STORMAN_SCG_SYSTEM_TYPE_PRIMARY</Type>
    <SystemMode>STORMAN_SCG_SYSTEM_MODE_ACTIVE</SystemMode>
    <PortIDs>
      <PortID>500000E0DA804724</PortID>
      <PortID>500000E0DA804733</PortID>
    </PortIDs>
  </StorageCluster>
  <StorageCluster>
    <StorageClusterName>DX500_2-DX500_1</StorageClusterName>
    ....
    ....
  </StorageCluster>
</StorageClusters>
<OperationalStatus>OK</OperationalStatus>
<OperationalStatusDetailList>
</OperationalStatusDetailList>
</StorageSystem>
```

```
</StorageSystems>
</Result>
</Response>
```

3. Output for storage systems with `-format=medium`

```
storcfg system -show -model eternus -format medium
4621347002 model=ETERNUS DX500 S3 version=V10L70-000G
```

4. Output for storage clusters

```
storcfg system -show -system 4621347002 -showclusters
Fehler beim Rendern des Makros 'code': Ungültiger Wert für den Parameter 'com.atlassian.confluence.ext.code.
render.InvalidValueException'
```

```
storage system name = 4621347002
  serial number      = 4621347002
  storage vendor     = FUJITSU
  storage model      = Eternus
  storage model name = ETERNUS DX500 S3
  version            = V10L60-6300
  cache size         = 64 GB
  physical disks     = 48
  logical volumes    = 853
  preferred provider = 172.17.67.121
  configuration state = OK
  storage cluster(s) = DX500_1-DX500_2
                        status           = normal
                        halt factor       = disabled
                        phase             = normal
                        auto failover     = true
                        auto failback    = false
                        read mode         = false
                        type              = primary
                        system mode       = active
                        percent synced    = 100
                        partner system(s) = 4621349005
```

5. Output for storage cluster, information for each SCO port

```
storcfg system -show -system 4621347002 -showclusters -showports
```

displays for each port:

```
Fehler beim Rendern des Makros 'code': Ungültiger Wert für den Parameter 'com.atlassian.confluence.ext.code.
render.InvalidValueException'
```

...

500000E0DA805434/FC

PortName	=	FCP_CM01CA01P00
speed	=	8 GB/s
max speed	=	16 GB/s
status	=	OK
cluster name	=	DX500_2-DX500_1
partner port(s)	=	4621349005/FCP_CM01CA01P00

...

3.5.4 storcfg volume

storcfg volume is used to manage the logical volumes in the pools of the StorMan repository.

```
storcfg volume -function -functionparam ...
```

Functions

The `-function` parameter supplies one of the following functions:

`-discover`

requests to discover a logical volume on a storage system, i.e. to update the configuration data of the specified logical volume

`-show`

displays information related to logical volumes

3.5.4.1 storcfg volume -discover

Starts a discovery call to the storage system for a specific logical volume to update its configuration and attributes. The specified volume(s) must be contained in a pool.

Syntax

```
storcfg volume -discover [ -storid storid[,...] ] [ -system system ]  
                        [ -deviceid devid[,...] ]
```

Parameter

`-storid storid`

This parameter is used for logical volumes with an assigned storID.

For logical volumes without assigned storID, the parameter must be omitted and the parameter `-deviceid` must be specified instead.

`-system system`

Specifies the name of the storage system. This parameter must be specified if the `-deviceid` parameter is used to specify the volume.

`-deviceid devid`

Specifies the device ID of the logical volume. This parameter is mandatory if the logical volume does not have an assigned storID.

It may be specified additionally for logical volumes with an assigned storID. If both storID and device ID are specified, the input must be consistent.

For both parameters `storid` and `deviceid`, comma separated lists can be specified.

Return-Codes

Fehlercode	Name	Fehlerart
0	STORMAN_OK	Funktion erfolgreich
3	STORMAN_VER_NOT_SUPP	Version wird nicht unterstützt
7	STORMAN_INV_PARAMETERS	Ungültige Parameter angegeben
9	STORMAN_STORID_IN_USE	Speicher-ID bereits vorhanden
13	STORMAN_COMMUNIC_ERROR	StorMan Kommunikation zwischen Client & Server fehlerhaft
14	STORMAN_STORAGE_LOCKED	Zu ermittelnde Speichereinheit aktuell gesperrt
16	STORMAN_FAULT	Unerwarteter Fehler in der Funktion
18	STORMAN_NOT_FOUND	Kein passendes Objekt (Speicher-Volume) verfügbar
20	STORMAN_ALREADY_EXISTS	Objekt existiert bereits in diesem Repository
22	STORMAN_RESOURCE_NOT_AVAILABLE	Provider oder Datenbank nicht verfügbar
25	STORMAN_PROVIDER_AUTH_FAILED	Benutzer / Kennwort für den Provider nicht gültig
36	STORMAN_AUTH_FAILED	Benutzer / Kennwort für StorMan nicht gültig

3.5.4.2 storcfg volume -show

Displays information related to logical volumes. For volumes used in a storage cluster the command displays additionally storage cluster related information for the specified volume.

Selection criteria can be specified using the function parameters.

Syntax

```
storcfg volume -show [ -storid storid[,...] ] [ -poolid poolid[,...] ]
]
      [ -system system ] [ -systemname systemname ]
      [ -deviceid devid[,...] ] [ -vendor vendor ]
      [ -model model ] [ -type type ]
      [ -minsize minsize ] [ -maxsize maxsize ]
      [ -hostname hostname ] [ -hostip ip ]
      [ -hostwwpn wwpn ] [ -hostiqn iqn ]
      [ -hostlun lun ] [ -raidtype raidtype ]
      [ -mirrortype mirrortype ] [ -replica replica ]
      [ -mirrorusage mirrorusage ] [ -copymode copymode ]
      [ -cluster cluster ] [ -withunmanaged ]
      [ -showconnections ] [ -showmirrors ]
      [ -format format ]
```

Parameters

`-storid storid`

Specifies the storID for the logical volume (default: *).

Wildcards (*) are supported. A comma separated list of storids is supported.

To display all logical volumes of a storage system (even if they are not managed by StorMan) specify `-storid #all` and exactly one storage system using the `system` parameter. All other parameters are ignored in this case.

`-poolid poolid`

Specifies the ID of a pool the logical volume belongs to (default: *).

Wildcards (*) are supported. A comma separated list of poolids is supported.

`-poolid #none` displays all volumes of a storage system that are NOT assigned to any pool for the specified system.

`-system system`

Specifies the system name of the storage system the logical volume belongs to (default: *).

Wildcards (*) are supported.

`-systemname systemname`

Specifies the (custom) name of the storage system the logical volume belongs to (default: *).

`-deviceid devId`

Specifies the device ID of the logical volume. (default: *).
Wildcards (*) are supported. A comma separated list of device IDs is supported.
It is not allowed to specify both storID and device ID.

`-vendor vendor`

Specifies the vendor of the storage system.
Supported values: `fujitsu` | `any` (default).

`-model model`

Selects by the model of the storage system.
Supported values: `eternus` | `any` (default).

`-type type`

Selects by the type of logical volume in the storage system (currently supported for ETERNUS DX/AF only).
Supported values: `normal` | `thin` | `snap` | `flexible` (default: no selection)
`normal` displays normal volumes.
`thin` displays thin provisioned volumes.
`snap` displays snap volumes used for snapshots.
`flexible` displays flexible volumes used for automated storage tiering.

`-minsize minsize`

Selects by the minimum size of the logical volume in MB (default: no restriction).

`-maxsize maxsize`

Selects by the maximum size of the logical volume in MB (default: no restriction).

`-hostname hostname`

Selects by the name of the host the storID of is attached to (default: *).
Wildcards (*) are supported.

`-hostip ip`

Selects by the IP address of the host the storID of is attached to (default: *).
Wildcards (*) are supported.

`-hostwwpn wwpn`

Selects by the WWPN of the host port the storID of is attached to (default: *).
Wildcards (*) are supported.

`-hostiqn iqn`

Selects by the IQN of the host port the storID of is attached to (default: *).
Wildcards (*) are supported.

`-hostlun lun`

Selects by the device number of the host the storID of is attached to.
If `-showconnections` is specified only this connection is displayed.

`-mirrorusage mirrorusage`

Selects the displayed volumes according to their usage as mirroring (replication) pairs (default: no selection). If the parameter is not specified, no selection of mirror usage is done.

Supported values: `none` | `origlocal` | `mirrorlocal` | `origremote` | `mirrorremote` | `any` (default)

`any` selects all volumes used for mirroring regardless of the kind of mirror usage.

`none` selects only volumes not used for mirroring.

`origlocal` selects all volumes used as original volumes of local mirror pair(s).

`mirrorlocal` selects all volumes used as mirror volumes of local mirror pair(s).

`origremote` selects all volumes used as original volumes of remote mirror pair(s).

`mirrorremote` selects all volumes used as mirror volumes of remote mirror pair(s).

`-mirrortype mirrortype`

Specifies the mirror type of the volume for mirroring (replication) functions.

Supported values: `snap` | `full` | `fullcopy` | `any` (default)

`any` selects the mirroring feature defined by the specified mirror pair(s).

`snap` selects snapshot (pointer based) mirror pair(s).

`full` selects full copy mirror pairs.

`fullcopy` selects full copy clones

`-replica replica`

Specifies the replica type of the volume for mirroring (replication) functions.

Supported values: `local` | `remote` | `any` (default)

`any` selects the mirroring feature defined by the specified mirror pair(s).

`local` selects local mirror pair(s).

`remote` selects remote mirror pairs.

`-copymode copymode`

Specifies the copy mode synchronous or asynchronous: `sync` | `async` | `asyncstack`

The default value (when omitted) is `sync` (synchronous).

`-copymode sync` corresponds to `sync REC` mode.

`-copymode async` corresponds to `async REC consistent` mode.

`-copymode asyncstack` corresponds to `async REC` stack mode.

`-copymode asyncthrough` corresponds to `asyncthrough` stack mode.

The parameter is only supported for `-replica remote` and as of ETERNUS DX S3 / AF.

`-raidtype raidtype`

Selects by the RAID type of the volume.

`any` selects the volumes regardless of the RAID type. The supported RAID types on a storage system can be shown by using `storcfg system -show -showraidtypes`.

`-cluster cluster`

Selects by the cluster the volume belongs to.

`-withunmanaged`

Displays also volumes which are not managed by StorMan (i.e. volumes which are not contained in a pool).

`-showconnections`

Displays also the host connections of the volumes (with output format `std`).

`-showmirrors`

Displays also assigned mirror volumes (with output format `std`).

`-format format`

Specifies the output format. Refer to the description of the "[Format parameter](#)".

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful
3	STORMAN_VER_NOT_SUPP	Version not supported
7	STORMAN_INV_PARAMETERS	Specified parameters invalid
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server
14	STORMAN_STORAGE_LOCKED	Storage unit to be modified currently locked
16	STORMAN_FAULT	Unexpected error in function
18	STORMAN_NOT_FOUND	Matching object could not be provided

Examples

1. Output for logical volumes with `-format std` (default)

```
storcfg volume -show -storid SM_2081* -showmirrors
```

```
storage ID          = SM_20817
pool ID             = test
storage system name = 4621347002
storage serial nr.  = 4621347002
device ID           = 751
GUID                = 600000E00D2A0000002A004702EF0000
storage size        = 10 GB
type                = normal
storage vendor      = FUJITSU
storage model       = ETERNUS DX
status              = READY
raid level          = RAID1
raid type           = RAID1
owner controller    = CM00
storage pools       = TFO-Group
targets
  storage ID        = SM_20819
  storage system name = 4621347002
  pool ID           = test
  device ID         = 753
  GUID              = 600000E00D2A0000002A004702F10000
  mirror type       = full-copy
  replication mode   = local
  copy mode         = sync
  status            = split
  isSynch           = no
  percentSynced     = 1
  timestamp         = 20170511164532.000000+000
no mirror sources found
```

2. Output for logical volumes with `-format medium`

```
storcfg volume -show -storid SM_20817 -format medium
```

```
SM_20817 storage=4621347002 deviceID=751 size=10 GB
```

3. Output for logical volumes with `-format xmlp`

```
storcfg volume -show -storid SM_20817 -showmirrors -format xmlp
```

```
<Response>
  <ReturnCode>
    <Code>STORMAN_OK</Code>
    <CodeNumber>0</CodeNumber>
    <Text>successful</Text>
    <SubCode>0</SubCode>
    <SubCodeText>STORMAN_SUB_NONE</SubCodeText>
  <AdditionalInformation/>
  <MessageID>846</MessageID>
  <ConnectionID>55546C7F911F0</ConnectionID>
  <TimeID>1501137374676000</TimeID>
</ReturnCode>
```

```
<Result>
  <VolumeDescriptions>
    <VolumeDescription>
      <StorID>SM_20817</StorID>
      <PoolID>test</PoolID>
      <StorageSystemName>4621347002</StorageSystemName>
      <StorageSerialNumber>4621347002</StorageSerialNumber>
      <StorageCustomName>DX500 S3-01</StorageCustomName>
      <GUID>600000E00D2A0000002A004702EF0000</GUID>
      <DeviceID>751</DeviceID>
      <DeviceNumber>751</DeviceNumber>
      <VolumeName>TFO-Vol1</VolumeName>
      <Size>10737418240</Size>
      <SizeNormalized>10 GB</SizeNormalized>
      <StorageVendor>STORMAN_STORAGE_VENDOR_FUJITSU</StorageVendor>
      <StorageModel>STORMAN_STORAGE_MODEL_ETERNUS</StorageModel>
      <StorageFeatures>29694</StorageFeatures>
      <Status>STORMAN_VOLUME_STATUS_READY</Status>
      <VolumeType>STORMAN_VOLUME_TYPE_NORMAL</VolumeType>
      <RaidLevel>STORMAN_RAID_LEVEL_1</RaidLevel>
      <RaidType>RAID1</RaidType>
      <CurrOwnerController>CM00</CurrOwnerController>
      <SpaceConsumedInBox>10737418240</SpaceConsumedInBox>
      <MaybeSource>true</MaybeSource>
      <MaybeTarget>true</MaybeTarget>
      <MaybeFullTarget>true</MaybeFullTarget>
      <MaybeSnapTarget>false</MaybeSnapTarget>
      <IsActionAllowed>true</IsActionAllowed>
      <FirstHostLun/>
      <StorageClusterName/>
      <Usage>Remote Replica Source or Target</Usage>
      <UsageCode>11</UsageCode>
      <HostIDs>
      </HostIDs>
      <StoragePoolNames>
        <StoragePoolName>TFO-Group</StoragePoolName>
      </StoragePoolNames>
      <StoragePoolIDs>
        <StoragePoolID>FUJITSU:RSP0014</StoragePoolID>
      </StoragePoolIDs>
      <HostConnections>
      </HostConnections>
      <MirroringTargets>
        <MirroringTarget>
          <StorID>SM_20819</StorID>
          <DeviceID>753</DeviceID>
          <DeviceNumber>753</DeviceNumber>
          <GUID>600000E00D2A0000002A004702F10000</GUID>
          <StorageSystemName>4621347002</StorageSystemName>
          <StorageSerialNumber>4621347002</StorageSerialNumber>
          <StorageCustomName>DX500 S3-01</StorageCustomName>
          <StorageVendor>STORMAN_STORAGE_VENDOR_FUJITSU</StorageVendor>
          <StorageModel>STORMAN_STORAGE_MODEL_ETERNUS</StorageModel>
          <PoolID>test</PoolID>
          <MirrorType>STORMAN_MIRROR_TYPE_FULL_COPY</MirrorType>
          <ReplicationMode>STORMAN_MIRROR_REPLICA_LOCAL</ReplicationMode>
          <CopyMethod>STORMAN_ETERNUS_COPY_METHOD_QUICK_OPC</CopyMethod>
          <Status>STORMAN_MIRROR_PAIR_STATUS_SPLIT</Status>
          <CopyMode>STORMAN_REMOTE_COPY_MODE_SYNC</CopyMode>
```

```

    <SplitMode>STORMAN_MIRROR_SPLIT_MODE_UNKNOWN</SplitMode>
    <RecoveryMode>STORMAN_MIRROR_RECOVERY_MODE_UNKNOWN</RecoveryMode>
    <IsSynch>>false</IsSynch>
    <IsSCO>>false</IsSCO>
    <ContinuousCopy>>false</ContinuousCopy>
    <PercentSynced>1</PercentSynced>
    <StorageClusterName/>
    <PairEstablishedSince/>
    <PointInTime>
      <TimeStamp>20170511164532.000000+000</TimeStamp>
    </PointInTime>
    <CustomProperties>
    </CustomProperties>
  </MirroringTarget>
</MirroringTargets>
<MirroringSources>
</MirroringSources>
<TargetPorts>
</TargetPorts>
<CustomProperties>
</CustomProperties>
<OperationalStatus>OK</OperationalStatus>
<OperationalStatusDetailList>
</OperationalStatusDetailList>
</VolumeDescription>
</VolumeDescriptions>
</Result>

```

4. Output for logical volumes extended with storage cluster information (if existing)

```
storcfg volume -show -system <system> -deviceid <deviceid>
```

```

storage ID          =
pool ID             =
storage system name = 4621349005
storage serial nr.  = 4621349005
device ID           = 912
GUID                = 600000E00D2A0000002A005403900000
storage size        = 20 GB
type                = normal
resource type       = predefined
storage vendor      = FUJITSU
storage model       = Eternus
status              = NOT-READY
raid level          = RAID5
raid type           = RAID5
owner controller    = CM00
cluster name        = DX500_2-DX500_1
storage pools       = RG900_02

```

3.6 storcluster

Manages storage clusters in StorMan for ETERNUS DX/AF storage systems. A storage cluster is manageable by StorMan only if both primary storage and secondary storage are managed by StorMan.

```
storcluster -function -functionparam  
...
```

Functions

The *-function* parameter supplies one of the following functions:

-failback

Performs a manual storage cluster failback.

-failover

Performs a manual storage cluster failover.

-show

Displays the storage cluster related information.

If the *-show* function is specified, the output format can be selected by specifying the *-format* parameter.

3.6.1 storcluster -failback

Performs a manual failback for the specified storage cluster from the secondary storage system back to the primary storage system.

Requirement: After a failover, the primary storage system is available again and the internal resynchronization is completed.

The command is always sent to the primary storage system.

Syntax

```
storcluster -failback -cluster clustername
```

Parameters

`-cluster clustername`

Selects the SCO group (storage cluster group) for the failback by the specified name.

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful.
2	STORMAN_NOT_COMPLETE	Function only partly completed.
3	STORMAN_VER_NOT_SUPP	Version not supported.
7	STORMAN_INV_PARAMETERS	Specified parameters invalid.
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server
16	STORMAN_FAULT	Unexpected error in function.
18	STORMAN_NOT_FOUND	Matching object could not be provided.
21	STORMAN_FUNCTION_NOT_POSSIBLE	StorMan SubCode STORMAN_SUB_SCO_ADD_INFO indicates additional information related to failed SCO call output as meaning.
22	STORMAN_RESOURCE_NOT_AVAILABLE	Provider or database not available
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid
37	STORMAN_PROVIDER_ERROR	Provider returned an error. StorMan SubCode STORMAN_SUB_SCO_ADD_INFO indicates additional information related to failed SCO call output as meaning.

Error subcodes of STORMAN_SUB_SCO_ADD_INFO:

Subcode	Error Type
0	Success
1	Not supported
2	Unknown
3	Timeout
4	Failed
5	Invalid parameter
32768	No license found
32768	Invalid TFO (Transparent Failover) group phase
32768	No FTV volume type in TFO group
32768	TFO group status is inconsistent in the primary storage
32768	TFO group status is inconsistent in the secondary storage
32768	Invalid TFO group activation specified for the secondary storage (failover)
32768	Invalid TFO group activation specified for the secondary storage (failback)
32768	REC paths are disabled
32768	Invalid TFO group condition

Example

```
storcluster -failback -cluster DX500_1-DX500_2
```

3.6.2 storcluster -failover

Performs a manual failover for the specified storage cluster from the primary storage system to the secondary storage system.

The command is always sent to the secondary storage system.

Syntax

```
storcluster -failover -cluster clustername [ -force ]
```

Parameters

`-cluster clustername`

Selects the SCO group (storage cluster group) for the failover by the specified name.

`-force`

Starts the failover for the SCO group only for storage clusters not in status 'normal'. This option is required after failure of the primary storage or the REC connection.

! **Attention!**

Use this option with care to avoid potential data loss or data corruption.

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful.
3	STORMAN_VER_NOT_SUPP	Version not supported.
7	STORMAN_INV_PARAMETERS	Specified parameters invalid.
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server
16	STORMAN_FAULT	Unexpected error in function.
18	STORMAN_NOT_FOUND	Matching object could not be provided.
21	STORMAN_FUNCTION_NOT_POSSIBLE	StorMan SubCode STORMAN_SUB_SCO_ADD_INFO indicates additional information related to failed SCO call output as meaning.
22	STORMAN_RESOURCE_NOT_AVAILABLE	Provider or database not available
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid
37	STORMAN_PROVIDER_ERROR	Provider returned an error. StorMan SubCode STORMAN_SUB_SCO_ADD_INFO indicates additional information related to failed SCO call output as meaning.
38	STORMAN_SCO_ERROR	Error in failover processing: <ul style="list-style-type: none"> • STORMAN_SUB_SCO_WRONG_PHASE: Phase does not allow a failover, use force • STORMAN_SUB_SCO_AUTOFAILBACK: Cluster is OK and has 'autofailback' enabled • STORMAN_SUB_SCO_FORCE_NOT_ALLOWED: Cluster state is NORMAL, force is rejected • STORMAN_SUB_SCO_SPLIT_BRAIN: Cluster state is FAILED but primary system still alive, force is rejected.

Error subcodes of STORMAN_SUB_SCO_ADD_INFO:

Subcode	Error Type
0	Success
1	Not supported
2	Unknown
3	Timeout
4	Failed
5	Invalid parameter
32768	No license found
32768	Invalid TFO (Transparent Failover) group phase
32768	No FTV volume type in TFO group
32768	TFO group status is inconsistent in the primary storage
32768	TFO group status is inconsistent in the secondary storage
32768	Invalid TFO group activation specified for the secondary storage (failover)
32768	Invalid TFO group activation specified for the secondary storage (failback)
32768	REC paths are disabled
32768	Invalid TFO group condition

Example

```
storcluster -failover -cluster DX500_1-DX500_2
```

3.6.3 storcluster -show

Displays all related information about the storage clusters.

Syntax

```
storcluster -show [ -cluster clustername ] [ -format format ]
```

Parameters

`-cluster clustername`

Specifies the name of the storage cluster.

If the parameter is not specified, all storage clusters in the StorMan repository are displayed.

`-format format`

Specifies the output format. Refer to the description of the "[Format parameter](#)".

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful.
3	STORMAN_VER_NOT_SUPP	Version not supported.
7	STORMAN_INV_PARAMETERS	Specified parameters invalid.
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server
16	STORMAN_FAULT	Unexpected error in function.
18	STORMAN_NOT_FOUND	Matching object could not be provided.
22	STORMAN_RESOURCE_NOT_AVAILABLE	Provider or database not available
35	STORMAN_SYSTEM_LOCKED	The storage system is locked for administration
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid

Examples

1. Output for storage clusters with `-format std` (default)

storcluster -show

```
cluster name      = DX500_1-DX500_2
  status          = normal
  halt factor     = none
  phase           = normal
  cluster mode    = Active/Standby
  auto failover   = false
  auto failback   = false
  read mode       = false
  percent synced  = 100
storage systems
  system name     = 4621347002
    serial nr.    = 4621347002
    custom name   = DX500 S3-01
    type          = primary
    system mode   = active
    cluster port(s) = 500000E0DA804724/FC
      port name   = FCP_CM00CA01P00
      speed       = 8 GB/s
      max speed   = 16 GB/s
      status      = OK
      partner port(s) = 4621349005/FCP_CM00CA01P00
    500000E0DA804733/FC
      port name   = FCP_CM01CA00P03
      speed       = 8 GB/s
      max speed   = 16 GB/s
      status      = OK
      partner port(s) = 4621349005/FCP_CM01CA00P03
  system name     = 4621349005
    serial nr.    = 4621349005
    custom name   = DX500 S3-02
    type          = secondary
    system mode   = standby
    cluster port(s) = 500000E0DA804724/FC
      port name   = FCP_CM00CA01P00
      speed       = -
      max speed   = 16 GB/s
      status      = OK
      partner port(s) = 4621347002/FCP_CM00CA01P00
    500000E0DA804733/FC
      port name   = FCP_CM01CA00P03
      speed       = -
      max speed   = 16 GB/s
      status      = OK
      partner port(s) = 4621347002/FCP_CM01CA00P03
```

3.7 storinfo

Provides information about StorMan.

Syntax

```
storinfo [-server server]
```

Parameters

`-server server`

Specifies hostname or IP address of the StorMan server where the information is provided from.

If the parameter is not specified information about the CLI is displayed.

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful
7	STORMAN_INV_PARAMETERS	Specified parameters invalid
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server
16	STORMAN_FAULT	Unexpected error in function
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid

Example

Output for storinfo

```
service@mul(MU): storinfo
local StorMan version: V10.2.0
local StorMan build: 10.2.0-0
local StorMan build date: 2023-07-07 10:34
local StorMan build SHA: 779d79a15cfe6da700f4260b3f54ccafe4529be9
local WebUI build date: 2023-07-07 09:59
local WebUI build SHA: 4d13c18bb2d32e777ea85ca2f9b2754972712c08
local hostname: k2somu
local hostinfo: Linux M2000 V6.5A (SUSE Linux Enterprise Server 15 SP4)
```

3.8 stormandb

Saves or restores the StorMan repository. This command is only supported on the StorMan server.

Syntax

```
stormandb { -dump | -load } [-noserver]
```

Parameters

`-dump`

Selects the backup function. The StorMan repository will be saved to the folder `backup` of the StorMan directory.

`-load`

Selects the restore function. The StorMan repository will be restored from the `backup` folder of the StorMan directory.

The StorMan server must be stopped to execute this command. Otherwise the command is rejected.

`-noserver`

Required for function `-dump` only: Setting this parameter the command will work directly on the repository. Make sure there is really no server working with the repository and no concurrent `stormandb` command is running because else the repository may be corrupted.

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful
7	STORMAN_INV_PARAMETERS	Specified parameters invalid
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server
16	STORMAN_FAULT	Unexpected error in function
21	STORMAN_FCT_NOT_POSSIBLE	StorMan server running

3.9 stormirror

Manages volume based replication functions.

Local replication functions are supported as full copy mirrors of a source volume (for ETERNUS DX/AF) or as snapshots (pointer based) local mirrors of a source volume (for ETERNUS DX/AF).

Remote replication functions are supported as full mirrors in synchronous and asynchronous mode (for ETERNUS DX/AF).

stormirror function	ETERNUS DX/AF			
	-mirror-type / -replica			
	full local	fullcopy local	snap local	full remote
create	yes	yes	yes	yes
modify	no	no	no	yes
restart	yes	yes	yes	yes
restore	yes	yes	yes	yes
suspend	yes	no	no	yes
swap	yes	no	no	yes
terminate	yes	yes	yes	yes
show	yes	yes	yes	yes

Please note for the management of replication functions:

- All logical volumes of a mirror pair have to have a storid assigned.
- When using a list of mirror pairs, the following applies:
 - All sources must be in the same storage system and all targets must be in the same storage system.
 - Only one mirror of a source can be managed in one call.
 - All mirror pairs must have the same `mirrorstype`, `replica`, `copymode` and `status`.

```
stormirror -function -functionparam ...
```

Functions

The `-function` parameter supplies one of the following functions:

`-create`

creates new local or remote mirror pair(s) for logical volume(s) by establishing a mirroring relationship between source volume(s) and mirror volume(s)

`-modify`

Modifies the remote copy mode for remote mirror pair(s) from synchronous to asynchronous and back

`-restart`

restarts local or remote mirroring function for mirror pair(s)

`-restore`

restores local mirror volume(s) of mirror pair(s) to source volume(s)

`-suspend`

suspends mirroring on local or remote mirror pair(s). Afterwards the mirror volume(s) are available for direct access from server.

`-swap`

reverses the roles of local or remote mirror pair(s)

`-terminate`

terminates local or remote mirroring relationship for mirror pair(s)

`-show`

displays information related to local or remote mirror pair(s)

If the `-show` function is specified, the output format can be selected by specifying the `-format` parameter.

3.9.1 stormirror -create

Creates one or multiple local or remote mirroring pairs by assigning one or multiple mirror volumes to one or multiple source volumes. The mirror volumes can be specified as full mirror copies or local pointer based logical copies (snapshots).

For full mirror copies after establishing the mirroring relationship the synchronization process is started. For local replication pairs, the source volumes and mirror volumes must all be part of the same storage system.

Syntax

```
stormirror -create -mirrortype mirrortype [ -replica replica ]  
[ -copymode copymode ] -source storid[,...]  
-target storid[,...] [ -waitforsync ]
```

Parameters

`-mirrortype mirrortype`

Specifies the type of mirror pair(s) to be created.

Supported values: `snap` | `full` | `fullcopy`

`snap` creates snapshot (pointer based) mirror pair(s). Snapshots on ETERNUS DX/AF based on SnapOPC+ systems are immediately available and accessible after creation.

`full` creates full copy mirror pairs (on ETERNUS DX/AF based on EC or REC).

`fullcopy` creates full copy pairs (on ETERNUS DX/AF based on QuickOPC)

`-replica replica`

Specifies if local or remote mirror pair(s) should be created.

Supported values: `local` | `remote` | `bytarget` (default)

`local` creates local replica(s) in the same storage system.

`remote` creates remote replica(s) in a different storage system of the same model for ETERNUS DX/AF. This can be on a different site. This value is supported for `-mirrortype full` only.

`bytarget` selects the replica location defined by the specified mirror pair(s). The automatically selected replica must be the same for all specified mirror pairs.

`-copymode copymode`

Defines the copy mode synchronous or asynchronous: `sync` | `async` | `asyncstack`

The default value (when omitted) is `sync` (synchronous).

`-copymode sync` for ETERNUS DX/AF corresponds to sync REC mode.

`-copymode async` for ETERNUS DX/AF corresponds to async REC consistent mode.

`-copymode asyncstack` for ETERNUS DX/AF corresponds to async REC stack mode.

The parameter is only supported for `-replica remote` and for storage systems ETERNUS DX /AF.

`-source storid[,...]`

Specifies the storID(s) of one or a list of source volumes for the mirror pair(s).

The number of specified storIDs for the source volumes must be equal to the number of specified storIDs for the target volumes.

`-target storid[,...]`

Specifies the storID(s) of one or a list of target volumes for the mirror pair(s).

The number of specified storIDs for the source volumes must be equal to the number of specified storIDs for the target volumes.

The capacity and type of the specified target volumes must match to the prerequisites of the specified mirroring feature of the storage system.

If the value `#auto` is specified, StorMan automatically assigns appropriate target volumes to create the mirror pair(s). This function can be supported for `-mirrortype snap` only.

`-waitforsync`

Option to wait for the completion of the synchronization process of the newly created mirror pair(s). This function can be supported for `-mirrortype full` only.

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful.
1	STORMAN_NO_ACTION	Nothing to do.
2	STORMAN_NOT_COMPLETE	Function only partly completed.
3	STORMAN_VER_NOT_SUPP	Version not supported
7	STORMAN_INV_PARAMETERS	Specified parameters invalid.
8	STORMAN_INVALID_STORID	Specified storID not allowed
10	STORMAN_STORID_NOT_FOUND	storID does not yet exist.
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server.
14	STORMAN_STORAGE_LOCKED	Storage unit currently locked.
16	STORMAN_FAULT	Unexpected error in function.
18	STORMAN_NOT_FOUND	Matching object could not be provided.
22	STORMAN_RESOURCE_NOT_AVAILABLE	Provider or database not available
25	STORMAN_PROVIDER_AUTH_FAILED	User / password for the provider not valid.
29	STORMAN_MIRROR_ERROR	Failure of the mirror operation
35	STORMAN_SYSTEM_LOCKED	The ETERNUS DX/AF system is locked for administration
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid
37	STORMAN_PROVIDER_ERROR	Provider returned an error

3.9.2 stormirror -modify

Modifies the copy mode of remote mirroring pairs by switching between synchronous mode and asynchronous modes.

Syntax

```
stormirror -modify [ -newcopymode newcopymode ]  
                  -mirrortype mirrortype [ -replica replica  
]                  -source storid[,...] -target storid[,...]
```

Parameters

`-newcopymode newcopymode`

Defines the copy mode synchronous or asynchronous: `sync` | `async` | `asyncstack`

The default value (when omitted) is `sync` (synchronous).

`-newcopymode sync` for ETERNUS DX/AF corresponds to sync REC mode.

`-newcopymode async` for ETERNUS DX/AF corresponds to async REC consistent mode.

`-newcopymode asyncstack` for ETERNUS DX/AF corresponds to async REC stack mode.

The parameter is only supported for `-replica remote` and for storage systems ETERNUS DX/AF.

`-mirrortype mirrortype`

Specifies the type of mirror pair(s) to be processed.

Supported values: `full`

`full` modifies full copy mirror pairs.

`-replica replica`

Specifies if local or remote mirror pair(s) should be processed.

Supported values: `remote` (default)

`remote` modifies remote replica(s) in a different storage system of the same model. This can be on a different site. This value is supported for `-mirrortype full` only.

`-source storid[,...]`

Specifies the storID(s) of one or a list of source volumes for the mirror pair(s).

The number of specified storIDs for the source volumes must be equal to the number of specified storIDs for the target volumes.

```
-target storid[,...]
```

Specifies the storID(s) of one or a list of target volumes for the mirror pair(s).

The number of specified storIDs for the source volumes must be equal to the number of specified storIDs for the target volumes.

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful.
1	STORMAN_NO_ACTION	Nothing to do.
2	STORMAN_NOT_COMPLETE	Function only partly completed.
3	STORMAN_VER_NOT_SUPP	Version not supported
7	STORMAN_INV_PARAMETERS	Specified parameters invalid.
8	STORMAN_INVALID_STORID	Specified storID not allowed
10	STORMAN_STORID_NOT_FOUND	storID does not yet exist.
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server.
14	STORMAN_STORAGE_LOCKED	Storage unit currently locked.
16	STORMAN_FAULT	Unexpected error in function.
18	STORMAN_NOT_FOUND	Matching object could not be provided.
22	STORMAN_RESOURCE_NOT_AVAILABLE	Provider or database not available
25	STORMAN_PROVIDER_AUTH_FAILED	User / password for the provider not valid.
29	STORMAN_MIRROR_ERROR	Failure of the mirror operation
35	STORMAN_SYSTEM_LOCKED	The ETERNUS DX/AF system is locked for administration
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid
37	STORMAN_PROVIDER_ERROR	Provider returned an error

3.9.3 stormirror -restart

Restarts the mirroring for the specified local or remote mirror pair(s). The mirror volumes are no longer accessible to the server and/or application and all changes done on the mirror volumes are discarded.

For local mirror pairs a subsequent `stormirror -suspend` may activate the mirror volumes again to obtain a new point in time of the mirrored data.

The function is only supported for local and remote full mirror pairs. It is not supported for `-mirrortype snap`.

Syntax

```
stormirror -restart [ -mirrortype mirrortype ]
                  [ -replica replica ]
                  -source storid[,...] -target storid[,...]
                  [ -waitforsync ]
```

Parameters

`-mirrortype mirrortype`

Specifies the type of mirror pair(s) to be restarted.

Supported values: `full` | `any` (default)

`full` selects full copy mirror pairs (on ETERNUS DX/AF based on EC or REC).

`fullcopy` selects full copy pairs (on ETERNUS DX/AF based on QuickOPC)

`any` selects the mirroring feature defined by the specified mirror pair(s).

`-replica replica`

Specifies if local or remote mirror pair(s) should be processed.

Supported values: `local` | `remote` | `bytarget` (default)

`local` creates local replica(s) in the same storage system.

`remote` creates remote replica(s) in a different storage system of the same model. This can be on a different site. This value is supported for `-mirrortype full` only.

`bytarget` selects the replica location defined by the specified mirror pair(s). The automatically selected replica must be the same for all specified mirror pairs.

`-source storid[,...]`

Specifies the storID(s) of one or a list of source volumes for the mirror pair(s).

The number of specified storIDs for the source volumes must be equal to the number of specified storIDs for the target volumes.

`-target storid[,...]`

Specifies the storID(s) of one or a list of target volumes for the mirror pair(s).

The number of specified storIDs for the source volumes must be equal to the number of specified storIDs for the target volumes.

-waitforsync

Option to wait for the completion of the re-synchronization process of the mirror pair(s).

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful.
1	STORMAN_NO_ACTION	Nothing to do.
2	STORMAN_NOT_COMPLETE	Function only partly completed.
3	STORMAN_VER_NOT_SUPP	Version not supported
7	STORMAN_INV_PARAMETERS	Specified parameters invalid.
8	STORMAN_INVALID_STORID	Specified storID not allowed
10	STORMAN_STORID_NOT_FOUND	storID does not yet exist.
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server.
14	STORMAN_STORAGE_LOCKED	Storage unit currently locked.
16	STORMAN_FAULT	Unexpected error in function.
18	STORMAN_NOT_FOUND	Matching object could not be provided.
22	STORMAN_RESOURCE_NOT_AVAILABLE	Provider or database not available
25	STORMAN_PROVIDER_AUTH_FAILED	User / password for the provider not valid.
29	STORMAN_MIRROR_ERROR	Failure of the mirror operation
35	STORMAN_SYSTEM_LOCKED	The ETERNUS DX/AF system is locked for administration
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid
37	STORMAN_PROVIDER_ERROR	Provider returned an error

3.9.4 stormirror -restore

Restores one or more mirror pairs. This function restores the contents of the local mirror volumes back to the original volumes of the mirrored pairs. All changes on the original volumes are discarded.

The mirror volumes of mirror type `snap` remain accessible to the server and/or application.

The mirror volumes of mirror type `full` are no longer accessible to the server and/or application. The status of mirror volumes after processing a restore operation depends on the specific storage system.

i This function is supported for ETERNUS DX/AF systems only for `-copymode sync`.

For ETERNUS DX/AF systems the restore operation is completed only after synchronization is also completed. The mirror volumes are accessible to the server and the mirror pairs are 'split' and 'synchronized'.

Syntax

```
stormirror -restore [ -mirrortype mirrortype ] [ -replica replica ]
                    -source storid[,...] -target storid[,...]
```

Parameters

`-mirrortype mirrortype`

Specifies the type of mirror pair(s) to be restored.

Supported values: `snap` | `full` | `fullcopy` | `any` (default)

`snap` selects snapshot (pointer based) mirror pair(s).

`full` selects full copy mirror pairs (on ETERNUS DX/AF based on EC or REC).

`fullcopy` selects full copy pairs (on ETERNUS DX/AF based on QuickOPC)

`any` selects the mirroring feature defined by the specified mirror pair(s).

`-replica replica`

Specifies if local or remote mirror pair(s) should be restored.

Supported values: `local` | `remote` | `bytarget` (default)

`local` creates local replica(s) in the same storage system.

`remote` restores remote replica(s) in a different storage system of the same model. This can be on a different site. This value is supported for `-mirrortype full` only.

`bytarget` selects the replica location defined by the specified mirror pair(s). The automatically selected replica must be the same for all specified mirror pairs.

`-source storid[,...]`

Specifies the storID(s) of one or a list of source volumes for the mirror pair(s).

The number of specified storIDs for the source volumes must be equal to the number of specified storIDs for the target volumes.

```
-target storid[,...]
```

Specifies the storID(s) of one or a list of target volumes for the mirror pair(s).

The number of specified storIDs for the source volumes must be equal to the number of specified storIDs for the target volumes.

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful.
1	STORMAN_NO_ACTION	Nothing to do.
2	STORMAN_NOT_COMPLETE	Function only partly completed.
3	STORMAN_VER_NOT_SUPP	Version not supported
7	STORMAN_INV_PARAMETERS	Specified parameters invalid.
8	STORMAN_INVALID_STORID	Specified storID not allowed
10	STORMAN_STORID_NOT_FOUND	storID does not yet exist.
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server.
14	STORMAN_STORAGE_LOCKED	Storage unit currently locked.
16	STORMAN_FAULT	Unexpected error in function.
18	STORMAN_NOT_FOUND	Matching object could not be provided.
22	STORMAN_RESOURCE_NOT_AVAILABLE	Provider or database not available
25	STORMAN_PROVIDER_AUTH_FAILED	User / password for the provider not valid.
29	STORMAN_MIRROR_ERROR	Failure of the mirror operation. Details in subcodes: STEP_RESTART_FAILED STEP_SUSPEND_FAILED STEP_2ND_SWAP_FAILED
35	STORMAN_SYSTEM_LOCKED	The storage system is locked for administration
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid
37	STORMAN_PROVIDER_ERROR	Provider returned an error

3.9.5 stormirror -suspend

Suspends the mirroring between source and target volumes of one or more mirrors pairs. The function suspends the mirroring for the specified mirror pair(s).

The local volumes remain accessible to the server and/or application and all changes are tracked by the storage system.

The mirror volumes become available for a server and/or application. The activation of multiple mirror volumes is not supported consistently by means of IO sequence. Therefore consistency must be assured by caller.

The mirror pairs specified by the source and mirror volumes must be homogenous, i.e. they must have the same mirror type and must be specified in the correct order.

The function is supported for local and remote full mirror pairs.

Syntax

```
stormirror -suspend [ -mirrortype mirrortype ] [ -replica replica ]  
                  -source storid[,...] -target storid[,...]]  
                  [ -force ]
```

Parameters

`-mirrortype mirrortype`

Specifies the type of mirror pair(s) to be suspended.

Supported values: `full` | `any` (default)

`full` selects full copy mirror pairs (on ETERNUS DX/AF based on EC or REC).

`any` selects the mirroring feature defined by the specified mirror pair(s).

`-replica replica`

Specifies if local or remote mirror pair(s) should be processed.

Supported values: `local` | `remote` | `std` (default)

`-source storid[,...]`

Specifies the storID(s) of one or a list of source volumes for the mirror pair(s).

The number of specified storIDs for the source volumes must be equal to the number of specified storIDs for the target volumes.

`-target storid[,...]`

Specifies the storID(s) of one ore a list of target volumes for the mirror pair(s).

The number of specified storIDs for the source volumes must be equal to the number of specified storIDs for the target volumes.

-force

Suspends the mirroring regardless of the status. The function is performed as supported by underlying functions of the storage system.

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful.
1	STORMAN_NO_ACTION	Nothing to do.
2	STORMAN_NOT_COMPLETE	Function only partly completed.
3	STORMAN_VER_NOT_SUPP	Version not supported
7	STORMAN_INV_PARAMETERS	Specified parameters invalid.
8	STORMAN_INVALID_STORID	Specified storID not allowed
10	STORMAN_STORID_NOT_FOUND	storID does not yet exist.
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server.
14	STORMAN_STORAGE_LOCKED	Storage unit currently locked.
16	STORMAN_FAULT	Unexpected error in function.
22	STORMAN_RESOURCE_NOT_AVAILABLE	Provider or database not available
25	STORMAN_PROVIDER_AUTH_FAILED	User / password for the provider not valid.
29	STORMAN_MIRROR_ERROR	Failure of the mirror operation
35	STORMAN_SYSTEM_LOCKED	The storage system is locked for administration
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid
37	STORMAN_PROVIDER_ERROR	Provider returned an error

3.9.6 stormirror -swap

Swaps the mirror roles of source and target volumes of one or more mirrors pairs. The function reverses the roles of the volumes for the specified mirror pair(s) in the storage system, making the source volumes to target volumes and vice versa. The current local volumes are no longer accessible to the server and/or application and all.

The function is supported for local and remote full mirror pairs (clones).

Syntax

```
stormirror -swap [ -mirrortype mirrortype ] [ -replica replica ]  
                -source storid[,...] -target storid[,...]
```

Parameters

`-mirrortype mirrortype`

Specifies the type of mirror pair(s) to be swapped.

Supported values: `full` | `any` (default)

`full` selects full copy mirror pairs (on ETERNUS DX/AF based on EC or REC).

`any` selects the mirroring feature defined by the specified mirror pair(s).

`-replica replica`

Specifies if local or remote mirror pair(s) should be processed.

Supported values: `local` | `remote` | `bytarget` (default)

`local` selects local replica(s) in the same storage system.

`remote` selects remote replica(s) in a different storage system of the same model. This can be on a different site.

`bytarget` selects the replica location defined by the specified mirror pair(s). The automatically selected replica must be the same for all specified mirror pairs.

`-source storid[,...]`

Specifies the storID(s) of one or a list of source volumes for the mirror pair(s).

The number of specified storIDs for the source volumes must be equal to the number of specified storIDs for the target volumes.

`-target storid[,...]`

Specifies the storID(s) of one ore a list of target volumes for the mirror pair(s).

The number of specified storIDs for the source volumes must be equal to the number of specified storIDs for the target volumes.

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful.
1	STORMAN_NO_ACTION	Nothing to do.
2	STORMAN_NOT_COMPLETE	Function only partly completed.
3	STORMAN_VER_NOT_SUPP	Version not supported
7	STORMAN_INV_PARAMETERS	Specified parameters invalid.
8	STORMAN_INVALID_STORID	Specified storID not allowed
10	STORMAN_STORID_NOT_FOUND	storID does not yet exist.
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server.
14	STORMAN_STORAGE_LOCKED	Storage unit currently locked.
16	STORMAN_FAULT	Unexpected error in function.
22	STORMAN_RESOURCE_NOT_AVAILABLE	Provider or database not available
25	STORMAN_PROVIDER_AUTH_FAILED	User / password for the provider not valid.
29	STORMAN_MIRROR_ERROR	Failure of the mirror operation
35	STORMAN_SYSTEM_LOCKED	The storage system is locked for administration
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid
37	STORMAN_PROVIDER_ERROR	Provider returned an error

3.9.7 stormirror -terminate

Terminates one or more local or remote mirror pairs. This function removes the relationship between the original volumes and the mirror volumes.

Syntax

```
stormirror -terminate [ -mirrortype mirrortype ] [ replica replica ]  
                    -source storid[,...] { -target storid [...]  
|  
                    [ -force ]
```

Parameters

`-mirrortype mirrortype`

Specifies the type of mirror pair(s) to be terminated.

Supported values: `snap` | `full` | `fullcopy` | `any` (default)

`snap` selects snapshot (pointer based) mirror pair(s).

`full` selects full copy mirror pairs (on ETERNUS DX/AF based on EC or REC).

`fullcopy` selects full copy pairs (on ETERNUS DX/AF based on QuickOPC)

`any` selects the mirroring feature defined by the specified mirror pair(s).

`-replica replica`

Specifies if local or remote mirror pair(s) should be processed.

Supported values: `local` | `remote` | `bytarget` (default)

`local` selects local replica(s) in the same storage system.

`remote` selects remote replica(s) in a different storage system of the same model. This can be on a different site.

`bytarget` selects the replica location defined by the specified mirror pair(s). The automatically selected replica must be the same for all specified mirror pairs.

`-source storid[,...]`

Specifies the storID(s) of one or a list of source volumes for the mirror pair(s).

The number of specified storIDs for the source volumes must be equal to the number of specified storIDs for the target volumes.

`-target storid[,...]`

Specifies the storID(s) of one or a list of target volumes for the mirror pair(s).

The number of specified storIDs for the source volumes must be equal to the number of specified storIDs for the target volumes.

-force

Terminates the mirror pair(s) regardless of their status. The function is performed as supported by underlying functions of the storage system.

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful.
1	STORMAN_NO_ACTION	Nothing to do.
2	STORMAN_NOT_COMPLETE	Function only partly completed.
3	STORMAN_VER_NOT_SUPP	Version not supported
7	STORMAN_INV_PARAMETERS	Specified parameters invalid.
8	STORMAN_INVALID_STORID	Specified storID not allowed
10	STORMAN_STORID_NOT_FOUND	storID does not yet exist.
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server.
14	STORMAN_STORAGE_LOCKED	Storage unit currently locked.
16	STORMAN_FAULT	Unexpected error in function.
18	STORMAN_NOT_FOUND	Matching object could not be provided.
22	STORMAN_RESOURCE_NOT_AVAILABLE	Provider or database not available
25	STORMAN_PROVIDER_AUTH_FAILED	User / password for the provider not valid.
29	STORMAN_MIRROR_ERROR	Failure of the mirror operation
35	STORMAN_SYSTEM_LOCKED	The storage system is locked for administration
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid
37	STORMAN_PROVIDER_ERROR	Provider returned an error

3.9.8 stormirror -show

Displays information about the relationship and status of mirrored pairs. The selection is controlled by the specified parameters. E.g. use parameters `-system system` and `-mirrorusage origlocal` to show all volumes on a specific storage system that are used as source volumes for local mirroring. A subset of the selection parameters of `storcfg volume -show` is supported.

i For storage volumes used in a storage cluster a remote replication is always maintained to the secondary system. This remote replication is managed exclusively by ETERNUS SF Storage Cluster functions. The replication relationship is not displayed by `stormirror -show`.

Syntax

```
stormirror -show [ -storid storid[,...] ] [ -poolid poolid[,...] ]
                 [ -system system ] [ -replica replica ]
                 [ -mirrorstype mirrorstype ] [ -copymode copymode ]
                 [ -mirrorusage mirrorusage ] [ -cluster cluster ]
                 [ -format format ]
```

Parameters

`-storid storid`

Specifies the storID for the logical volume (default: *). Wildcards (*) are supported.

To display all logical volumes of a storage system (even if they are not managed by StorMan) specify `-storid #all` and exactly one storage system using the `system` parameter. All other parameters are ignored in this case. A comma separated list of stor IDs is allowed.

`-poolid poolid`

Specifies the ID of a pool the logical volume belongs to (default: *). Wildcards (*) are supported. A comma separated list of pool IDs is allowed.

`-system system`

Specifies the system name of the storage system the logical volume belongs to (default: *). Wildcards (*) are supported.

`-replica replica`

Specifies if local or remote mirror pair(s) should be displayed.

Supported values: `local` | `remote` | `any` (default)

`local` selects local replica(s) in the same storage system.

`remote` selects remote replica(s) in a different storage system of the same model.

`any` selects all replicas.

`-mirrortype mirrortype`

Specifies the mirror type of the volume for mirroring (replication) functions.

Supported values: `snap` | `full` | `fullcopy` | `any` (default)

`snap` selects snapshot (pointer based) mirror pair(s).

`full` selects full copy mirror pairs (on ETERNUS DX/AF based on EC or REC).

`fullcopy` selects full copy pairs (on ETERNUS DX/AF based on QuickOPC).

`any` selects the mirroring feature defined by the specified mirror pair(s).

`-copymode copymode`

Selects the displayed volumes according to their copy mode, supported only for `mirrorusage origremote` and `mirrorremote`:

Supported values: `sync` | `async` | `asyncstack` | `asyncthrough` | `any` (default)

`-copymode sync` selects the volumes with copy mode `sync`.

`-copymode async` selects the volumes with copy mode `async`.

`-copymode asyncstack` selects the volumes with copy mode `asyncstack`.

`-copymode asyncthrough` selects the volumes with copy mode `asyncthrough`.

`-mirrorusage mirrorusage`

Selects the displayed volumes according to their usage as mirroring (replication) pairs (default: `any`).

Supported values: `origlocal` | `mirrorlocal` | `origremote` | `mirrorremote` | `any` (default)

`any` selects the pairs regardless of their mirror usage.

`origlocal` selects all volumes used as original volumes of local mirror pair(s).

`mirrorlocal` selects all volumes used as mirror volumes of local mirror pair(s).

`origremote` selects original volumes of remote mirror pair(s).

`mirrorremote` selects mirror volumes of remote mirror pair(s).

`-cluster cluster`

Selects by the cluster the volume belongs to.

`-format format`

Specifies the output format. Refer to the description of the "[Format parameter](#)".

To display all logical volumes (even if they are not managed by StorMan) of a storage system you have to specify exactly one system using the `-system` parameter and specify `-storid` without a value. All other parameters are ignored in this case.

i Additionally all selection parameters offered by `storcfg volume -show` are supported.

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful.
2	STORMAN_NOT_COMPLETE	Function only partly completed.
3	STORMAN_VER_NOT_SUPP	Version not supported.
7	STORMAN_INV_PARAMETERS	Specified parameters invalid.
8	STORMAN_INVALID_STORID	Specified storID not allowed
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server
16	STORMAN_FAULT	Unexpected error in function.
18	STORMAN_NOT_FOUND	Matching object could not be provided.
22	STORMAN_RESOURCE_NOT_AVAILABLE	Provider or database not available
35	STORMAN_SYSTEM_LOCKED	The storage system is locked for administration
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid

Examples

1. Output for logical volumes with `-format std` (default)

```
stormirror -show -storid SM_20817
```

```
storage ID          = SM_20817
pool ID             = test
storage system name = 4621347002
storage serial nr.  = 4621347002
device ID           = 751
GUID                = 600000E00D2A0000002A004702EF0000
storage size        = 10 GB
type                = normal
storage vendor       = FUJITSU
storage model        = ETERNUS DX
status              = READY
raid level           = RAID1
raid type            = RAID1
owner controller    = CM00
storage pools        = TFO-Group
host access          = restricted
mirror targets
  storage ID        = SM_20819
  storage system name = 4621347002
  pool ID           = test
  device ID         = 753
  GUID              = 600000E00D2A0000002A004702F10000
  mirror type        = full-copy
  replication mode   = local
  copy mode          = sync
  status             = split
  isSynch            = no
  percentSynced      = 1
  timestamp          = 20170511164532.000000+000
no mirror sources found
```

2. Output for logical volumes with `-format medium`

```
stormirror -show -storid UID_ SM_20817 -format medium
```

```
SM_20817 storage=4621347002 deviceID=751 size=10 GB
```

```
targets:SM_20819/753/split
```

3. Output for logical volumes with `-format xmlp`

```
stormirror -show -storid SM_20817 -format xmlp
```

```
<Response>
  <ReturnCode>
    <Code>STORMAN_OK</Code>
    <CodeNumber>0</CodeNumber>
    <Text>successful</Text>
    <SubCode>0</SubCode>
    <SubCodeText>STORMAN_SUB_NONE</SubCodeText>
    <AdditionalInformation/>
    <MessageID>889</MessageID>
    <ConnectionID>55547508F2658</ConnectionID>
    <TimeID>1501139666197000</TimeID>
  </ReturnCode>
  <Result>
    <VolumeDescriptions>
      <VolumeDescription>
        <StorID>SM_20817</StorID>
        <PoolID>test</PoolID>
        <StorageSystemName>4621347002</StorageSystemName>
        <StorageSerialNumber>4621347002</StorageSerialNumber>
        <StorageCustomName>DX500 S3-01</StorageCustomName>
        <GUID>600000E00D2A0000002A004702EF0000</GUID>
        <DeviceID>751</DeviceID>
        <DeviceNumber>751</DeviceNumber>
        <VolumeName>TFO-Vol1</VolumeName>
        <Size>10737418240</Size>
        <SizeNormalized>10 GB</SizeNormalized>
        <StorageVendor>STORMAN_STORAGE_VENDOR_FUJITSU</StorageVendor>
        <StorageModel>STORMAN_STORAGE_MODEL_ETERNUS</StorageModel>
        <StorageFeatures>29694</StorageFeatures>
        <Status>STORMAN_VOLUME_STATUS_READY</Status>
        <VolumeType>STORMAN_VOLUME_TYPE_NORMAL</VolumeType>
        <RaidLevel>STORMAN_RAID_LEVEL_1</RaidLevel>
        <RaidType>RAID1</RaidType>
        <CurrOwnerController>CM00</CurrOwnerController>
        <SpaceConsumedInBox>10737418240</SpaceConsumedInBox>
        <MaybeSource>true</MaybeSource>
        <MaybeTarget>true</MaybeTarget>
        <MaybeFullTarget>true</MaybeFullTarget>
        <MaybeSnapTarget>false</MaybeSnapTarget>
        <IsActionAllowed>true</IsActionAllowed>
        <FirstHostLun/>
        <StorageClusterName/>
        <Usage>Remote Replica Source or Target</Usage>
        <UsageCode>11</UsageCode>
        <StoragePoolNames>
          <StoragePoolName>TFO-Group</StoragePoolName>
        </StoragePoolNames>
        <StoragePoolIDs>
          <StoragePoolID>FUJITSU:RSP0014</StoragePoolID>
        </StoragePoolIDs>
        <HostConnections>
        </HostConnections>
        <MirroringTargets>
          <MirroringTarget>
```

```
<StorID>SM_20819</StorID>
<DeviceID>753</DeviceID>
<DeviceNumber>753</DeviceNumber>
<GUID>600000E00D2A0000002A004702F10000</GUID>
<StorageSystemName>4621347002</StorageSystemName>
<StorageSerialNumber>4621347002</StorageSerialNumber>
<StorageCustomName>DX500 S3-01</StorageCustomName>
<StorageVendor>STORMAN_STORAGE_VENDOR_FUJITSU</StorageVendor>
<StorageModel>STORMAN_STORAGE_MODEL_ETERNUS</StorageModel>
<PoolID>test</PoolID>
<MirrorType>STORMAN_MIRROR_TYPE_FULL_COPY</MirrorType>
<ReplicationMode>STORMAN_MIRROR_REPLICA_LOCAL</ReplicationMode>
<CopyMethod>STORMAN_ETERNUS_COPY_METHOD_QUICK_OPC</CopyMethod>
<Status>STORMAN_MIRROR_PAIR_STATUS_SPLIT</Status>
<CopyMode>STORMAN_REMOTE_COPY_MODE_SYNC</CopyMode>
<SplitMode>STORMAN_MIRROR_SPLIT_MODE_UNKNOWN</SplitMode>
<RecoveryMode>STORMAN_MIRROR_RECOVERY_MODE_UNKNOWN</RecoveryMode>
<IsSynch>>false</IsSynch>
<IsSCO>>false</IsSCO>
<ContinuousCopy>>false</ContinuousCopy>
<PercentSynced>1</PercentSynced>
<StorageClusterName/>
<PairEstablishedSince/>
<PointInTime>
  <TimeStamp>20170511164532.000000+000</TimeStamp>
</PointInTime>
<CustomProperties>
</CustomProperties>
</MirroringTarget>
</MirroringTargets>
<MirroringSources>
</MirroringSources>
<TargetPorts>
</TargetPorts>
<CustomProperties>
</CustomProperties>
<OperationalStatus>OK</OperationalStatus>
<OperationalStatusDetailList>
</OperationalStatusDetailList>
</VolumeDescription>
</VolumeDescriptions>
</Result>
</Response>
```

3.10 storparam

Modifies the settings for the StorMan server without restarting it. All settings are valid for the current StorMan server session. They can optionally be maintained persistent for further sessions.

Syntax

```
storparam { -show | [ -debug level ] [ -debugcom comopt ]  
           [ -traceworker level] [ -tracefilemaxage level]  
           [ -save ]
```

Parameters

-show

Shows the settings of the StorMan server.

-debug *level*

Sets the debug level of the server. Supported values:

0	Trace severe errors only
1	Trace errors too
2	Trace even warnings
3	Trace information
4	Trace debug (default)
5	Trace extended debug

`-debugcom comopt`

Sets the debug option for communication (only active if the overall debug level is 5). Supported values:

1	Trace tcp / ip calls of clients
2	Trace messages of clients
4	Trace tcp / ip calls of provider communication
8	Trace messages of provider communication

Adding the values enables multiple traces.

`-traceworker level`

Enables the tracing of background threads with debug trace level (not higher than the level set by debug) to the trace file. Supported values:

0	Trace off (default)
1	Trace worker
2	Trace system updater
4	Trace mirror updater
8	Trace provider status updater
16	Trace statistics collector
32	Trace main thread
64	Trace indication handler
128	Trace script updater
256	Trace volume updater
512	Trace cluster updater

Adding the values enables multiple levels.

`-tracefilemaxage level`

Defines how many days the StorMan log files are kept before they are automatically deleted. Supported values:

0	No limit (default)
n	n = number of days

`-save`

Saves the currently specified parameter values to the file `smsserver.ini` to be preserved for subsequent sessions (restart of StorMan server).

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful
7	STORMAN_INV_PARAMETERS	Specified parameters invalid
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server
16	STORMAN_FAULT	Unexpected error in function
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid

Examples

Output of the StorMan parameters `storparam -show`:

```
service@mul(MU): storparam -show
debug level: 5
communication debug level: 0
worker trace: 0
authorization level: enabled
max trace file age: 90days
```

3.11 storstat

The `storstat` command is used to manage the collection of performance and statistical information.

```
storstat object -function -functionparam ...
```

The first parameter specifies the object group of the repository that is configured:

First parameter <i>object</i>	Object
volume	logical volumes of storage systems visible by StorMan
all	All available components of storage systems (ETERNUS DX/AF only)

The second parameter specifies the function:

Second parameter <i>function</i>	Meaning
-get	get statistic information

If the `-get` function is specified, the output format can be selected by specifying the `-format` parameter.

3.11.1 storstat volume

`storstat volume` is used to get statistical and performance data for storage volumes by StorMan.

```
storstat volume -function -functionparam ...
```

Functions

The `-function` parameter supplies the following functions:

`-get`

Gets the statistical data for volumes of a storage system.

3.11.1.1 storstat volume -get

Gets the statistical and performance data related to storage volumes of a storage system. Selection criteria for the `-get` function can be specified using the parameters described below.

Please note that the output may be different for different storage systems

Syntax

```
storstat volume -get -system system [ -format format ]
```

Parameters

`-system system`

Specifies the system name of the storage system the logical volume belongs to. Wildcards (*) are supported.

`-format format`

Specifies the output format. Refer to the description of the ["Format parameter"](#).

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful.
3	STORMAN_VER_NOT_SUPP	Version not supported.
7	STORMAN_INV_PARAMETERS	Specified parameters invalid.
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server.
16	STORMAN_FAULT	Unexpected error in function.
18	STORMAN_NOT_FOUND	Matching object could not be provided.
21	STORMAN_FCT_NOT_POSSIBLE	Function rejected by provider.
22	STORMAN_RESOURCE_NOT_AVAILABLE	Provider or database not available.
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid

Output

The output field DataVersion for ETERNUS DX/AF storage systems contains the information:

- DataVersion = 2: data provided via SMI-S (ETERNUS DX/AF)

The following volume specific metrics are provided for ETERNUS DX/AF (DataVersion = 2):

Name	Description
TimeLastSampled	Absolute point in time of last sampled statistical data. Format: yyyy-mm-dd hh:mm:ss.sss Example: 2016-01-13 13:56:15.000
DeviceID	Device Id of the volume
ReadIOs	Number of read IOs (Counter)
WriteIOs	Number of write IOs (Counter)
MBytesRead	Amount of MB read (Counter)
MBytesWritten	Amount of MB written (Counter)
KBytesRead	Amount of KB read (Counter)
KBytesWritten	Amount of KB written (Counter)
ReadHitIOs	Number of read hit IOs (Counter)
WriteHitIOs	Number of write hit IOs (Counter)
ReadIOTimeCounter	Time counter for read IOs (ms)
ReadHitIOTimeCounter	Time counter for read hit IOs (ms)
WriteIOTimeCounter	Time counter for write IOs (ms)
WriteHitIOTimeCounter	Time counter for write Hit IOs (ms)

- All Counters are defined as UINT64 (the maximum value being 18446744073709551615). However overflow is handled by the provider.

Examples

1. Output for logical volumes with `-format xmlp` (default)

ETERNUS DX500 S3:

```
storstat volume -get -system 4621347002 -format xmlp
```

```
<Response>
<Response>
  <ReturnCode>
    <Code>STORMAN_OK</Code>
    <CodeNumber>0</CodeNumber>
    <Text>successful</Text>
    <SubCode>0</SubCode>
    <SubCodeText>STORMAN_SUB_NONE</SubCodeText>
    <AdditionalInformation/>
    <MessageID>53</MessageID>
    <ConnectionID>5555D641C8740</ConnectionID>
  </ReturnCode>
  <Result>
    <StorageSystem>
      <StorageSystemName>4621347002</StorageSystemName>
      <StorageModel>STORMAN_STORAGE_MODEL_ETERNUS</StorageModel>
      <StorageVendor>STORMAN_STORAGE_VENDOR_FUJITSU</StorageVendor>
      <DataVersion>2</DataVersion>
      <StatusCode>0</StatusCode>
      <Status>successful</Status>
      <TimeLastSampled>2017-07-28 10:33:23.000</TimeLastSampled>
      <SampleInterval>300</SampleInterval>
      <StatisticsVolumes>
        <StatisticsVolume>
          <DeviceID>0</DeviceID>
          <TimeLastSampled>2017-07-28 10:33:23.000</TimeLastSampled>
          <ReadIOs>27</ReadIOs>
          <WriteIOs>0</WriteIOs>
          <KBytesRead>290</KBytesRead>
          <KBytesWritten>0</KBytesWritten>
          <MBytesRead>0</MBytesRead>
          <MBytesWritten>0</MBytesWritten>
          <ReadHitIOs>23</ReadHitIOs>
          <WriteHitIOs>0</WriteHitIOs>
          <ReadIOTimeCounter>45</ReadIOTimeCounter>
          <ReadHitIOTimeCounter>2</ReadHitIOTimeCounter>
          <WriteIOTimeCounter>0</WriteIOTimeCounter>
          <WriteHitIOTimeCounter>0</WriteHitIOTimeCounter>
        </StatisticsVolume>
        <StatisticsVolume>
          <DeviceID>1</DeviceID>
          <TimeLastSampled>2017-07-28 10:33:23.000</TimeLastSampled>
          <ReadIOs>23</ReadIOs>
          <WriteIOs>0</WriteIOs>
          <KBytesRead>46</KBytesRead>
          <KBytesWritten>0</KBytesWritten>
          <MBytesRead>0</MBytesRead>
          <MBytesWritten>0</MBytesWritten>
          <ReadHitIOs>22</ReadHitIOs>
          <WriteHitIOs>0</WriteHitIOs>
          <ReadIOTimeCounter>8</ReadIOTimeCounter>
          <ReadHitIOTimeCounter>1</ReadHitIOTimeCounter>
          <WriteIOTimeCounter>0</WriteIOTimeCounter>
          <WriteHitIOTimeCounter>0</WriteHitIOTimeCounter>
        </StatisticsVolume>
      </StatisticsVolumes>
    </StorageSystem>
  </Result>
</Response>
```

2. Output for logical volumes with `-format std` (default)

ETERNUS DX500 S3:

storstat volume -get -system 4621347002

```
storage system name = 4621347002
  storage vendor      = STORMAN_STORAGE_VENDOR_FUJITSU
  storage model       = STORMAN_STORAGE_MODEL_ETERNUS
  status              = successful
  time last sampled   = 2016-06-06 15:01:42.000
storage StatisticsVolume(s)
  DeviceID = 857
  TimeLastSampled = 2017-07-28 15:08:24.000
  ReadIOs = 30198
  WriteIOs = 0
  KBytesRead = 15099
  KBytesWritten = 0
  MBytesRead = 14
  MBytesWritten = 0
  ReadHitIOs = 30198
  WriteHitIOs = 0
  ReadIOTimeCounter = 2172
  ReadHitIOTimeCounter = 2172
  WriteIOTimeCounter = 0
  WriteHitIOTimeCounter = 0
...
```

3.11.2 storstat all

`storstat all` is used to get all available statistical and performance data including volumes, frontend ports (FA and CA) for ETERNUS DX/AF storage systems by StorMan.

```
storstat all -function -functionparam ...
```

Functions

The `-function` parameter supplies the following functions:

`-get`

Get all statistical data for volumes, front end ports and controllers of a storage system.

3.11.2.1 storstat all -get

Get the statistical and performance data related to volumes, front end ports and controllers of a storage system. Selection criteria for the `-get` function can be specified using the parameters described below.

Syntax

```
storstat all -get -system system [ -format format ]
```

Parameters

`-system system`

Specify the system name of the storage system to get information from. Wildcards (*) are supported.

`-format format`

Specifies the output format. Refer to the description of the "[Format parameter](#)".

Return codes

Error Code	Name	Error Type
0	STORMAN_OK	Function successful.
3	STORMAN_VER_NOT_SUPP	Version not supported.
7	STORMAN_INV_PARAMETERS	Specified parameters invalid.
13	STORMAN_COMMUNIC_ERROR	Error in StorMan communication between client and server.
16	STORMAN_FAULT	Unexpected error in function.
18	STORMAN_NOT_FOUND	Matching object could not be provided.
21	STORMAN_FCT_NOT_POSSIBLE	Function rejected by provider.
22	STORMAN_RESOURCE_NOT_AVAILABLE	Provider or database not available.
36	STORMAN_AUTH_FAILED	User / password for StorMan not valid

Output

The following volume and port specific metrics are provided for ETERNUS DX/AF (DataVersion = 2):

Name	Description
TimeLastSampled	Absolute point in time of last sampled statistical data. Format: yyyy-mm-dd hh:mm:ss.sss Example: 2020-01-13 13:56:15.000
<i>Volume specific:</i>	
DeviceID	Device Id of the volume
ReadIOs	Number of read IOs (Counter)
WriteIOs	Number of write IOs (Counter)
MBytesRead	Amount of MB read (Counter)
MBytesWritten	Amount of MB written (Counter)
KBytesRead	Amount of KB read (Counter)
KBytesWritten	Amount of KB written (Counter)
ReadHitIOs	Number of read hit IOs (Counter)
WriteHitIOs	Number of write hit IOs (Counter)
ReadIOTimeCounter	Time counter for read IOs (ms)
ReadHitIOTimeCounter	Time counter for read hit IOs (ms)
WriteIOTimeCounter	Time counter for write IOs (ms)
WriteHitIOTimeCounter	Time counter for write hit IOs (ms)
<i>Port specific:</i>	
PortName	Name of the port
PortID	ID of the port
ControllerName	Identifier of the Controller
ReadIOs	Number of read IOs / port (Counter)
WriteIOs	Number of write IOs / port (Counter)
MBytesRead	Amount of MB read / port (Counter)

MBytesWritten	Amount of MB written / port (Counter)
KBytesRead	Amount of KB read / port (Counter)
KBytesWritten	Amount of KB written / port (Counter)
KBytesTransferred	Amount of KB transferred / port (Counter)
ReadIOTimeCounter	Time counter for read IOs (ms)
WriteIOTimeCounter	Time counter for write IOs (ms)
<i>Disk specific:</i>	
DeviceID	ID of the disk
ReadIOs	Number of read IOs
WriteIOs	Number of write IOs
KBytesTransferred	Amount of KB transferred

Examples

Output for all statistics of ETERNUS DX900 S5 with -format xmlp (default)

```
storstat all -get -system 4652005001 -format xmlp
```

```
<Response>
  <ReturnCode>
    <Code>STORMAN_OK</Code>
    <CodeNumber>0</CodeNumber>
    <Text>successful</Text>
    <SubCode>0</SubCode>
    <SubCodeText>STORMAN_SUB_NONE</SubCodeText>
    <AdditionalInformation/>
    <MessageID>179258</MessageID>
    <ConnectionID>601DC1419EDBF</ConnectionID>
  </ReturnCode>
  <Result>
    <StorageSystem>
      <StorageSystemName>4652005001</StorageSystemName>
      <StorageModel>STORMAN_STORAGE_MODEL_ETERNUS</StorageModel>
      <StorageVendor>STORMAN_STORAGE_VENDOR_FUJITSU</StorageVendor>
      <DataVersion>2</DataVersion>
      <StatusCode>0</StatusCode>
      <Status>successful</Status>
      <TimeLastSampled>2023-08-01 13:56:53.000</TimeLastSampled>
      <SampleInterval>30</SampleInterval>
      <StatisticsVolumes>
        <StatisticsVolume>
          <DeviceID>0</DeviceID>
          <TimeLastSampled>2023-08-01 13:56:53.000</TimeLastSampled>
          <ReadIOs>4</ReadIOs>
          <WriteIOs>0</WriteIOs>
          <KBytesRead>2</KBytesRead>
```

```
<KBytesWritten>0</KBytesWritten>
<MBytesRead>0</MBytesRead>
<MBytesWritten>0</MBytesWritten>
<ReadHitIOs>4</ReadHitIOs>
<WriteHitIOs>0</WriteHitIOs>
<ReadIOTimeCounter>0</ReadIOTimeCounter>
<ReadHitIOTimeCounter>0</ReadHitIOTimeCounter>
<WriteIOTimeCounter>0</WriteIOTimeCounter>
<WriteHitIOTimeCounter>0</WriteHitIOTimeCounter>
</StatisticsVolume>
... <StatisticsPorts>
<StatisticsPort>
  <PortName>FCP_CM00CA00P00</PortName>
  <TimeLastSampled>2023-08-01 13:56:53.000</TimeLastSampled>
  <ReadIOs>5937</ReadIOs>
  <WriteIOs>161</WriteIOs>
  <KBytesRead>760166</KBytesRead>
  <KBytesWritten>5330</KBytesWritten>
  <MBytesRead>742</MBytesRead>
  <MBytesWritten>5</MBytesWritten>
  <KBytesTransferred>765496</KBytesTransferred>
  <ReadIOTimeCounter>822</ReadIOTimeCounter>
  <WriteIOTimeCounter>9</WriteIOTimeCounter>
  <ControllerName>CM00</ControllerName>
  <PortID>500000E0DC425E00</PortID>
</StatisticsPort>
...
<StatisticsDisks>
  <StatisticsDisk>
    <DeviceID>DD0x0000</DeviceID>
    <TimeLastSampled>2023-08-01 13:56:53.000</TimeLastSampled>
    <ReadIOs>70374941</ReadIOs>
    <WriteIOs>11553488</WriteIOs>
    <KBytesTransferred>869341968</KBytesTransferred>
  </StatisticsDisk>
  ...
</StorageSystem>
</Result>
</Response>
```

4 Related publications

You will find the manuals on the internet at <https://bs2manuals.ts.fujitsu.com>. You can order printed copies of those manuals which are displayed with an order number.

- [1] **SHC-OSD**
Storage Management for BS2000
User Guide
- [2] **IMON (BS2000)**
Installation Monitor
User Guide
- [3] **Fujitsu Server BS2000 SE Series**
Operation and Administration
User Guide
- [4] **SE Server**
SE Manager Help
Online Help