digital

DIGITAL Storageworks HSZ70 Array Controller HSOF Version 7.0

EK–HSZ70–RM. A01

Digital Equipment Corporation
Maynard, Massachusetts

CLI Reference Manual

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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the manuals, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Restrictions apply to the use of the local-connection port on this series of controllers; failure to observe these restrictions may result in harmful interference. Always disconnect this port as soon as possible after completing the setup operation. Any changes or modifications made to this equipment may void the user's authority to operate the equipment.

Warning!
This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Achtung!
Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.

Avertissement!
Cet appareil est un appareil de Classe A. Dans un environnement résidentiel cet appareil peut provoquer des brouillages radioélectriques. Dans ce cas, il peut être demandé à l' utilisateur de prendre les mesures appropriées.

Contents

Preface

Tables

Preface

This book provides information and guidance for operating the command line interface (CLI) for the array controller. This book defines, explains, and presents examples of how you can implement the commands supported by the software accompanying your controller.

This book does not contain information about the operating environments to which the controller may be connected, nor does it contain detailed information about subsystem enclosures or their components. See the documentation that accompanied these peripherals for information about them.

Precautions

Follow these precautions when you’re carrying out the procedures in this book.

Electrostatic Discharge Precautions

Static electricity collects on all nonconducting material, such as paper, cloth, and plastic. An electrostatic discharge (ESD) can easily damage a controller or other subsystem component even though you may not see or feel the discharge. Follow these precautions whenever you’re servicing a subsystem or one of its components:

- Always use an ESD wrist strap when servicing the controller or other components in the subsystem. Make sure that the strap contacts bare skin and fits snugly, and that its grounding lead is attached to a bus that is a verified earth ground.
- Before touching any circuit board or component, always touch a verifiable earth ground to discharge any static electricity that may be present in your clothing.
- Always keep circuit boards and components away from nonconducting material.
- Always keep clothing away from circuit boards and components.
- Always use antistatic bags and grounding mats for storing circuit boards or components during replacement procedures.
- Always keep the ESD cover over the program card when the card is in the controller. If you remove the card, put it in its original carrying case. Never touch the contacts or twist or bend the card while you’re handling it.
- Do not touch the connector pins of a cable when it is attached to a component or host.

VHDCI Cable Precautions

All of the cables to the controller, cache module, and external cache battery use very-high-density cable interconnect connectors (VHDCI). These connectors have extraordinarily small mating surfaces that can be adversely affected by dust and movement.

Use the following precautions when you're connecting cables that use VHDCI connectors:

- Clean the mating surfaces with a blast of clean air.
- Mate the connectors by hand, then tighten the retaining screws to 1.5 inch-pounds—approximately 1/4 additional turn after the connectors have fully mated.
- Test the assembly by gently pulling on the cable, which should not produce visible separation.

Local-Connection Port Precautions

The local-connection port generates, uses, and radiates radio-frequency energy through cables that are connected to it. This energy may interfere with radio and television reception. Do not leave a cable connected to this port when you're not communicating with the controller.

Conventions

This book uses the following typographical conventions and special notices to help you find what you're looking for.

Typographical Conventions

Convention	Meaning
ALLCAPS BOLD	Command syntax that must be entered exactly as shown, for example: **SET FAILOVER COPY=OTHER_CONTROLLER**
ALLCAPS	Command discussed within text, for example: "Use the SHOW SPARESET command to show the contents of the spareset."
`Monospaced`	Screen display.
Sans serif italic	Command variable or numeric value that you supply, for example: SHOW *RAIDset-name* or **SET THIS_CONTROLLER ID=***(n,n,n,n,)*
italic	Reference to other books, for example: "See *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for details."
⋮	Indicates that a portion of an example or figure has been omitted, for example: **ADD RAIDSET RAID1 DISK10000 DISK20000** **INITIALIZE RAID1** **.** **.** **.** **SHOW RAID1**
"this controller"	The controller serving your current CLI session through a local or remote terminal.
"other controller"	The controller in a dual-redundant pair that's connected to the controller serving your current CLI session.

Special Notices

This book doesn't contain detailed descriptions of standard safety procedures. However, it does contain warnings for procedures that could cause personal injury and cautions for procedures that could damage the controller or its related components. Look for these symbols when you're carrying out the procedures in this book:

Warning A warning indicates the presence of a hazard that can cause personal injury if you do not avoid the hazard.

Caution A caution indicates the presence of a hazard that might damage hardware, corrupt software, or cause a loss of data.

Tip A tip provides alternative methods or procedures that may not be immediately obvious. A tip may also alert prior customers that the controller's behavior being discussed is different from prior software or hardware versions.

Note A note provides additional information that's important to the completion of an instruction or procedure.

Related Publications

The following table lists some of the documents related to the use of the controller, cache module, and external cache battery.

Document Title	**Part Number**
HSZ70 Array Controller HSOF Version 7.0 CLI Reference Manual	EK–CLI70–RM. A01
HSZ70 Array Controller HSOF Version 7.0 Configuration Manual	EK–HSZ70–CG. A01
HSZ70 Array Controller HSOF Version 7.0 Service Manual	EK–HSZ70–SV. A01
HSZ70 Family Array Controller Operating Software (HSOF) Version 7.0 Software Product Description	SPD *xx.xx*. 00
Getting Started–HSZ70 Solutions Software Version 7.0 for...*platform*	AA–R60*xx*–TE. A01
Polycenter Console Manager	See the *Getting Started* guide for the platform-specific order number
StorageWorks Array Controller HSZ70 Array Controller Operating Software HSOF Version 7.0 Release Notes	EK–HSZ70–RN. A01
StorageWorks Getting Started with Command Console, Version 2.0	AA–R0HJC–TE
DIGITAL StorageWorks Ultra SCSI RAID Cabinet Subsystem (SW600) Installation and User’s Guide	EK–SW600–UG
DIGITAL StorageWorks Ultra SCSI RAID Enclosure (BA370-Series) User’s Guide	EK–BA370–UG
The RAIDBOOK—A Source for RAID Technology	RAID Advisory Board

Revision History

This is a new document

CLI Overview

The command line interpreter (CLI) is one of the user interfaces through which you control your StorageWorks array controller in the StorageWorks subsystem. The CLI commands allow you to manage the subsystem by viewing and modifying the configuration of the controller and the devices attached to them. You can also use the CLI to start controller diagnostic and utility programs.

While the CLI provides the most detailed level of subsystem control, a graphical user interface (GUI) is available for use with the CLI. The GUI, named StorageWorks Command Console, replicates most of the functions available within the CLI in graphic form and provides a very user-friendly method of executing CLI commands.

CLI commands for configuring and viewing the controllers in a dual-redundant configuration use the relative terms “this controller” and “other controller.” See “Typographical Conventions,” page viii, for an explanation of these terms.

Using the CLI

You can access the CLI by connecting a maintenance terminal to the port in the front bezel of the controller (local connection) or by using HSZterm software (remote connection). See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for instructions explaining how to connect a local terminal to the controller. After you have initially configured the controller, making it visible to the host, you can perform all other configuration tasks through a remote connection.

The section entitled “Local-Connection Port Precautions,” page vii, explains precautions you should observe when operating the CLI through a local connection port.

Command Overview

The CLI consists of six basic command types:

- Controller Commands—Enable you to configure the controller’s SCSI ID numbers, maintenance terminal characteristics, CLI prompt, and so forth. Controller commands are also used to shut down and restart the controller.

- Device Commands—Enable you to create and configure containers made from physical devices attached to the controller.
- Storageset Commands—Enable you to create and configure complex containers made from groups of device containers. There are four basic types of storagesets: stripesets, RAIDsets, striped-mirrorsets, and mirrorsets. Storageset commands group device containers together and allow them to be handled as single units.
- Logical Unit Commands—Enable you to create and optimize access to logical units made from any container type.
- Failover Commands—Enable you to configure the controllers to operate in transparent or mulle bus failover while also providing support for dual-redundant configurations.
- Diagnostic and Utility Commands—Enable you to perform general controller support functions

Getting Help

Help on using the CLI is at your fingertips. For an overview of the CLI help system, enter “help” at the prompt. For help on a specific command or to determine what switches are available with a command, enter as much of the command as you know followed by a space and a question mark. For example, to get information on the switches used with the SET THIS_CONTROLLER command, enter:

SET THIS_CONTROLLER ?

See the HELP command on page -57 for further information.

Entering CLI Commands

Use the following tips and techniques when entering CLI commands:

- Commands are not case sensitive.
- For most commands, you only need to enter enough of the command to make the command unique (usually three characters). For example, SHO is the same as entering SHOW.
- The controller processes each command in sequence. You may continue entering subsequent commands while the controller is processing prior commands. A device experiencing heavy data input and output (I/O) may respond slowly to CLI commands.

Note Due to space limitations the length, some examples in this manual contain commands which exceed one line in length. In such instances, the paragraph proceeding the example will identify which command is continued on the next line.

Specific keys or a combination of keys allow you to recall and edit the last four commands. This feature can save time and help prevent mistakes when you need to enter similar commands during the configuration process. Table 1 lists the keys used to recall and edit commands.

Table 1 Recall and Edit Command Keys

Key	Function
Up Arrow or Ctrl/B, Down Arrow or Ctrl/N	Steps backward and forward through the four most recent CLI commands.
Left arrow or Ctrl/D, Right arrow or Ctrl/F	Moves the cursor left or right in a command line.
Ctrl/E	Moves the cursor to the end of the line.
Ctrl/H or Backspace	Moves the cursor to the beginning of the line.
Ctrl/J or Linefeed	Deletes the word to the left of the cursor.
Ctrl/U	Deletes all characters on the same line as the cursor.
Ctrl/A	Toggles between insert mode and overstrike mode. The default setting is insert mode, which allows you to insert characters at the cursor location, moving the existing characters to the right. Overstrike mode replaces existing characters. The CLI returns to insert mode at the beginning of each line.
Ctrl/R	Recalls the contents of the command line. This is especially helpful if the system issues a message interrupting your typing.

Unit Naming

The host operating system identifies the location of units based on a logical unit numbering (LUN) scheme.

Each unit number contains the following:

- The first character is a letter indicating the kind of device in the storage unit: use D for disk devices (including CD-ROMs) or P to indicate passthrough devices such as tape devices, loaders, and libraries.

Note A device letter is automatically supplied when you use the CFMENU utility to configure your storagesets and devices.

- If entered, the next one or two digits indicate which target ID number is to access the unit during normal operation. Use one of the controller's SCSI target ID numbers assigned to the controller with the SET *controller* ID= command. Omit leading zeroes for SCSI target ID numbers less than ten. For example, use 2 instead of 02 for a storageset being accessed through the controller SCSI target ID number 0, LUN 2. The SCSI target ID number is initially set with the SET THIS_CONTROLLER ID= or SET OTHER_CONTROLLER ID= command. See page -83 for an explanation of these commands.

  By carefully choosing the SCSI target ID number when adding units, the preferred paths for all of your storage units in a dual-redundant configuration can be established. Data I/O load to the units can likewise be controlled by equally distributing unit access between the controllers.

  If the target ID number is not entered, the unit is still brought online by whatever target ID number is specified in the ADD UNIT command.

Note When operating in multiple bus failover mode, settings specified with the PREFERRED_ID= switch takes priority over settings assigned with the SET *controller* ID= switch.

- The digit following the SCSI target ID number is always zero.
- The last digit identifies the logical unit number (LUN) for the device or storage unit. Acceptable LUN numbers are 0 through 7.

Table 2 Unit Numbering Examples

Unit Number	Device Type	Target ID Number	LUN
D1207	disk	12	7
D401	disk	4	1
D30	(not an acceptable unit number)		
D5	disk	0	5

When a container is partitioned, assign all partitions to the same controller target ID number.

Note The host communicates with a logical unit based on its LUN address. The controller communicates with a device based on its PTL address.

Command Syntax

Commands to the controller must use the following command structure:

Command *Parameter Switches*

- **Command.** A word or phrase expressed as a verb used to instruct the controller what to do. Every CLI command begins with a command. Commands are represented in this manual in capitalized form.
- **Parameter.** When required in the command, one or more a words or phrases entered to supply necessary information to support the action of the command. Not all CLI commands require parameters. Parameters are represented in this manual in capitalized form.
- **Switches.** An optional word or phrase which modifies the command. Not all CLI commands require switches. Switches are represented in this manual as capitalized, italicized text.

ADD CDROM

Names a CD-ROM device and adds it to the controller configuration.

Syntax

ADD CDROM *container-name SCSI-port-location*

Parameters

container-name
Assigns a name to the CD-ROM device. This is the same name used with the ADD UNIT command to create a single-disk unit.

The container name must start with a letter (A through Z) and may consist of a maximum of nine characters including letters A through Z, numbers 0 through 9, periods (.), dashes (-), or underscores (_).

SCSI-port-location
Indicates the PTL address of the CD-ROM used by the controller. See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for an explanation of the PTL addressing naming format.

Note See the *HSZ70 Array Controller HSOF Operating Software Version 7.0 Release Notes* to confirm the compact disc device you are planning to use is compatible with the controller.

Example

This example shows how to add a CD-ROM device named CD_PLAYER located at port 1, target 8, LUN 0:

```
ADD CDROM CD_PLAYER 1 8 0
```

See also

ADD UNIT
DELETE *container-name*
SHOW CDROM
SHOW DEVICES

ADD DISK

Names a disk drive and adds it to the controller's configuration.

Syntax

ADD DISK *container-name SCSI-port-location*

Parameters

container-name
Assigns a name to the disk device. This is the same name used with the ADD UNIT command to create a single-disk unit.

The container name must start with a letter (A through Z) and may consist of a maximum of nine characters including letters A through Z, numbers 0 through 9, periods (.), dashes (-), or underscores (_).

Tip It is common to name a disk drive DISK*ptl*, where *ptl* is the disk's Port-Target-LUN address. Although other naming conventions are certainly acceptable, this naming convention offers the advantage of presenting to the user both the type of disk drive and its SCSI location in an intuitive manner.

SCSI-port-location
Indicates the PTL address of the disk device. See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for an explanation of the PTL addressing naming format.

Note See the *HSZ70 Array Controller HSOF Operating Software Version 7.0 Release Notes* to confirm the disk drive you are planning to use is compatible with the controller.

Switches

NOTRANSPORTABLE (Default)
TRANSPORTABLE
Indicates whether a disk drive can be accessed exclusively by StorageWorks controllers.

If the NOTRANSPORTABLE switch is specified, the controller makes a small portion of a non-transportable disk inaccessible to the host. This restricted space is used to store information (metadata) used to improve data reliability, error detection, and the ability to recover data. Because of this metadata, only StorageWorks controllers can retrieve data from non-transportable devices. Disks used as storagesets cannot be set as being transportable.

Transportable disk drives do not contain any metadata or restricted areas on them. Therefore, transportable disks forfeit the advantage metadata provides. However, transportable disks can be moved to a non-StorageWorks environment with their data intact.

If the NOTRANSPORTABLE switch is specified and there is no metadata on the unit, the unit must be initialized.

Note DIGITAL recommends you avoid making a disk transportable unless it is imperative and there is no other way to accomplish moving the data.

TRANSFER_RATE_REQUESTED=ASYNCHRONOUS
TRANSFER_RATE_REQUESTED=20MHZ (Default)
TRANSFER_RATE_REQUESTED=10MHZ
TRANSFER_RATE_REQUESTED=5MHZ
Specifies the maximum data transfer rate at which the controller is to communicate with the disk drive. The transfer rate may need to be limited to accommodate long cables between the controllers and the device, such as with a tape library.

Examples

This example shows how to add DISK10000 at port 1, target 0, LUN 0:

```
ADD DISK DISK10000 1 0 0
```

This example shows how to add DISK40200 as a transportable disk drive to port 4, target 2, LUN 0.

```
ADD DISK DISK40200 4 2 0 TRANSPORTABLE
```

This example shows how to:

- Add a disk drive named DISK30200 as non-transportable device to port 3, target 2, LUN 0
- Set the data transfer rate to 10 MHz.

Enter the following command on one line.

```
ADD DISK DISK30200 3 2 0 NOTRANSPORTABLE
TRANSFER_RATE_REQUESTED=10MHZ
```

See also

ADD MIRRORSET
ADD UNIT
DELETE *container-name*
LOCATE
SHOW DISKS
SHOW DEVICES
SET *container-name*

ADD MIRRORSET

Names a mirrorset and adds it to the controller configuration.

Syntax

ADD MIRRORSET *mirrorset-name disk-name1 [disk-nameN]*

Parameters

mirrorset-name

Assigns a name to the mirrorset. This is the same name used with the ADD UNIT command to identify the mirrorset as a host-addressable unit.

The mirrorset name must start with a letter (A through Z) and may consist of a maximum of nine characters including letters A through Z, numbers 0 through 9, periods (.), dashes (-), or underscores (_).

Tip It is common to name a mirrorset MIRR*n*, where *n* is a sequentially assigned, unique identifier. Other naming conventions are acceptable, but this naming convention presents both the type of container and its unique identifier in an intuitive manner.

---

disk-name1 [disk-nameN

Identifies the disk drives making up the mirrorset. A mirrorset may contain one to six disk drives.

Switches

COPY=FAST

COPY=NORMAL (Default)

Sets the speed at which the controller copies data from normal mirrorset members to a new member or members when data is being mirrored to the storagesets disk drives.

Specify COPY=FAST when you want the creation of mirrored data is to take priority over other controller operations. When COPY=FAST is specified, the controller uses more resources to create the mirrored data. Copying takes less time. However, overall controller performance is reduced.

Specify COPY=NORMAL when operations performed by the other controller should take priority over the copy operation. When COPY=NORMAL is specified, the controller uses relatively few resources when creating the mirrored data, resulting in minimal impact on performance.

POLICY=BEST_FIT
POLICY=BEST_PERFORMANCE (Default)
NOPOLICY
Sets the selection criteria the controller uses to choose a replacement member from the spareset when a mirrorset member fails.

Specify POLICY=BEST_FIT to choose a replacement disk drive from the spareset most closely matching the capacity of the mirrorset. If there is more than one disk drive in the spareset most closely matching the capacity of the mirrorset, the controller selects the disk drive having the best performance.

Specify POLICY=BEST_PERFORMANCE to choose a replacement disk drive from the spareset having the best performance. The controller attempts to select a disk on a different port than existing mirrorset members. If there is more than one disk drive in the spareset matching the best performance criteria, the controller selects the disk drive most closely matching the capacity of the mirrorset.

Specify NOPOLICY to prevent the controller from automatically replacing a failed disk device. The mirrorset operates in a reduced state until a POLICY=BEST_FIT or POLICY=BEST_PERFORMANCE is selected, or a member is manually replaced in the mirrorset (see “SET,” page 103).

READ_SOURCE=disk-name
READ_SOURCE=LEAST_BUSY (Default)
READ_SOURCE=ROUND_ROBIN
Selects the mirrorset member used by the controller to satisfy a read request.

Specify the READ_SOURCE=*disk-name* of a specific member to which you want the controller to direct all read requests. If the member fails out of the mirrorset, the controller selects the first normal member it finds to satisfy its read requests.

Specify READ_SOURCE=LEAST_BUSY to direct read requests to the mirrorset member with the least amount of work in its queue.

Specify READ_SOURCE=ROUND_ROBIN to sequentially direct read requests to each mirrorset member. The controller equally queries all normal members for each read request.

Examples

This example shows how to add DISK10000, DISK20100, and DISK30200 as a mirrorset with the name MIRR1:

```
ADD DISK DISK10000 1 0 0
ADD DISK DISK20100 2 1 0
ADD DISK DISK30200 3 2 0
ADD MIRRORSET MIRR1 DISK10000 DISK20100 DISK30200
```

This example creates a host-addressable unit after the mirrorset MIRR1 has been created:

```
INITIALIZE MIRR1
ADD UNIT D305 MIRR1
```

See also

ADD DISK
ADD UNIT
DELETE *container-name*
INITIALIZE
MIRROR
REDUCE
SHOW *mirrorset-name*
SHOW MIRRORSETS
SHOW STORAGESETS
UNMIRROR

ADD PASSTHROUGH

Creates a passthrough container. A passthrough container bypasses controller processing and allows the host to have direct access to the device. A passthrough device appears as if it were connected directly to the host bus rather than to the controller. Use passthrough containers to communicate with tape devices and tape loaders because they do not require the controller for optimum operation performance.

Syntax

ADD PASSTHROUGH *passthrough-name SCSI-port-location*

Parameter

passthrough-name

Names the device being added to or changed in a subsystem configuration. This is the same name used with the ADD UNIT command to create a host-addressable unit. You may want to use a name indicating the type of device is being added as a passthrough container, such as TAPE or LOADER.

The container name must start with a letter (A through Z) and may consist of a maximum of nine characters including letters A through Z, numbers 0 through 9, periods (.), dashes (-), or underscores (_).

Tip It is common to name a tape passthrough device TAPE*ptl*, where *ptl* is the tape's Port-Target-LUN address. Although other naming conventions are acceptable, this naming convention offers the advantage of presenting to the user both the type of device and its SCSI location in an intuitive manner.

SCSI-port-location

Indicates the PTL address of the passthrough device. See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for an explanation of the PTL addressing naming format.

Note See the *HSZ70 Array Controller HSOF Operating Software Version 7.0 Release Notes* to confirm the passthrough device you are planning to use is compatible with the controller.

Switches

TRANSFER_RATE_REQUESTED=ASYNCHRONOUS
TRANSFER_RATE_REQUESTED=20MHZ (Default)
TRANSFER_RATE_REQUESTED=10MHZ
TRANSFER_RATE_REQUESTED=5MHZ
Specifies the maximum data transfer rate for the controller to use in communicating with the device. For example, the transfer rate may need to be limited to accommodate long cables between the controller and the device, such as with a tape library. The transfer rate is negotiated immediately and does not require a restart in order to take effect.

Example

This example shows how to add tape device TAPE20300 at port 2, target 3, LUN 0:

```
ADD PASSTHROUGH TAPE20300 2 3 0
ADD UNIT P100 TAPE20300
```

See also

ADD UNIT
DELETE *container-name*
SHOW DEVICES
SHOW PASSTHROUGH
SHOW *passthrough-name*

ADD RAIDSET

Names a RAIDset and adds the RAIDset to the controller's configuration. DIGITAL RAIDsets are often referred to as RAID level 3/5 storagesets because they use the best characteristics of RAID level 3 and RAID level 5. The number of members in the storageset is determined by the number of containers specified by the *container-name* parameter in the command. The data capacity of the RAIDset is determined by the storage size of the smallest member.

Syntax

ADD RAIDSET *RAIDset-name container-name1 container-name2 container-name3 [container-nameN]*

Parameters

RAIDset-name

Assigns a name to the RAIDset. This name is also used with the ADD UNIT command to identify the RAIDset as a host-addressable unit.

The container name must start with a letter (A through Z) and may consist of a maximum of nine characters including letters A through Z, numbers 0 through 9, periods (.), dashes (-), or underscores (_).

Tip It is common to name a RAIDset RAID*n*, where *n* is a sequentially assigned, unique identifier. This naming convention presents to the user both the type of container and its unique identifier in an intuitive manner.

---

container-name1 container-name2 container-name3 [container-nameN]

Specifies the disks making up the RAIDset.

Switches

POLICY=BEST_FIT
POLICY=BEST_PERFORMANCE (Default)
NOPOLICY

Switches set the selection criteria the controller uses to choose a replacement member from the spareset when a RAIDset member fails.

Specify POLICY=BEST_FIT to choose a replacement disk drive from the spareset most closely matching the sizes of the remaining members of the RAIDset. If more than one disk drive in the spareset is the correct size, the controller selects the disk drive giving the best performance.

Specify POLICY=BEST_PERFORMANCE to choose a replacement disk drive from the spareset resulting in the best performance of the RAIDset. The controller attempts to select a disk on a different port than existing RAIDset members. If there is more than one disk drive in the spareset matching the best performance criteria, the controller selects the disk drive most closely matching the size of the remaining members of the RAIDset selected.

Specify NOPOLICY to prevent the controller from automatically replacing a failed disk device. This causes the RAIDset to operate in a reduced state until a POLICY=BEST_FIT or POLICY=BEST_PERFORMANCE is selected, or a member is manually replaced in the mirrorset. See the “SET,” page 113, for more information regarding this procedure.

RECONSTRUCT=FAST
RECONSTRUCT=NORMAL (Default)
Sets the speed at which the controller reconstructs data to a new RAIDset member replacing a the failed member.

Specify NORMAL to balance other controller operations with the reconstruct operation. The controller uses relatively few resources to perform the reconstruct process. Thus, there is little impact on performance.

Specify FAST to allow the reconstruct process to take precedence over other controller operations. When the RECONSTRUCT=FAST switch is specified, the controller uses more resources to perform the reconstruction. Reconstruction takes less time, but overall controller performance is reduced during reconstruction.

REDUCED
NOREDUCED (Default)
Switches permit the addition of a RAIDset missing a member. Specify the REDUCED switch when you add a RAIDset missing a member. Specify the NOREDUCED switch when all RAIDset members making

up the RAIDset are present—for instance, when creating a new RAIDset.

Verify the RAIDset contains at least two disk drives before specifying the REDUCED switch.

Examples

This example shows how to create a RAIDset named RAID9 containing disks DISK10000, DISK20100, and DISK30200.

```
ADD DISK DISK10000 1 0 0
ADD DISK DISK20100 2 1 0
ADD DISK DISK30200 3 2 0
ADD RAIDSET RAID9 DISK10000 DISK20100 DISK30200
```

This example shows how to create a RAIDset named RAID8 containing disks DISK10000, DISK20100, and DISK30200, and uses the BEST_FIT switch to indicate the replacement policy. Enter the ADD RAIDSET command on one line.

```
ADD DISK DISK10000 1 0 0
ADD DISK DISK20100 2 1 0
ADD DISK DISK30200 3 2 0
ADD RAIDSET RAID8 DISK10000 DISK20100 DISK30200
POLICY=BEST_FIT
```

This example creates RAIDset named RAID8, and then creates a host-addressable unit.
INITIALIZE RAID8
ADD UNIT D304 RAID8

This example shows how you can create a three-member RAIDset from the members of an already reduced four-member RAIDset. Do not initialize the RAIDset again because it was initialized when it was added.

Caution Data contained on the RAIDset is erased if you reinitialize the RAIDset.

```
ADD DISK DISK10300 1 3 0
ADD DISK DISK20400 2 4 0
ADD DISK DISK30500 3 5 0
ADD RAIDSET RAID6 DISK10300 DISK20400 DISK30500 REDUCED
```

See also

ADD UNIT
DELETE *container-name*
SET RAIDSET
SHOW RAIDSET
SHOW *RAIDset-name*
SHOW STORAGESETS
INITITALIZE

ADD SPARESET

Adds a disk drive to the spareset and initializes the metadata on it.

Syntax

ADD SPARESET *disk-name*

Parameter

disk-name

Indicates the name of the disk drive being added to the spareset. Only one disk drive can be added to the spareset with each ADD SPARESET command.

Example

This example shows how to add a disk drive named DISK20200 and DISK30300 to a spareset:

```
ADD DISK DISK20200 2 2 0
ADD DISK DISK30300 3 3 0
ADD SPARESET DISK20200
ADD SPARESET DISK30300
```

See also

DELETE SPARESET
SET FAILEDSET
SHOW SPARESET
SHOW STORAGESETS

ADD STRIPESET

Names a stripeset and adds it to the controller configuration. Stripesets sometimes referred to as RAID level 0 storagesets. The number of members in the stripeset is determined by the number of *container-name* parameters specified. Specified at least two disk drives for RAIDsets.

Syntax

ADD STRIPESET *stripeset-name container-name1 container-name2 [container-nameN]*

Parameters

stripeset-name
Assigns a name to the stripeset. This is the same name used with the ADD UNIT command to identify the stripeset as a host-addressable unit.

container-name1 container-name2 [container-nameN]
Indicates the name of name of the disk drive being added to or changed in a subsystem configuration. This is the same name used with the ADD UNIT command to create a host-addressable unit.

The container name must start with a letter (A through Z) and may consist of a maximum of nine characters including letters A through Z, numbers 0 through 9, periods (.), dashes (-), or underscores (_).

Tip It is common to name a stripeset STRIPE*n*, where n is a sequentially assigned, unique identifier. This naming convention presents to the user both the type of container and its unique identifier in an intuitive manner.

---

container-name1 container-name2 [container-nameN]
Identifies the disk drives or mirrorsets making up the stripeset.

Examples

This example shows how to create a stripeset named STRIPE1 with three disks: DISK10000, DISK20100, and DISK30200:

```
ADD DISK DISK10000 1 0 0
ADD DISK DISK20100 2 1 0
ADD DISK DISK30200 3 2 0
ADD STRIPESET STRIPE1 DISK10000 DISK20100 DISK30200
```

This example show how to create a stripeset named STRIPE1 and then create a logical unit from it:

```
INITIALIZE STRIPE1
ADD UNIT D403 STRIPE1
```

This example shows how to create a two-member striped mirrorset (a stripeset whose members are mirrorsets), and how to create a logical unit from it. Because you can initialize the stripeset, you do not need to individually initialize the mirrorsets.

```
ADD DISK DISK10000 1 0 0
ADD DISK DISK20100 2 1 0
ADD DISK DISK30200 3 2 0
ADD DISK DISK40300 4 3 0
ADD MIRRORSET MR1 DISK10000 DISK20100
ADD MIRRORSET MR2 DISK30200 DISK40300
ADD STRIPESET STRIPE1 MR1 MR2
INITIALIZE STRIPE1
ADD UNIT D304 STRIPE1
```

See also

ADD UNIT
ADD MIRRORSET
DELETE *container-name*
INITIALIZE
SHOW STORAGESET
SHOW STRIPESET
SHOW *stripeset-name*

ADD UNIT

Creates a logical unit from a device, container, or partition. The controller maps all requests from the host to the logical-unit number as requests to the container specified in the ADD UNIT command.

Initialize the disk drive or storageset container before adding it as a logical unit.

Syntax

ADD UNIT *unit-number container-name*

Parameters

unit-number
Assigns a number to the unit being created from a device, container, or partition in the subsystem. The host uses this number to indicate the source or target for every I/O request it sends to the controller. The *unit-number* is a host-addressable LUN.

container-name
Specifies the name of the container (that is, disk drive, device, storageset, or partition) being used to create the unit.

The maximum of 32 devices are allowed in each unit.

Switches

Table 3 lists all switches for the ADD UNIT command and identifies which switches may be used with each type of device or storageset. Descriptions of each switch follow the table.

Table 3 ADD UNIT Switches for New Containers

Container Type / **Switch**	ACCESS_ID=ALL	PARTITION=partition-number	MAXIMUM_CACHED_	PREFERRED_PATH	READ_CACHE	RUN	WRITE_PROTECT	WRITEBACK_CACHE
RAIDset	✓	✓	✓	✓	✓	✓	✓	✓
Stripeset	✓	✓	✓	✓	✓	✓	✓	✓
Mirrorset	✓	✓	✓	✓	✓	✓	✓	✓
Non-Transportable Disk	✓	✓	✓	✓	✓	✓	✓	✓
Transportable Disk	✓	✓	✓	✓	✓	✓	✓	
CD-ROM	✓	✓	✓	✓	✓	✓		
Partition	✓	✓	✓	✓	✓		✓	✓
Passthrough				✓				

Note Regardless of the storageset type, the RUN and NORUN switches cannot be specified for partitioned units.

ACCESS_ID=ALL (Default)
ACCESS_ID=unit identification
Grants exclusive unit access privileges to the host. The access ID number must be set to the initiator SCSI ID number used by the host to

communicate with the controller. When a specific ID number is assigned, only the initiator' target ID number specified is permitted to read from or write to the unit. When set to ALL, any host may access the unit.

Units added as passthrough LUNs do not accept ACCESS_ID numbers. The ACCESS_ID switch for passthrough LUNs is set to ALL by default.

PARTITION=partition_number
Identifies the unit number for a partition on a container. The *partition-number* identifies the partition associated with the unit number being added. Use the SHOW *container-name* command to find the partition numbers used by a storageset or a single-disk unit.

Note Partitions must be have the same target ID number and must be part of the same container.

MAXIMUM_CACHED_TRANSFER=32 (Default)
MAXIMUM_CACHED_TRANSFER=n
Sets the largest number of write blocks to be cached by the controller. The controller will not cache any transfers over the set size. Accepted write block sizes are 1 through 1024.

PREFERRED_PATH=OTHER_CONTROLLER
PREFERRED_PATH=THIS_CONTROLLER
NOPREFERRED_PATH (Default)
May be set only when dual-redundant controllers are operating in a multiple bus failover configuration. In a multiple bus failover configuration, the host determines which controller the units are accessed through. The host's unit-to-controller settings always take precedence over the preferred path assigned to units with this switch. The target ID numbers assigned with the SET *controller* ID= command determines which target ID number the controller uses to respond to the host.

Note If your controller are configured to operate in transparent-failover mode, do not set the PREFERRED_PATH switch with the ADD UNIT or SET *unit-number* command—otherwise, an error message is displayed. The error message indicates the assignment of a preferred controller path at the unit level is valid only when operating in multiple bus failover mode.

When no preferred path is assigned, the unit is targeted through the controller which detects the unit first after the controllers start.

Select PREFERRED_PATH=THIS_CONTROLLER to instruct “this controller” to bring the units online.

Select PREFERRED_PATH=OTHER_CONTROLLER to instruct the “other controller” to bring the units online.

See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for information regarding multiple bus failover.

Tip Subsystem performance is better if target ID numbers are balanced across the dual-redundant pair.

READ_CACHE (Default)
NOREAD_CACHE
Switches are used to set the controller’s cache read policy function.

Read caching improves performance in almost all situations. Therefore, it is recommended you leave its default setting READ_CACHE enabled. However, under certain conditions, such as when performing a backup, read caching may not be necessary since only a small amount of data is cached. In such instances, it may be beneficial to disable the read cache function and remove the processing overhead associated with caching data.

RUN (Default)
NORUN
Controls the unit's availability to the host.

Specify RUN to make a unit available to the host.

Specify NORUN to make a unit unavailable to the host and to cause any data in cache to be flushed to one or more drives. NORUN spins down the devices used in the unit. The drives making up the unit spin down after the data has been completely flushed.

Note Do not specify the RUN and NORUN switches for partitions.

WRITE_PROTECT
NOWRITE_PROTECT (Default)
Instructs the controller whether data contained on the unit can be overwritten.

Specify WRITE_PROTECT to prevent the host from writing data to the unit. However, the controller may still write to a write-protected RAIDset to complete a reconstruct operation. However, metadata, reconstruct data, and copy data is still written to RAIDsets and mirrorsets.

Specify NOWRITE_PROTECT to allow the host to write data to the unit. This allows the controller to overwrite existing data.

WRITEBACK_CACHE
NOWRITEBACK_CACHE (Default)
Enable or disable the write-back data caching function of the controller. The controller's write-back caching feature improves write performance.

Specify WRITEBACK_CACHE for all new units you want to take advantage of the controller's write-back caching feature.

Specify NOWRITEBACK_CACHE for units you want to receive data directly from the host without being cached.

Caution Though there is built-in redundancy to protect data contained in cache, allowing data to be written to write-back cache may result in the loss of data if a catastrophic subsystem failure occur.

Examples

This example shows how to create unit D102 from a single-disk drive named DISK10000 and sets host's access to the unit through "this controller":

```
ADD DISK DISK10000 1 0 0
INITIALIZE DISK10000
ADD UNIT D102 DISK10000 PREFERRED_PATH=THIS_CONTROLLER
```

This example shows how to create unit D107 from a RAIDset named RAID9 and instructs the unit to take advantage of the controller's write-back caching feature.

```
ADD DISK DISK10100 1 1 0
ADD DISK DISK20100 2 1 0
ADD DISK DISK30100 3 1 0
ADD DISK DISK40100 4 1 0
ADD RAIDSET RAID9 DISK10100 DISK20100 DISK30100 DISK40100
INITIALIZE RAID9
ADD UNIT D107 RAID9 WRITEBACK_CACHE
```

See also

CREATE_PARTITION
DELETE *unit-number*
SET *unit-number*
SHOW UNITS

CLEAR_ERRORS CLI

Stops the display of current or previous error messages at the CLI prompt. This command does not clear the error conditions, it only stops the display of errors at the CLI prompt.

After the cause of the error condition has been corrected, issue the CLEAR_ERRORS CLI command to clear the error message.

Enter this command to clear errors existing from previous error conditions.

Syntax

CLEAR_ERRORS CLI

Example

This example shows how to clear the message “All NVPM components initialized to their default settings” from the CLI prompt:

```
ALL NVPM COMPONENTS INITIALIZED TO THEIR DEFAULT SETTINGS
CLEAR_ERRORS CLI
```

See also

CLEAR_ERRORS INVALID_CACHE
CLEAR_ERRORS LOST_DATA
CLEAR_ERRORS UNKNOWN
CLEAR_ERRORS UNWRITEABLE_DATA

CLEAR_ERRORS *controller* INVALID_CACHE

Clears an invalid cache error and allows the controller and cache to resume operation. If the error is due to an incorrectly mirrored configuration, the controller indicates mirrored mode status after the error is cleared.

Use this command for the following situations:

- When the controller or cache modules have been replaced, resulting in mismatched data between the controllers.
- When the controller or cache module is replaced while data is still in cache and not properly flushed with the SHUTDOWN or SET NOFAILOVER COPY= commands.

Syntax

CLEAR_ERRORS *controller* INVALID_CACHE

Completely spell out the phrase INVALID_CACHE.

Parameters

controller

Identifies which controller is to receive the CLEAR_ERRORS command. You must specify THIS_CONTROLLER or OTHER_CONTROLLER.

data-retention-policy
DESTROY_UNFLUSHED_DATA
NODESTROY_UNFLUSHED_DATA (Default)

Instructs the controller how to handle write-back cached data. Specify NODESTROY_UNFLUSHED_DATA (default) to retain the cached data and discard controller information. Specify DESTROY_UNFLUSHED_DATA to retain the controller information and discard the cached data.

Specify NODESTROY_UNFLUSHED_DATA in the following situations:

- If the controller module has been replaced
- If the controller's nonvolatile memory (NVMEM) has lost its contents, possibly from an NVMEM battery failure

Specify DESTROY_UNFLUSHED_DATA in the following situations:

- If the cache module has been replaced
- Any other reason not listed above

Caution Specifying the DESTROY_UNFLUSHED_DATA switch destroys data remaining in cache, which can result in the possible loss of data.

Examples

This example shows how to clear an invalid cache error on “this controller” after you have replaced a controller module. Enter the command on one line.

CLEAR_ERRORS THIS_CONTROLLER INVALID_CACHE NODESTROY_UNFLUSHED_DATA

This example shows how to clear an invalid cache error on the “other controller” after a cache module has been replaced. Enter this command on the same line. Enter the command on one line.

CLEAR_ERRORS OTHER_CONTROLLER INVALID_CACHE DESTROY_UNFLUSHED_DATA

See also

CLEAR_ERRORS CLI
CLEAR_ERRORS LOST_DATA
CLEAR_ERRORS UNKNOWN
CLEAR_ERRORS UNWRITEABLE_DATA

CLEAR_ERRORS *unit-number* LOST_DATA

Clears lost data errors on a unit and All partitions on the unit's container are effected.

The controller reports a lost data error on the unit when you remove a write-back cache module or when the cache module contains unflushed data, possibly due to an interruption in the primary power source with no backup power present. The CLEAR_ERRORS LOST_DATA command clears the lost data error but does not recover the lost data.

Note Clearing lost data errors or lost data block errors on a RAIDset causes a reconstruction of all parity blocks. Clearing lost data errors or lost data block errors on a mirrorset causes members to normalize.

Syntax

CLEAR_ERRORS *unit-number* LOST_DATA

Completely spell out the phrase LOST_DATA.

Caution This command may cause data loss.

Parameters

unit-number

Identifies the unit on which the lost data error is to be cleared. The *unit-number* is the same name given to the unit when you added it to the controller's configuration.

Example

This example shows how to clear the lost data error on disk unit number D103:

```
CLEAR_ERRORS D103 LOST_DATA
```

See also

CLEAR_ERRORS CLI
CLEAR_ERRORS INVALID_CACHE
CLEAR_ERRORS UNKNOWN
CLEAR_ERRORS UNWRITEABLE_DATA

CLEAR_ERRORS UNKNOWN

Clears unknown errors from a device the controller identifies as unknown or not correctly configured.

If a device failure causes the controller to label the device as unknown, the controller does not check the device again to see if it has been repaired or if the error condition has been corrected. You must enter this command so the controller can recognize the device after the cause of the error has been corrected.

Use this command to force the controller to recognize a failed device, regardless of the controller's prior evaluation of the device's condition.

Syntax

CLEAR_ERRORS *device-name* UNKNOWN

The word UNKNOWN must be completely spelled out.

Parameters

device-name
Identifies the device with the unknown error.

Example

This example shows how to force the controller to recognize a previously unknown device named DISK30000:

```
CLEAR_ERRORS DISK30000 UNKNOWN
```

See also

CLEAR_ERRORS CLI
CLEAR_ERRORS INVALID_CACHE
CLEAR_ERRORS UNKNOWN
CLEAR_ERRORS UNWRITEABLE_DATA

CLEAR_ERRORS *unit-numbe*r UNWRITEABLE_DATA

This command clears an unwriteable data error on a unit.

This command affects all partitions on the same container.

If a storageset or disk drive fails before its data has been written to the it, the controller reports an unwriteable data error. The CLEAR_ERRORS UNWRITEABLE_DATA command removes the data from the cache and clears the unwriteable data error.

Caution This command causes the data loss.

Syntax

CLEAR_ERRORS *unit-number* UNWRITEABLE_DATA

Completely spell out the phrase UNWRITEABLE_DATA.

Parameters

unit-number

Identifies the unit having the unwriteable data error. The *unit-number* is the name given to the unit when it was created with the ADD UNIT command.

Example

This example shows how to clear the unwriteable data error on disk unit D103:

CLEAR_ERRORS D103 UNWRITEABLE_DATA

See also

CLEAR_ERRORS CLI
CLEAR_ERRORS INVALID_CACHE
CLEAR_ERRORS LOST_DATA
CLEAR_ERRORS UNKNOWN
RETRY_ERRORS UNWRITEABLE_DATA

CREATE_PARTITION

This command divides a non-transportable disk drive or single-disk storageset into several, separately addressable storage units. The command marks a specified percentage of a disk drive or storageset to be used as a separately addressable unit. You an divide any nontransportable disk into a maximum of eight partitions. Each partition can be separately presented to the host. Partitions are not supported in multiple bus failover mode. Initialize disks and storagesets before creating partitions.

Note Partitioned storagesets partitioned single-disk units cannot function in multiple bus failover dual-redundant configurations. Because they are not supported, you must delete your partitions before configuring the controllers for multiple bus failover.

After you partition a container, you must initialize it before destroying the partitions.

Syntax

CREATE_PARTITION *container-name SIZE=percent*

Parameters

container-name

Identifies the disk or storageset to partition. This is the same name given to the disk or storageset when it was created with the ADD command (for example, ADD DISK, ADD STRIPESET, and so forth). Any disk, stripeset, mirrorset, striped mirrorset, or RAIDset can be partitioned. A transportable disk cannot be partitioned. You must initialize the container before creating a partition.

SIZE=percent
SIZE=LARGEST

Specifies the size of the partition to be created as a percentage of the total container's storageset size.

To create a partition, specify a percentage of the container's total capacity. The entire container is then divided into segments equal to the percentage specified. For example, if SIZE-20, the container is divided into five (1.0/0.2=5) equal segments. The resulting partition is slightly smaller than the size specified because metadata also accompanies each partition.

Specify LARGEST in the following situations:

- To have the controller create the largest partition possible from unused space on the disk or storageset.
- To create the last partition on a container. Because the remaining space is not equal to an exact percentage value, specifying LARGEST allows you to optimize use of the remaining space.

Example

This example shows how to create a RAIDset named RAID9 and divide it into four equal parts. It also creates host-addressable units for each partition:

```
ADD DISK DISK10000 1 0 0
ADD DISK DISK20100 2 1 0
ADD DISK DISK30200 3 2 0
ADD RAIDSET RAID9 DISK10000 DISK20100 DISK30200
INITIALIZE RAID9
CREATE_PARTITION RAID9 SIZE=25
CREATE_PARTITION RAID9 SIZE=25
CREATE_PARTITION RAID9 SIZE=25
CREATE_PARTITOIN RAID9 SIZE=LARGEST
ADD UNIT D101 RAID9 PARTITION=1
ADD UNIT D102 RAID9 PARTITION=2
ADD UNIT D103 RAID9 PARTITION=3
ADD UNIT D104 RAID9 PARTITION=4
```

See also

ADD UNIT
DELETE *unit-number*
DESTROY PARTITION
SHOW

DELETE *container-name*

Deletes a container from the controller's configuration. You cannot delete a container in use by a higher-level container. For example, you cannot delete a disk belonging to a member of a RAIDset, or a RAIDset being declared as a unit; you must first delete the higher-level container or containers.

Note This command does not delete spareset or failedsets. Spareset and failedset containers cannot be deleted.

When a container is deleted, the individual disks are free to be used by another container. If the container is again created with the exact same disk configuration, and none of the disks have been used for anything, then the container can be reassembled using its original disks.

Syntax

DELETE *container-name*

Parameters

container-name

Identifies the container to be deleted. This is the name given to the container when it was created using the ADD command (for example, ADD DISK, ADD STRIPESET, and so forth).

Examples

This example shows how to delete a disk drive named DISK10000:

DELETE DISK10000

This example shows how to delete a stripeset named STRIPE1:

DELETE STRIPE1

This example shows how to delete a RAIDset named RAID9:

DELETE RAID9

See also

DELETE FAILEDSET
DELETE SPARESET
UNMIRROR

DELETE FAILEDSET

Removes a disk drive from the failedset. The failedset contains disk drives removed by the controller from RAIDsets and mirrorsets because they failed or were manually removed using the SET command. Enter the DELETE FAILEDSET command before removing failed members from the storage shelf for testing, repair, or replacement.

Regard disk drives in the failedset defective. Repair or replace defective disk devices.

Syntax

DELETE FAILEDSET *disk-name*

Parameter

disk-name

Identifies the disk you want to delete from the failedset. Remove only one disk at a time from a failedset.

Example

This example shows how to delete DISK20200 from the failedset:

DELETE FAILEDSET DISK20200

See also

SET FAILEDSET

SHOW FAILEDSET

DELETE SPARESET

Removes a disk drive from the spareset.

Syntax

DELETE SPARESET *disk-name*

Parameter

disk-name

Identifies the disk drive being deleted from the spareset. Remove only one disk at a time from a spareset.

Example

This example shows how to remove DISK20300 from the spareset:

```
DELETE SPARESET DISK20300
```

See also

ADD SPARESET
SHOW SPARESET

DELETE *unit-number*

Deletes a logical unit from the controller configuration. The host cannot address deleted units, deleted devices, storagesets, or partitions. If the controller's write-back caching feature is enabled, the controller flushes the cached data to the unit's devices before deleting the unit.

Before using the DELETE *unit-number* command, clear any errors with the CLEAR_ERRORS UNWRITEABLE_DATA or CLEAR_ERRORS LOST_DATA commands.

Syntax

DELETE *unit-number*

Parameter

unit-number

Identifies the unit number to be deleted. The *unit-number* is the same name given to the unit when it was created using the ADD UNIT command.

Example

This example shows how to delete disk unit number D103:

```
DELETE D103
```

See also

ADD UNIT
CLEAR_ERRORS LOST_DATA
CLEAR_ERRORS UNWRITEABLE_DATA
DESTROY_PARTITION

DESTROY_PARTITION

Labels a reserved partition as available. The partition is then consolidated with any adjacent available partitions.

Caution Data contained on a partition is lost when you enter the DESTROY_PARTITION command.

You cannot destroy a partition that has been assigned a unit number. First enter the DELETE *unit-number* command to delete the unit using the partition.

Syntax

DESTROY_PARTITION *container-name* PARTITION=*partition-number*

Parameters

container-name
Identifies the disk or storageset containing the partition to be destroyed. This is the name given to the container when it was created using the ADD command (for example, ADD DISK, ADD STRIPESET, and so forth).

partition-number
Identifies the partition to be destroyed. Use the SHOW *container-name* command to identify the correct partition before carrying out the DESTROY_PARTITION command.

Example

This example shows how to delete the unit for partition 2 on RAIDset RAID9 and destroy the partition:

```
DELETE D102
DESTROY_PARTITION RAID9 PARTITION=2
```

See also

CREATE_PARTITION
DELETE *unit-number*
SHOW

DIRECTORY

Lists the diagnostics and utilities available on “this controller.”

Syntax

DIRECTORY

Example

This example shows how to display a directory listing:

DIRECTORY

```
HSUTILV70Z   D
FRUTILV70Z   D
CFMENUV70Z   D
CHVSN V70Z   D
CLCP  V70Z   D
CLONE V70Z   D
CONFIGV70Z   D
DILX  V70Z   D
DIRECTV70Z   D
DSTAT V70Z   D
FMU   V70Z   D
VTDPY V70Z   D
```

Note CHVSN and DSTAT are not user utilities. They may be used by DIGITAL authorized service personnel only.

See also

RUN

HELP

Displays a brief explanation of how to use the question mark (?) to obtain help on any command or CLI function. You must precede the question mark with a space.

Syntax

HELP

Example

This example shows how to display information regarding the HELP command:

HELP

```
Help may be requested by typing a question mark (?) at the CLI prompt. This
will print a list of all available commands For further information you may enter
a partial command and type a space followed by a (?) to print a list of all
available options at that point in the command. For example:

                      SET THIS_CONTROLLER ?

Prints a list of all legal SET THIS_CONTROLLER commands
```

This example shows how to get help on the SET command using the question mark (?):

SET ?

```
Your options are:
   EMU
   FAILOVER
   NOFAILOVER
   MULTIBUS_FAILOVER
   NOMULTIBUS_FAILOVER
   OTHER_CONTROLLER
   THIS_CONTROLLER
   LOG
   FAILEDSET
   Unit number or mirrorset or raidset or device name
```

INITIALIZE

Initializes a container—thus, allowing a logical unit can be associated with it. During initialization, a small amount of disk space is reserved for controller metadata and is made inaccessible to the host. Disks made transportable do not contain controller metadata.

Syntax

INITIALIZE *container-name*

Caution The INITIALIZE command destroys all user data on the container unless you enter the NODESTROY switch.

If you make a single-disk container transportable, any metadata contained on the disk is destroyed and the entire disk drive is accessible by the host.

Use the INITIALIZE command when:

- Creating a unit from a newly installed disk
- Creating a unit from a newly created RAIDset, stripeset, or mirrorset
- Initializing the data structure of a previously partitioned container

Do not use the INITIALIZE command when:

- Creating a unit from the same disks previously initialized, such as when a RAIDset is moved
- Creating a storageset from deleted members
- Adding a RAIDset with the REDUCED switch

Parameters

container-name
Specifies the container to initialize. This is the same name given to the disk or storageset when it was created using the ADD command (for example, ADD DISK, ADD STRIPESET, and so forth).

Switches

CHUNKSIZE=DEFAULT (Default)
CHUNKSIZE=n
Specifies the block chunk size to be used for RAIDsets and stripesets. You can specify the chunk block size by entering CHUNKSIZE=*n*, or allow the controller to determine the optimal chunk block size by entering CHUNKSIZE=DEFAULT. The CHUNKSIZE switch does not apply to mirrorsets.

The default chunk size for storagesets with less than nine members is 256 blocks, or 128 kilobytes (K). The default chunk size for storagesets with more than nine members is 128 blocks, or 64K. The default values provide optimal storageset performance for a wide variety of applications. A chunk size less than 128 blocks (64K) is not recommended.

Tip Accept the default chunk size setting for most applications. Do not change the default setting unless you are fully aware of the impact to the storageset's performance.

See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for information regarding recommended chunk size settings for your application.

DESTROY (Default)
NODESTROY
Controls how the metadata on the initialized container is to be handled.

Specify NODESTROY to preserve forced error metadata during the initialization process. Use the NODESTROY switch only when a unit is to be created from disk drives reduced from mirrorsets. This allows the data on the container to be accessed by a disk, stripeset, or mirrorset unit. The NODESTROY switch is ignored for RAIDsets and single-disk configurations.

Specify DESTROY to overwrite user data and forced error flags during the initialization.

Note The DESTROY and NODESTROY switches are only valid with stripesets and mirrorsets.

SAVE_CONFIGURATION
NOSAVE_CONFIGURATION (Default)
Instructs the controller whether to save the controller's configuration to the container being initialized. See also SET *controller* INITIAL_CONFIGURATION on page -87.

Save configuration is intended only for use with single controller applications. The SAVE_CONFIGURATION switch requires only one disk to be initialized with this option. However, more disks may be used if desired.

Specify SAVE_CONFIGURATION to store a copy of the controller configuration on the container being initialized. A new controller can receive information from a container containing configuration information saved with the SAVE_CONFIGURATION switch. If SAVE_CONFIGURATION is specified for a multi-device storageset, such as a stripeset, the complete controller configuration information is stored on each disk drive in the storageset.

A disk drive initialized with the SAVE_CONFIGURATION switch specified has slightly less storage space available for user data.

Specify NOSAVE_CONFIGURATION if you do not want to store a copy of the controller configuration on a container.

See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for more information regarding SAVE_CONFIGURATION.

Examples

This example shows how to initialize container DISK10000 and how to save a copy of the controller configuration on it.

```
ADD DISK DISK10000 1 0 0
INITIALIZE DISK10000 SAVE_CONFIGURATION
```

The follows example shows sample devices with the SAVE_CONFIGURATION switch enabled:

SHOW DEVICES FULL

```
Name          Type                     Port Targ  Lun        Used by
------------------------------------------------------------------------------
DISK10000     disk                        1    0    0        S2
          DEC      RZ28M    (C) DEC 1003
        Switches:
          NOTRANSPORTABLE
          TRANSFER_RATE_REQUESTED = 20MHZ (synchronous 10.00 MHZ negotiated)
        Size: 4108970 blocks
        Configuration being backed up on this container
DISK30300     disk                        3    3    0        S2
          DEC      RZ28M    (C) DEC 1003
        Switches:
          NOTRANSPORTABLE
          TRANSFER_RATE_REQUESTED = 20MHZ (synchronous 10.00 MHZ negotiated)
        Size: 4108970 blocks
        Configuration being backed up on this container
TAPE40300     passthrough tape            4    3    0        P1107
          DEC      TZS20     (C)DEC 01ab
        Switches:
          TRANSFER_RATE_REQUESTED = 20MHZ (synchronous 10.00 MHZ negotiated)
```

This example shows how to initialize stripeset STRIPE1 with the default chunk size. The chunk size does not have to be specified. The controller initializes the unit with the default chunk size.

ADD DISK DISK10100 1 1 0
ADD DISK DISK20100 2 1 0
ADD DISK DISK30100 3 1 0
ADD STRIPESET STRIPE1 DISK10100 DISK20100 DISK30100
INITIALIZE STRIPE1

This example shows how to initialize RAIDset RAID9 with a chunk size of 20:

ADD DISK DISK10200 1 2 0
ADD DISK DISK20200 2 2 0
ADD DISK DISK30200 3 2 0
ADD RAIDSET RAID9 DISK10200 DISK20200 DISK30200
INITIALIZE RAID9 CHUNKSIZE=20

This example shows how to initialize DISK40400 and preserve the data after it is removed (reduced) from a mirrorset:

REDUCE DISK40400
INITIALIZE DISK40400 NODESTROY

LOCATE

Indicates the location of configured units, storagesets, and devices by flashing the amber device fault LED on the front of the storage building block (SBB). The device fault LED flashes once per second until turned off with the LOCATE CANCEL command. The LOCATE command can also be used to test the LED itself.

The device fault LED on a failed device stays on continuously. When located, the device fault LED on a good device flashes. The flashing LED helps to distinguish between located devices and failed devices. The device fault LED on failed devices stays on after the LOCATE CANCEL command is entered.

Syntax

LOCATE *parameter*

Parameters

Only one of the following parameters may be entered with each LOCATE command.

ALL
Causes the amber device fault LEDs of all configured devices to flash. You can also use specify ALL to test all of the LEDs at once. Enter LOCATE CANCEL to turn off the LEDs.

CANCEL
Turns off all amber device fault LEDs turned on with the LOCATE command.

DISKS
Causes the amber device fault LEDs of all configured disks to flash. Enter LOCATE CANCEL to turn off the LEDs.

OPTICALS
Causes the amber device fault LEDs of all configured optical devices to flash. Enter LOCATE CANCEL to turn off the LEDs.

PTL (SCSI-location)
Causes the amber device fault LED on the device at the given SCSI location to flash. See the *HSZ70 Array Controller HSOF Version 7.0*

Configuration Manual for an explanation of the PTL addressing naming format.

Not all devices have a device fault LED. Therefore, they do not appear to respond to the LOCATE command.

UNITS
Causes the amber device fault LEDs of all devices used by the units to flash. This command is useful to determine which devices are not currently configured into logical units. Enter LOCATE CANCEL to turn off the device fault LEDs.

container-name
Causes the amber device fault LEDs on the devices within the *container-name* to flash. If a device name is given, the device's fault LED is turned on. If a storageset name is given, the fault LED on all of the devices assigned to the storageset turns on. Use LOCATE CANCEL to turn off the LEDs.

unit-number
Causes the amber device fault LEDs on the devices making up the *unit-number* to flash. Use LOCATE CANCEL to turn off the LEDs.

Examples

This example shows how to cause the amber device fault LED on device DISK10000 to flash:

```
LOCATE DISK10000
LOCATE CANCEL
```

This example shows how to cause the device fault LEDs on all of the devices assigned to disk unit number D102 to flash:

```
LOCATE D102
```

This example shows how to cause the device fault LEDs on all configured disk devices to flash:

```
LOCATE DISKS
```

This example shows how to turn off the flashing device fault LEDs on all devices:

```
LOCATE CANCEL
```

MIRROR

Creates a one-member mirrorset from a single disk. This command is used only on disks configured as units or members of a stripeset. Enter the ADD MIRRORSET command to create a mirrorset from disk drives not already members of higher level containers.

After the disk drive is converted to a mirrorset, increase the nominal number of members by entering the SET *mirrorset-name* MEMBERSHIP=*number-of-members* command. Enter the SET *mirrorset-name* REPLACE=*disk-name* command to add more members to the mirrorset.

Syntax

MIRROR *disk-name mirrorset-name*

Parameters

disk-name
Specifies the name of the disk to convert to a one-member mirrorset. The disk must be part of a unit.

mirrorset-name
Assigns a name for the mirrorset.

It is common to name a mirrorset MIRR*n*, where n is a sequentially assigned, unique identifier. Other naming conventions are acceptable, but this naming convention presents to the user both the type of container and its unique identifier in an intuitive manner.

Switches

COPY=FAST
COPY=NORMAL (Default)
Sets the speed at which the controller copies data from a normal mirrorset member, or members, to new members.

Specify FAST when the creation of mirrored data is to take priority over other controller operations. The controller uses more resources to create the mirrored data. Copying takes less time, but overall controller performance is reduced.

Specify NORMAL when other controller operations are to take priority over the copy operation. The controller uses relatively few resources when creating the mirrored data, resulting in minimal impact on performance.

POLICY=BEST_FIT
POLICY=BEST_PERFORMANCE
NOPOLICY (Default)
Sets the selection criteria the controller uses to choose a replacement member from the spareset when a mirrorset member fails.

Specify POLICY=BEST_FIT to choose a replacement disk drive from the spareset most closely matching the individual capacities of the remaining members. If there is more than one disk drive in the spareset most closely matching the capacity of the remaining members, the controller selects the disk drive having the best performance.

Specify POLICY=BEST_PERFORMANCE to choose a replacement disk drive from the spareset resulting in the best performance. The controller attempts to select a disk on a different port than existing members. If there is more than one disk drive in the spareset matching the best performance criteria, the controller selects the disk drive most closely matching the individual capacities of the remaining members.

Specify NOPOLICY to prevent the controller from automatically replacing a failed disk device. This causes the mirrorset to operate in a reduced state until a POLICY=BEST_FIT or POLICY=BEST_PERFORMANCE is selected, or a member is manually replaced in the mirrorset. See “SET,” page 103.

Example

This example shows how to create a one-member mirrorset from each member of a stripeset. The succeeding commands set the nominal number of members in each mirrorset to two and add a second disk to each mirrorset. It is not necessary to initialize the mirrorsets or add them as units; the higher-level structure of the stripeset is carried down to the mirrorsets.

```
ADD DISK DISK10100 1 1 0
ADD DISK DISK20100 2 1 0
ADD DISK DISK30100 3 1 0
ADD STRIPESET STRIPE1 DISK10100 DISK20100 DISK30100
INITIALIZE STRIPE1
ADD UNIT D102 STRIPE1
MIRROR DISK10100 MIRROR1
SET MIRROR1 MEMBERSHIP=2
SET MIRROR1 REPLACE=DISK20200
MIRROR DISK20100 MIRROR2
SET MIRROR2 MEMBERSHIP=2
SET MIRROR2 REPLACE=DISK30200
MIRROR DISK30100 MIRROR3
SET MIRROR3 MEMBERSHIP=2
SET MIRROR3 REPLACE=DISK10200
```

See also

ADD MIRRORSET
REDUCE
SHOW MIRRORSETS
UNMIRROR

REDUCE

Removes member disk drives from mirrorsets and decreases the nominal number of members in the mirrorsets.

Unlike the SET *mirrorset-name* REMOVE=*disk-name* command, the controller does not put reduced members into the failedset. When using the REDUCE command to copy a striped mirrorset, you must reduce all mirrorsets at the same time with one command. The CLONE utility does this automatically.

The nominal number of members in a mirrorset is determined the number of members assigned to the mirrorset with the SET *mirrorset-name* MEMBERSHIP=*number-of-members* command or the ADD MIRRORSET *mirrorset-name disk-name1 [disk-nameN]* command—in other words, the number of disks that originally contained in the mirrorset before it is reduced. The actual number of members contained in the mirrorset may be less than the nominal number of members if:

- A disk drive is not added back to the mirrorset
- A member remains removed from the mirrorset
- The mirrorset replacement policy switch NOPOLICY is specified with the SET *mirrorset-name* command
- No spare disks exist

The actual number of members in the mirrorset can never be greater than the nominal number of members. The disks to be removed do not need to be members of the same mirrorset. However, the disks must all be part of the same unit (for example, the same striped mirrorset). When a disk is reduced from a mirrorset, the controller:

- Pauses I/O to the unit
- Flushes all of the unit's data from write-back data cache
- Removes the specified mirrorset disk(s)
- Decreases the nominal number of members of the mirrorset(s) by the number of disk(s) removed from the mirroset(s).

For each reduced mirrorset, there must be at least one remaining normal member after the reduction. If this is not true for all of the *disk-names* specified, the mirrorset is not reduced.

Only normal members can be reduced. A normal member is a mirrorset member whose entire contents are the same as all other normal members within the mirrorset.

Note An error is displayed if you attempt to reduce the only normal mirrorset member.

Syntax

REDUCE *disk-name1 disk-name2 disk-name3...*

Parameters

disk-name1 disk-name2 disk-name3...
Specifies one or more names of one or more normal mirrorset members to be removed. Multiple members can be removed with the REDUCE command.

Example

This example shows how to remove DISK20100, DISK20500, and DISK40200 from their respective mirrorsets:

SHOW STRIPE1

```
Name    Storageset                          Uses            Used by
--------------------------------------------------------------------
STRIPE1  stripeset                          MIRR1           D304
                                            MIRR2
                                            MIRR3
```

SHOW MIRRORSETS

```
Name          Storageset                    Uses            Used by
--------------------------------------------------------------------
MIRR1         mirrorset                     DISK10100       STRIPE1
                                            DISK20100
MIRR2         mirrorset                     DISK10200       STRIPE1
                                            DISK20500
MIRR3         mirrorset                     DISK30300       STRIPE1
                                            DISK40200
```

REDUCE DISK20100 DISK20500 DISK40200

SHOW MIRRORSETS

```
Name         Storageset                    Uses             Used by
---------------------------------------------------------------------
MIRR1        mirrorset                    DISK10100         STRIPE1
MIRR2        mirrorset                    DISK10200         STRIPE1
MIRR3        mirrorset                    DISK30300         STRIPE1
```

See also

ADD MIRRORSET
MIRROR
RUN CLONE
SHOW MIRRORSET
SET *mirrorset-name*

RENAME

Renames a container.

Syntax

RENAME *old-container-name new-container-name*

Parameters

old-container-name
Specifies the existing name of the container.

new-container-name
Assigns the new name for the container.

See "Command Syntax," page 6, for information regarding container naming rules.

Note Units may not be renamed.

Example

This example shows how to rename DISK10000 to MYDISK:

SHOW DISKS

```
Name            Type          Port Targ Lun          Used by
-----------------------------------------------------------------------------
DISK10000       disk            1    0    0           D100
DISK10100       disk            1    1    0           D101
```

RENAME DISK10000 MYDISK
SHOW DISKS

```
Name            Type           Port Targ Lun         Used by
--------------------------------------------------------------------
MYDISK          disk            1    0     0          D100
DISK10100       disk            1    1     0          D101
```

RESTART *controller*

Flushes all user data from the specified controller's write-back cache (if present) and restarts the controller.

Syntax

RESTART *controller*

Parameters

controller
The *controller* parameter indicates which controller is to be restarted. Specify OTHER_CONTROLLER or THIS_CONTROLLER.

Switches

IGNORE_ERRORS
NOIGNORE_ERRORS (Default)
Switches control the reaction of the controller based on the status of write-back cache.

Caution The IGNORE_ERRORS and IMMEDIATE_SHUTDOWN switches cause the controller to keep unflushed data in the write-back cache until it restarts and is able to write the data to devices. Do not perform any hardware changes until the controller flushes the cache.

Specify IGNORE_ERRORS to instruct the controller to restart even if the data within write-back cache cannot be written to the devices.

Specify NOIGNORE_ERRORS to instruct the controller to not restart if the data within write-back cache cannot be written to the devices.

IMMEDIATE_SHUTDOWN
NOIMMEDIATE_SHUTDOWN (Default)
Instructs the controller when to shutdown.

Specify IMMEDIATE_SHUTDOWN to instruct the controller to restart immediately without checking for online devices or before flushing data from the write-back cache to devices.

Specify NOIMMEDIATE_SHUTDOWN to instruct the controller not to restart without checking for online devices or before all data has been flushed from write-back cache to the devices.

Examples

This example shows how to restart “this controller”:

RESTART THIS_CONTROLLER

This example shows how to restart the “other controller”:

RESTART OTHER_CONTROLLER

See also

SELFTEST *controller*
SHUTDOWN *controller*

RETRY_ERRORS UNWRITEABLE_DATA

Causes the controller to attempt to write previously unwriteable data from the write-back cache to the devices. If a container fails, preventing the data in write-back cache to be written to the container, an unwriteable data error is reported. If possible, correct the condition causing the unwriteable data and try the write operation again. No data is lost if the retry fails.

Syntax

RETRY_ERRORS *unit-number* UNWRITEABLE_DATA

Parameter

unit-number
Identifies the unit number to which the data contained in write-back cache tries to write. The unit-number is the same name given to the unit when it was created using the ADD UNIT command.

Example

This example shows how to retry writing the cached data previously marked unwriteable to disk unit D103:

```
RETRY_ERRORS D103 UNWRITEABLE_DATA
```

See also

CLEAR_ERRORS UNWRITEABLE_DATA

RUN

Runs a diagnostic or utility program on “this controller.” Diagnostic and utility programs only run on “this controller.”

Syntax

RUN *program-name*

Parameter

program-name

The *program-name* parameter specifies the name of the diagnostic or utility program to be run. The following programs can currently be run:

- CFMENU—A utility used to configure storage devices attached to the controller. See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for more information regarding this utility.
- CHVSN—This is not a user utility. This utility may be used by DIGITAL authorized service personnel only.
- CLCP—A utility used to load updated software code or patches. See the *HSZ70 Array Controller HSOF Version 7.0 Service Manual* for more information regarding this utility.
- CLONE—A utility used to partially automates the process of mirroring units to create a snapshot copy of host unit data. See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for more information regarding this utility.
- CONFIG—A utility used to locate and add devices to the controller configuration. CONFIG may be run anytime new devices are added to the subsystem. See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for more information regarding this utility.
- DILX—A utility used to test and verify the controller’s operation with an attached storage device under a high or low I/O load. Run DILX (disk inline exerciser) only when there is no activity on the controller. The total I/O load is handled by the controller, bypassing the host.

  The DILX utility automatically:

  - Tests all of the disk units configured (selection of specific disk units not permitted)

- Performs thorough tests with writes enabled
- Provides run time and performance summary options.
- Can be run in read-only mode.

Caution Run the DILX utility only at initial installations. When write operations are enabled, the DILX utility may overwrite existing data.

- DIRECT—A command used to display a list of all executable diagnostic or utility programs.
- DSTAT—This is not a user utility. This utility may be used by DIGITAL authorized service personnel only.
- FMU—A fault management utility used to control several spontaneous errors. FMU also displays information regarding the most recent controller and memory system failure.
- FRUTIL—A utility used when replacing a failed controller, external cache battery, or cache module.
- HSUTIL—A utility used to format a newly installed device or to load new software to a tape or disk device.
- VTDPY—A utility used to display the current controller state, performance data, processor utlization, host post activity and status, device state, logical unit state, cache performance, and I/O performance.

See the *HSZ70 Array Controller HSOF Version 7.0 Service Manual* for more information regarding the above utilities.

Example

This example shows how to start the DILX diagnostic program:

```
RUN DILX
.
.
.
```

See also

DIRECTORY

SELFTEST *controller*

Flushes the data from the specified controller's write-back cache (if present) and shuts down the controller. It then restarts the controller in self-test mode. Press the controller reset (//) button to take the controller out of self-test mode.

Syntax

SELFTEST *controller*

Parameters

controller

The *controller* parameter indicates which controller is to perform the self-test program. Specify OTHER_CONTROLLER or THIS_CONTROLLER.

Switches

IGNORE_ERRORS

NOIGNORE_ERRORS (Default)

Instruct the controller how to respond to write-back cache errors.

Caution The IGNORE_ERRORS switch may cause data to remain in write-back cache. See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for considerations when implementing write-back cache.

Specify IGNORE_ERRORS to instruct the controller to ignore any write-back cache errors. Such errors can result from data contained within write-back cache unable to be written to the devices or lost data errors.

Specify NOIGNORE_ERRORS to instruct the controller not to run the self-test program if the write-back cache errors are detected.

IMMEDIATE_SHUTDOWN

NOIMMEDIATE_SHUTDOWN (Default)

Instructs the controller when to shutdown when running the self-test program.

Caution The IMMEDIATE_SHUTDOWN switch instructs the controller to immediately shutdown, without regard to any data contained within write-back cache. See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for considerations when implementing write-back cache.

Select IMMEDIATE_SHUTDOWN to instruct the controller to run the self-test program immediately without checking for online devices or without flushing user data from write-back cache to devices.

Select NOIMMEDIATE_SHUTDOWN to instruct the controller to flush data from write-back cache before running the self-test program.

Examples

This example shows how to start the self-test program on “this controller”:

```
SELFTEST THIS_CONTROLLER
```

This example shows how to run the self-test program on the “other controller,” even if the “other controller” cannot flush all data from the write-back cache:

```
SELFTEST OTHER_CONTROLLER IGNORE_ERRORS
```

See also

RESTART *controller*
SHUTDOWN *controller*

SET *controller*

Changes parameters on the specified controller.

Syntax

SET *controller*

Tip For customers familiar with prior DIGITAL HSx array controllers, the syntax for this command has not changed. It is expressed differently in this manual to improve the manual's organization and consistency.

Parameter

controller

Indicates which controller is to be set. Specify OTHER_CONTROLLER or THIS_CONTROLLER.

Switches

Table 4 lists the switches available with this command. Descriptions of the switches follow the table.

Table 4 SET *controller* Switches

Switch	Values
CACHE_FLUSH_TIMER	1–65535 sec, 10 (default)
CACHE_UPS NOCACHE_UPS	None
COMMAND_CONSOLE_LUN NOCOMMAND_CONSOLE_LUN	None
HOST_FUNCTION	A, B, C, D
ID number	0–15 (Maximum of 8 target ID numbers used at a time.)
INITIAL_CONFIGURATION	None
MIRRORED_CACHE NOMIRRORED_CACHE	None
PREFERRED_ID NOPREFERRED_ID	0–15 (Maximum of 8 target ID numbers used at a time.)
PROMPT	1–16 characters
TERMINAL_PARITY NOTERMINAL_PARITY	odd, even
TERMINAL_SPEED	4800, 9600, 19200
TIME	dd–mmm–yyy:hh:mm:ss
TRANSFER_RATE_REQUESTED	5Mhz 10Mhz 20Mhz (default)

CACHE_FLUSH_TIMER=n
CACHE_FLUSH_TIMER=10 (Default)
Specifies how many seconds
(1–65535) of idle time may elapse before the write-back cache flushes its entire contents to a given device or RAIDset. The default setting is 10 seconds. When changed, the new value entered for this switch takes effect immediately.

CACHE_UPS
NOCACHE_UPS (Default)
Specifies whether the controller should perform regular battery condition checks. When changed, you must restart both controllers in order for the new setting to take effect.

Specify CACHE_UPS if your storage subsystem power is supported by an uninterruptable power supply (UPS). The controller does not check the condition of the cache batteries and ignores the battery's state. This causes RAIDsets and mirrorsets to always be available, regardless of the condition of the cache batteries.

Caution Setting CACHE_UPS without having a UPS or similar backup system in place may result in data loss if power is interrupted.

Specify NOCACHE_UPS to instruct the controller to perform regular cache battery checks and evaluate the condition of the cache batteries.

Setting the CACHE_UPS switch for either controller sets the CACHE_UPS switch for both controllers.

COMMAND_CONSOLE_LUN
NOCOMMAND_CONSOLE_LUN (Default)
Enable or disables the virtual LUN used with the StorageWorks Command Console. When changed, the new setting for this switch takes effect immediately.

Select COMMAND_CONSOLE_LUN to enable the virtual LUN. Select NOCOMMAND_CONSOLE_LUN to disable the virtual LUN.

HOST_FUNCTION=mode
HOST_FUNCTION=(ID,mode)
Configures the host compatibility mode for a controller target ID number. When changed, you must restart both controllers in order for the new setting to take effect.

Select the HOST_FUNCTION=mode switch to set all of the targets on the host interface to the same mode. The default mode is A.

Select the HOST_FUNCTION=(ID,mode) switch to configure the host port on a target-by-target basis for compatibility with various operating systems.

The HOST_FUNCTION switch assigns only one host function to the specified target ID number with each SET command. You must enter separate SET commands to set multiple modes to different target ID number—for example, to support hosts with different operating systems on a single SCSI bus.

Each controller or pair of controllers can service a maximum of two hosts simultaneously as long as they as they are assigned to different targets. If the HOST_FUNCTION switch is changed on a single controller in a dual-redundant configuration, corresponding mode changes are automatically passed on to the other controller. The controller does not have to restart for these changes to take affect.

The following modes can be assigned:

- A—DIGITAL UNIX®, OpenVMS, Sun®, and Hewlett-Packard® HP–UX (Default)
- B—IBM AIX®
- C—HSZ15
- D—Windows NT™ Server

Enter the SHOW *controller* command to display the current Host Function Mode settings.

ID=(n1,n2,n3...)
Assigns one to eight SCSI target ID numbers (0 through 15). Multiple target ID numbers allow the controller to present more units to the host. If two or more target ID numbers are entered, the numbers must be enclosed in parentheses and separated with commas. When changed, you must restart both controllers in order for the new setting to take effect.

A controller can present up to eight units to the host on each target ID number. Unit numbers identify both the target ID number and the LUN. For example, D203 indicates a disk is addressed through target 2, LUN 3. D5 is target 0, LUN 5.

If two controllers are in a dual-redundant configuration, both controllers support the same target ID numbers. When the ID numbers are changed on one controller, the other controller is automatically updated.

Note Use the PREFERRED_ID switch along with the ID= switch to specify which targets are assigned to each of your controllers. If you do not specify the preference of your targets as you add them, the controller automatically prefers all of the targets to the “other controller.”

INITIAL_CONFIGURATION
Erases the entire configuration on “this controller” and restores the controller’s default configuration. The default configuration is determined by the configuration information last stored in non-volatile memory with the INITIALIZE SAVE_CONFIGURATION command. When entered, this switch takes effect immediately.

The INITIAL_CONFIGURATION switch can be specified on “this controller” in nofailover mode only. Enter this switch to ensure all of the old configuration information is removed when a controller is moved from one location to another within the same subsystem.

The controllers stop after this command is carried out. Press the reset buttons on the front of the controllers to restart them.

If the controller cannot find any saved configuration information, an error message is displayed on the terminal screen.

Completely spell out the phrase INITIAL_CONFIGURATION.

MIRRORED_CACHE
NOMIRRORED_CACHE (Default)
Enables the mirrored-write-back-data cache feature on dual-redundant controllers. When changed, both controllers restart for the new switch setting to take effect.

The following tasks are performed when the NOMIRRORED_CACHE switch is specified: Both controllers must be operational before this command is accepted.

- Data in write-back cache is flushed when cache is configured in non-mirrored mode.
- Enables mirrored write-back cache on both controllers.
- If an invalid cache configuration exists within the cache modules, an error is generated.

Issue this switch through only one controller. The controller must contain a valid cache configuration before specifying this switch. See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for rules regarding valid cache configurations. The controllers automatically restart when this switch is specified.

Note All unwritten write-cached data is automatically flushed from cache before restart when the MIRRORED_CACHE switch is specified. Depending on the amount of data to be flushed, this command may take several minutes to complete before the controller is restarted.

The NOMIRRORED_CACHE switch disables mirror mode. Data in write-back cache is flushed when this switch is entered from mirrored mode. This switch disables mirrored write-back cache on both controllers. Therefore, this switch is only to be issued through one controller. The controller must contain a valid cache configuration before this switch is assigned. Unlike going from nonmirrored mode to mirrored mode, going from mirrored mode to nonmirrored mode is permitted with a failed cache module. The controller automatically restarts when this switch is specified.

PREFERRED_ID=(n1,n2,n3...)
NOPREFERRED_ID (Default)
In dual-redundant configurations, specifies which targets and units are handled by the specified controller. First, specify, the total set of ID numbers with the preferred ID number switch. If you enter two or more PREFERRED_ID numbers, the numbers must be enclosed within parentheses and separated with commas. When changed, the new setting for this switch takes effect immediately.

Note Only target ID numbers set with the ID= switch can be preferred with the PREFERRED_ID= switch.

Except in a multiple bus failover environment, when the PREFERRED_ID numbers are assigned on one controller, the other controller is automatically updated to support the remaining ID numbers, if any.

For example, if a dual-redundant pair of controllers is set to ID numbers 0, 1, and 2, one controller can be set to respond to ID numbers 0 and 1; the other controller automatically responds to ID number 2. The first controller presents unit numbers 0 through 7 and 100 through 107. The other controller presents unit numbers 200 through 207 to the controllers.

Note Setting the PREFERRED_ID switch in multiple bus failover configurations does not affect how the controller handles units. The controller permits the host operating to determine which controller units are accessed through.

Specify NOPREFERRED_ID for one controller so it is immediately available if the other controller fails. The other controller processes all of the data during normal operation. However, if the other controller fails, the controller assigned the NOPREFFERED_ID switch assumes control of the targets assigned to the failed controller.

PROMPT="new prompt"
Specifies a 1- to 16-character prompt displayed when the controller's CLI prompts for input. Only printable ASCII characters and spaces are valid. The new prompt name must be enclosed within quotes. When changed, the new text entered for this switch takes effect immediately.

TERMINAL_PARITY=ODD
TERMINAL_PARITY=EVEN
NOTERMINAL_PARITY (Default)
Specifies the parity with which data is transmitted and received. When changed, the new setting for this switch takes effect immediately.

TERMINAL_SPEED=baud_rate
TERMINAL_SPEED=9600 (Default)
Sets the terminal transmission and reception speed (**baud** rate) to 4800, 9600 (default), or 19200 baud. When changed, the new value entered for this switch takes effect immediately.

TIME=dd–mmm–yyyy:hh:mm:ss
Sets the date and time. The time is set on both controllers in a dual-redundant configuration.When changed, the new value entered for this switch takes effect immediately.

TRANSFER_RATE_REQUESTED=20MHZ (Default)
TRANSFER_RATE_REQUESTED=10MHZ
TRANSFER_RATE_REQUESTED=5MHZ
Specifies the maximum data transfer rate the controllers use when communicating with the host. The transfer rate may need to be limited to accommodate long cables between the subsystem and the host system. Set the same transfer rate for both controllers in a dual-redundant configuration. When changed in a dual-redundant configuration, you must restart both controllers in order for the new setting to take effect. When changed in a single configuration, restart only the controller on which the new setting will take effect.

The controller must be restarted for any changes to the data transfer rate to take effect.

Table 5 lists the maximum transfer rates for different lengths of fast and slow SCSI buses. These lengths represent cable lengths plus shelf-bus lengths.

Table 5 Maximum SCSI-Bus Cable Lengths for Given Data Transfer Rate

Transfer Rate	Meters	Feet
5 MHz	6	19.7
10 MHz	3	9.8
20 MHz	25	82.0

Examples

This example shows how to change the other controller's CLI prompt:

```
SET OTHER_CONTROLLER PROMPT=”CONTROLLER B”
```

This example shows how to set “this controller” so it responds to requests for target ID numbers 2 and 5:

```
SET THIS_CONTROLLER ID=(2,5)
```

See also

SHOW THIS_CONTROLLER
SHOW OTHER_CONTROLLER

SET *device-name*

Changes the transportable characteristics and the maximum data transfer rate between the controller and the specified device.

Syntax

SET *device-name*

Parameter

device-name

Specifies the name the device to change. This can be a previously named device, disk, passthrough device, or container.

Switches

TRANSFER_RATE_REQUESTED=ASYNCHRONOUS
TRANSFER_RATE_REQUESTED=20MHZ (Default)
TRANSFER_RATE_REQUESTED=10MHZ
TRANSFER_RATE_REQUESTED=5MHZ

Specifies the maximum data transfer rate for the controller to use in communicating with the device. You may need to limit the transfer rate to accommodate long cables between the controllers and the device, such as with a tape library.

TRANSPORTABLE
NOTRANSPORTABLE (Default)

Indicates whether a disk can be accessed exclusively by StorageWorks controllers.

Set the TRANSPORTABLE switch for disks only. The controller makes a small portion of a non-transportable disk inaccessible to the host. This restricted space is used to store metadata which improves data reliability, error detection, and the ability to recover data. Because of this metadata, only StorageWorks controllers can retrieve data from non-transportable initialized disk devices.

Storagesets cannot be made transportable. Specify NOTRANSPORTABLE for all disks used in RAIDsets, stripesets, and mirrorsets and sparesets.

Transportable disks do not contain any metadata or restricted areas on the disk. Therefore, transportable disks forfeit the advantage metadata provides. Transportable disks can be moved to a non-StorageWorks environment with their data intact.

If NOTRANSPORTABLE is specified and there is no metadata on the unit, the unit must be initialized.

Note DIGITAL recommends you avoid specifying TRANSPORTABLE unless transportability of the device or media is imperative and there is no other way to accomplish moving the data.

Examples

This example shows how to set the data transfer rate of DISK20000 to 5MHz:

```
SET DISK20000 TRANSFER_RATE_REQUESTED=5MHZ
```

This example shows how to set DISK10300 to transportable:

```
SET DISK10300 TRANSPORTABLE
```

See also

ADD DISK
SHOW DISKS

SET EMU

Sets operating parameters for the environmental monitoring unit (EMU).

Syntax

SET EMU

Switches

The SENSOR and FANSPEED switches control both the master and slave EMU settings. The EMU within the primary cabinet instructs the EMUs within the other cabinets to operate at the same SENSOR and FANSPEED settings to which the master EMU is set.

SENSOR_1_SETPOINT nn
SENSOR_2_SETPOINT nn
SENSOR_3_SETPOINT nn
SENSOR_x_SETPOINT 35 (Default)
Sets the acceptable temperatures at which the subsystem operates. Sensor 1 and Sensor 2 set the maximum operating temperature for the primary subsystem cabinet. Sensor 3 sets the maximum operating temperature for the EMU unit. The allowable range for the setpoint is 0°C (32°F) to 49°C (120°F). The EMU determines the default setpoint for all three sensors.

Table 6 lists the valid EMU set-point temperatures in both Fahrenheit and Celsius.

Table 6 EMU Set Point Temperatures

ºC	**ºF**	**ºC**	**ºF**	**ºC**	**ºF**	**ºC**	**ºF**	**ºC**	**ºF**
0	32	10	50	20	68	30	86	40	104
1	34	11	52	21	70	31	88	41	106
2	46	12	54	22	72	32	90	42	108
3	37	13	55	23	73	33	91	43	109
4	39	14	57	24	75	34	93	44	111
5	41	15	59	25	77	35	95	45	113
6	43	16	61	26	79	36	97	46	115
7	45	17	63	27	81	37	99	47	117
8	46	18	64	28	82	38	100	48	118
9	48	19	66	29	84	39	102	49	120

If any of the setpoints assigned to a slave EMU do not match the corresponding setpoints assigned to the master EMU, the slave EMU settings change to match the corresponding master EMU settings.

Refer to the for detailed information regarding setting the EMU temperature set points.

FANSPEED=HIGH
FANSPEED=AUTOMATIC (Default)
Sets the speed at which the fan operates.

Select FANSPEED=HIGH to force the fans in all connected cabinets to operate at high speed continuously.

Select FANSPEED=AUTOMATIC to allow the EMU to control the fan speed for the fans in all connected cabinets.

The EMU instructs the fans to operate at high speed when any of the temperature setpoints are exceeded or when one or more fans are not functioning.

Examples

This example shows how to set EMU sensor number 2 to 34°C:

SET EMU SENSOR_2_SETPOINT 34

This example shows how to set the EMU fan to operate at high speed:

SET EMU FANSPEED=HIGH

See also

SHOW

SET FAILEDSET

Changes the automatic replacement policy for the failedset.

Syntax

SET FAILEDSET *replacement policy*

Parameters

replacement policy

Specifies the policy to be used by the controller when a disk drive is physically replaced in the failedset.

Specify AUTOSPARE to instruct the controller to automatically move devices replaced in the failedset into the spareset.

Specify NOAUTOSPARE to instruct the controller to leave devices having failed in the failedset. The device, though replaced, remains in the failedset until it is manually removed with the DELETE FAILEDSET command.

In most circumstances, the failed disk placed into the failedset contains no metadata—that is, a new or initialized device. When the AUTOSPARE switch is specified, the controller checks to see if any metadata is present. If the controller detects metadata, the disk remains in the failedset. If the controller does not detect metadata, the controller automatically initializes the disk and moves it from the failedset to the spareset. Now a member of the spareset, the disk is available for any mirrorset or RAIDset requiring a replacement member. If the automatic initialization fails, the disk remains in the failedset.

When you move the disk into the spareset, some metadata is written to it—meaning it is no longer transportable. Additional metadata is written to the disk when it is moved from the spareset into a RAIDset or mirrorset.

To make a failedset disk containing metadata on it available as a spareset replacement disk, perform the following steps.

1. Delete all containers to which the disk belongs.

2. Make the disk transportable.

   SET DISK10000 TRANSPORTABLE.

3. Initialize the disk.

   INIT DISK10000

4. Delete the disk.

   DELETE DISK10000

5. Remove DISK10000 from the cabinet until it is time to replace a failed disk.

Example

This example shows how to enable the automatic spare feature:

SET FAILEDSET AUTOSPARE

This example shows how to disable the automatic spare feature:

SET FAILEDSET NOAUTOSPARE

See also

SHOW FAILEDSET

SET FAILOVER

Configures both controllers to operate in a dual-redundant, transparent failover, configuration. This allows both controllers to access the storage devices, providing controller fault-tolerant data processing. If one of the two controllers fail, the devices and any cache attached to the failed controller become available to and accessible through the other controller.

Note The controllers must be present and placed in non-failover mode by entering the SET NOFAILOVER command before they can be set to failover mode.

Syntax

SET FAILOVER COPY=*controller*

Parameters

THIS_CONTROLLER
OTHER_CONTROLLER
Specifies which controller contains the source configuration for the copy. The companion controller receiving the configuration information restarts after the command is carried out.

Caution Make sure you know which controller has the good configuration information before entering this command.The device configuration information from the controller specified by the *controller* parameter overwrites the information on the companion controller.

Specify THIS_CONTROLLER to copy the device configuration information from the "this controller" to "other controller."

Specify OTHER_CONTROLLER to copy the device configuration information from the "other controller" to "this controller."

Due to the amount of information being passed from one controller to the other, this command may take up to one minute to complete.

Example

This example shows how to set the controllers in a dual-redundant configuration and copy the configuration information from “this controller” to the “other controller”:

```
SET FAILOVER COPY=THIS_CONTROLLER
```

See also

SET MULTIBUS_FAILOVER
SET NOFAILOVER

SET *mirrorset-name*

Changes the characteristics of a mirrorset, including the addition and removal of members.

Syntax

SET *mirrorset-name*

Parameter

mirrorset-name

Specifies the name of the mirrorset to modify. This is the same name given to the mirrorset when it was created with the ADD MIRRORSET command.

Switches

COPY=FAST

COPY=NORMAL (Default)

Sets the speed at which the controller copies data from normal mirrorset members to new members.

Specify NORMAL when other controller operations are to take priority over the copy operation. The controller uses relatively few resources when creating the mirrored data, resulting in minimal impact on performance.

Specify FAST when the creation of mirrored data is to take priority over other controller operations. The controller uses more resources to create the mirrored data. Copying takes less time, but overall controller performance is reduced.

MEMBERSHIP=number-of-members

Sets the nominal number of mirrorset members to the number you specify for the *number-of-members* value. A maximum of six members can be specified.

Note No other switches can be set when you specify the MEMBERSHIP switch.

If you increase the number of members and specify a replacement policy with the POLICY= switch, the controller automatically adds disk drives from the spareset to the mirrorset until the new number of members is reached, or there are no more suitable disk drives in the spareset.

If you increase the number of members and the NOPOLICY switch is specified, the REPLACE=*disk-name* switch must be specified to bring the mirrorset up to the new nominal number of members.

You cannot set the nominal number of members lower than the actual number of members. Specify the REMOVE switch to reduce the number of disk drives from the mirrorset.

REMOVE=disk-name
Instructs the controller to remove a member from an existing mirrorset. The disk drive specified by *disk-name* is removed from the mirrorset specified by *mirrorset-name*. The removed disk drive is added to the failedset.

Note No other switches can be set when the REMOVE= switch is specified.

If the mirrorset would not have a normal member remaining if the disk drive were removed, the controller reports an error and no action is taken. A normal member is a mirrorset member whose contents are the same as all other normal members.

For each reduced mirrorset, there must be at least one remaining normal member after the reduction.

Unlike the REDUCE command, the REMOVE switch does not change the nominal number of members in the mirrorset. If the mirrorset has a replacement policy and there are acceptable disk drives in the spareset, the controller adds disk drives from the spareset to the mirrorset to make the actual number of members equal to the nominal number of members.

Note Normalizing members exist only when you first create a mirrorset is first created, or when you clear lost data on a mirrored unit. The controller recognizes the member as normal, and all other original mirrorset members are recognized as “normalizing.” New data is written to the mirrorset is written to all members. The controller copies the data existing before the mirrorset was created on the normal member to the normalizing members. The controller recognizes the normalizing members as normal when the mirrorset member’s block are all the same.

REPLACE=disk-name
Instructs the controller to add a disk member to an existing mirrorset if the following conditions are met:

- The replacement policy is set to NOPOLICY
- The mirrorset is missing at least one member

If these conditions are met, the disk drive specified by *disk-name* is added to the mirrorset specified by *mirrorset-name*. The nominal number of members does not change.

The disk name used is the name given to a disk when it was added to the configuration with the ADD DISK command.

Note Do not specify any other switches when the REPLACE= switch is specified.

POLICY=BEST_FIT
POLICY=BEST_PERFORMANCE (Default)
NOPOLICY
Sets the selection criteria the controller uses to choose a replacement member from the spareset when a mirrorset member fails.

Specify POLICY=BEST_FIT to choose a replacement disk drive from the spareset most closely matching the capacity of the mirrorset. If there is more than one disk drive in the spareset most closely matching the capacity of the mirrorset, the controller selects the disk drive having the best performance.

Specify POLICY=BEST_PERFORMANCE to choose a replacement disk drive from the spareset resulting in the best performance. The controller attempts to select a disk on a different port than existing members. If there is more than one disk drive in the spareset matching the best performance criteria, the controller selects the disk drive most closely matching the capacity of the mirrorset.

Specify NOPOLICY to prevent the controller from automatically replacing a failed disk device. This causes the mirrorset to operate in a reduced state until you choose a POLICY=BEST_FIT or POLICY=BEST_PERFORMANCE, or you manually replace a member in the mirrorset.

READ_SOURCE=disk-name
READ_SOURCE=LEAST_BUSY (Default)
READ_SOURCE=ROUND_ROBIN
Selects the mirrorset member used by the controller to satisfy a read request.

Specify the *disk-name* of a specific member to which all read requests are directed. If the member selected fails out of the mirrorset, the controller selects the first normal member found for mirrorset read requests.

Specify LEAST_BUSY to direct read requests to the normal mirrorset member with the least amount of work in the queue.

Specify ROUND_ROBIN to sequentially direct read requests to each normal mirrorset member. All normal members are equally queried for each read request.

Examples

This example shows how to change the replacement policy of mirrorset MIRR1 to BEST_FIT:

```
SET MIRR1 POLICY=BEST_FIT
```

This example shows how to remove member DISK30000 from mirrorset MIRR1 created above. If the mirrorset has a replacement policy and an acceptable disk drive is in the spareset, the controller automatically adds the spare disk drive to the mirrorset.

```
SET MIRR1 REMOVE=DISK30000
```

This example shows how to add disk DISK30200 to the mirrorset MIRR1:

```
SET MIRR1 REPLACE=DISK30200
```

A copy operation begins immediately on DISK30200.

See also

ADD MIRRORSET
MIRROR
REDUCE
SHOW MIRRORSET
UNMIRROR

SET MULTIBUS_FAILOVER

Places “this controller” and the “other controller” into a dual-redundant (failover) configuration within a multiple-bus environment. This allows both controllers to access the storage devices and provide greater throughput. If one controller fails, the devices and cache attached to the failed controller become available to and accessible through the remaining controller. Both controllers must be configured for nofailover before you enter the SET MULTIBUS_FAILOVER command.

Note Partitioned storagesets and partitioned single-disk units cannot function in multiple bus failover dual-redundant configurations. Because they are not supported, you must delete your partitions before configuring the controllers for multiple bus failover.

Syntax

SET MULTIBUS_FAILOVER COPY=*controller*

Parameters

controller

Specifies which controller contains the source configuration for the copy. The companion controller receiving the configuration information restarts after the command is carried out.

Caution Make sure you know which controller has the good configuration information before entering this command. The device configuration information from the controller specified by the *controller* parameter overwrites the information on the companion controller.

Specify THIS_CONTROLLER to copy the device configuration information from the “this controller” to “other controller.”

Specify OTHER_CONTROLLER to copy the device configuration information from the “other controller” to “this controller.”

Due to the amount of information being passed from one controller to the other, this command may take up to one minute to complete.

Example

This example shows how to configure two controllers to operate in dual-redundant mode within a multiple bus environment:

```
SET THIS_CONTROLLER ID=(0,1,2,3)
RESTART THIS_CONTROLLER
SET MULTIBUS_FAILOVER COPY=THIS_CONTROLLER
```

The configuration on “this controller” is automatically copied to the “other controller” when you issue the SET MULTIBUS_FAILOVER COPY command. If you want to prefer specific units to specific controllers, use the following command after setting multiple bus failover:

```
SET D100 PREFERRED=THIS_CONTROLLER
SET D101 PREFERRED=OTHER_CONTROLLER
```

See also

SET FAILOVER
SET NOFAILOVER
SET NOMULTIBUS_FAILOVER

SET NOFAILOVER

Reconfigures both controllers to operate in a non-dual-redundant (non-failover) configuration. Immediately after entering this command, remove one controller from the shelf because the sharing of devices is not supported by nonredundant controllers.

Note SET NOFAILOVER and SET NOMULTIBUS_FAILOVER have the same effect. Either command exits from transparent or multiple bus failover mode.

It is recommended that both controllers be present when this command is carried out. Otherwise, the controllers become misconfigured with each other, requiring additional steps to later render their configurations alike.

This command affects both controllers, regardless of the controller on which the command is carried out. All units accessed through the “other controller” failover to “this controller” and the “other controller” is shut down. No configuration information is lost when the SET NOFAILOVER command is carried out.

Syntax

SET NOFAILOVER

Switches

DESTROY_UNFLUSHABLE_DATA
NODESTROY_UNFLUSHABLE_DATA (Default)
Instructs the controller how to handle data contained within write-back cache. These switches have no effect if both controllers are operational. Select one of these switches to indicate how the controller is to handle data contained in cache if one of the controllers fail before it can properly shut down with the SET NOFAILOVER or SHUTDOWN commands.

Under some circumstances, the data in a failed controller’s write-back cache may not fail over to the operating controller’s write-back cache. For example, if the cache battery fails on the “other controller,” failover mode tries to forward the failed controller’s cached data to the cache area of the “other controller.” Therefore, the write-cache data configured with “this controller” is unflushable. In this circumstance, “this controller’s” cached data is lost if power is interrupted.

Specify NODESTROY_UNFLUSHABLE_DATA to leave the unwritten data intact in the failed controller’s write-back cache. When the failed controller is replaced and placed into service, the write-back cache data is flushed to the appropriate devices.

Specify DESTROY_UNFLUSHABLE_DATA to reconfigure the operational controller before replacing the failed controller. The unwritten data of the failed controller may reference devices not present in the new configuration. If you do not destroy the old configuration data, it may conflict with the new configuration and cause the subsystem to behave unpredictably.

Caution Unflushed data cannot be recovered after it is destroyed.

Example

This example shows how to terminate failover mode between two controllers in a dual-redundant configuration:

```
SET NOFAILOVER
```

See also

SET FAILOVER

SET *RAIDset-name*

Changes the characteristics of a RAIDset.

Syntax

SET *RAIDset-name*

Parameters

RAIDset-name

Specifies the name of the RAIDset to modify. This is the same name given to the RAIDset when it was created with the ADD RAIDSET command.

Switches

POLICY=BEST_FIT

POLICY=BEST_PERFORMANCE (Default)

NOPOLICY

Switches specify the replacement policy to use when a member within the RAIDset fails.

Specify BEST_FIT to choose a replacement disk drive from the spareset most closely matching the sizes of the remaining members of the RAIDset. If more than one disk drive in the spareset is the correct size, the controller selects the disk drive having the best performance.

Specify POLICY=BEST_PERFORMANCE to choose a replacement disk drive from the spareset resulting in the best performance of the RAIDset. The controller attempts to select a disk on a different port than existing members. If more than one disk drive in the spareset matches the best performance criteria, the controller selects the disk drive most closely matching the size of the remaining members of the RAIDset selected.

Specify NOPOLICY to prevent the controller from automatically replacing a failed disk device. This causes the RAIDset to operate in a reduced state until POLICY=BEST_FIT or POLICY=BEST_PERFORMANCE is selected, or a member is manually replaced in the mirrorset.

RECONSTRUCT=FAST
RECONSTRUCT=NORMAL (Default)
Sets the speed at which the controller reconstructs the data on the new RAIDset member replacing a failed member.

Specify NORMAL to balance other controller operations against the reconstruct operation. The controller uses relatively few resources to perform the reconstruct, and there is little impact on performance.

Specify FAST when the reconstruct operation must take precedence over other controller operations. The controller uses more resources to perform the reconstruction. Reconstruction takes less time, but overall controller performance is reduced during the reconstruction.

REMOVE=disk-name
Instructs the controller to remove a member from an existing RAIDset. The disk drive specified by *disk-name* is removed from the RAIDset specified by *RAIDset-name*. The removed disk drive s added to the failedset.

If a RAIDset is already in a reduced state, an error is displayed and the command is rejected. If a replacement policy is specified, the replacement is taken from the spareset to replace the removed member using the policy specified.

If the NOPOLICY switch is specified with the SET RAIDset command, the RAIDset continues to operate in a reduced state until a replacement policy is specified or the REPLACE switch is specified. See the REPLACE=*disk-name* switch for information on manually replacing a RAIDset member. See the POLICY and NOPOLICY switches on page -113 for information regarding setting a policy for automatic member replacement.

Note Do not specify other switches when you use the REMOVE= switch.

REPLACE=disk-name
Instructs the controller to add a disk member to an existing RAIDset if the following conditions are met:

- The replacement policy is set to NOPOLICY.
- The disk member is not in any configuration, including a spareset.

An error is displayed and the command is rejected if the RAIDset is not in a reduced state, if a replacement policy is already specified, or if the disk specified is already being used by a configuration (including a spareset).

Note Do not specify other switches when you use the REPLACE= switch.

Examples

This example shows how to change the replacement policy for RAIDset RAID9 to BEST_FIT:

```
SET RAID9 POLICY=BEST_FIT
```

This example shows how to remove member DISK10000 from the RAID9 RAIDset:

```
SET RAID9 REMOVE=DISK10000
```

If there is a replacement policy, the controller moves a disk from the spareset to the RAIDset automatically.

This example shows how to add disk DISK20100 to the reduced RAIDset, RAID9:

```
SET RAID9 REPLACE=DISK20100
```

Reconstruction immediately begins on DISK20100.

See also

ADD RAIDSET
SHOW RAIDSETS

SET *unit-number*

Changes the characteristics of a unit.

Syntax

SET *unit-number*

Parameter

unit-number

Specifies the logical unit number to modify. The *unit-number* is the name given to the unit when it was created using the ADD UNIT command.

Switches

Table 7 lists all switches for the SET *unit-number* command and shows which switches can be used with each type of device and storageset. Descriptions of the switches follow the table.

Table 7 SET UNIT Switches for Existing Containers

Switch / **Container Type**	ACCESS_ID=ALL	PARTITION=partition_number	MAXIMUM_CACHED_	PREFERRED_PATH	READ_CACHE	RUN	WRITE_PROTECT	WRITEBACK_CACHE
RAIDset	✓	✓	✓	✓	✓	✓	✓	✓
Stripeset	✓	✓	✓	✓	✓	✓	✓	✓
Mirrorset	✓	✓	✓	✓	✓	✓	✓	✓
NoTransportable Disk	✓	✓	✓	✓	✓	✓	✓	✓
Transportable Disk	✓	✓	✓	✓	✓	✓	✓	

Table 7 SET UNIT Switches for Existing Containers (Continued)

Container Type / Switch	ACCESS_ID=ALL	PARTITION=partition_number	MAXIMUM_CACHED_	PREFERRED_PATH	READ_CACHE	RUN	WRITE_PROTECT	WRITEBACK_CACHE
Optical Disk	✓	✓	✓	✓	✓	✓	✓	✓
CD-ROM	✓	✓	✓	✓	✓	✓		
Partition	✓	✓	✓	✓	✓		✓	✓
Passthrough				✓				

Note Regardless of storageset type, the RUN and NORUN switches cannot be specified for partitioned units.

ACCESS_ID=ALL (Default)
ACCESS_ID=n
Controls the host access to any unit. Set the access ID number set to the initiator SCSI ID number used by the host to communicate with the controller. When a specific you assign ID number, only the initiator ID number specified is permitted to write to or read from the unit. When set to ALL, any host may access the unit.

Passthrough LUNs cannot accept ACCESS_ID numbers. Passthrough LUNs are set to ALL by default.

MAXIMUM_CACHED_TRANSFER=n
MAXIMUM_CACHED_TRANSFER=32 (Default)
Sets the largest number of write blocks to be cached by the controller. The controller does not cache any transfers over the set size. Accepted values are 1 through 1024.

PREFERRED_PATH=OTHER_CONTROLLER
PREFERRED_PATH=THIS_CONTROLLER
NOPREFERRED_PATH (Default)
Switches may be set only when dual-redundant controllers are operating in a multiple bus failover configuration. The host determines which controller units are accessed through. The host's settings always take precedence over the preferred path assigned to units. The target ID numbers assigned with the SET *controller* ID= command only determine which target ID number the controller uses to respond to the host.

Note When the controllers are configured to operate in transparent-failover mode, if you set the PREFERRED_PATH switch with the ADD UNIT or SET *unit-number* command, an error message displays because you can only assign a preferred controller path at the unit level only when in multiple bus failover mode.

If you do not assign preferred path, the unit is targeted through whichever controller detects the unit first when the controller starts.

Select PREFERRED_PATH=THIS_CONTROLLER to permit "this controller" to bring the unit online.

Select PREFERRED_PATH=OTHER_CONTROLLER to permit the "other controller" to bring the unit online.

See the *HSZ70 Array Controller HSOF Version 7.0 Configuration Manual* for information regarding multiple bus failover.

READ_CACHE (Default)
NOREAD_CACHE
Switches enable or disable the read-cache function for the unit.

Read caching improves performance in almost all situations, so it is generally recommended to leave it enabled. However, under certain types of conditions, such as when performing a backup, read-caching may not be necessary since only a small amount of data is cached. In such instances, it may be beneficial to disable read cache and remove the processing overhead associated with caching.

RUN (Default)
NORUN
Controls the disk drive's operation and availability to the host.

Specify RUN to make a unit available to the host.

Specify NORUN to make a unit unavailable to the host and to cause any data in cache to be flushed to one or more drives. NORUN spins down the devices making up a unit. The drives making up the unit spin down after the data has been completely flushed.

Note Do not specify the RUN and NORUN switches for partitioned units.

WRITE_PROTECT
NOWRITE_PROTECT (Default)
Assigns to the unit's a write-protect policy.

Specify WRITE_PROTECT to prevent host write operations to the unit. However, the controller may still write to a write-protected RAIDset to satisfy a reconstruct pass or to reconstruct a newly replaced member. However, metadata, reconstruct, and copy writes are still be allowed to RAIDsets and mirrorsets.

Specify NOWRITE_PROTECT to write data to the unit, overwriting existing data.

WRITEBACK_CACHE
NOWRITEBACK_CACHE (Default)
Specifies whether or not the unit is to take advantage of the controller's write-back caching feature.

Specify WRITEBACK_CACHE for all new RAIDsets, mirrorsets, and units you want to take advantage of write-back caching.

Specify NOWRITEBACK_CACHE for units you want to receive data directly from the host without being cached.

Caution Specifying NOWRITEBACK_CACHE may result in data loss if the controller fails.

Note The controller may take up to 5 minutes to flush data contained within the write-back cache when you specify the NOWRITEBACK_CACHE switch.

Example

This example shows how to enable write protect and turn off the read cache on unit D102:

```
SET D102 WRITE_PROTECT NOREAD_CACHE
```

See also

SHOW UNITS
SHOW *unit-number*

SHOW

Displays information about controllers, storagesets, devices, partitions, and units.

The SHOW command may not display some information for devices accessed through the companion controller in a dual-redundant configuration. When information regarding a device or parameter does not appear, enter the same SHOW command from a terminal on the other controller.

Syntax

SHOW *controller*
SHOW *device-type*
SHOW *device-name*
SHOW *storageset-type*
SHOW *storageset-name*
SHOW DEVICES
SHOW EMU
SHOW FAILEDSET
SHOW UNITS
SHOW *unit-number*

Parameters

device-type
Specifies the type of devices you want to be displayed. Valid choices are:

- DEVICES—Shows all devices attached to the controller
- CDROMS—Shows all CD-ROM devices attached to the controller
- DISKS—Shows all disks attached to the controller
- PASSTHROUGH—Shows all passthrough containers attached to the controller

device-name
Specifies the name of a particular device to be displayed. For example, SHOW DISK20100 displays information about the device named DISK20100.

EMU
Displays information regarding the status of the environmental monitoring unit (EMU).

storageset-type
Specifies the type of storageset to be displayed. Valid types are:

- STORAGESETS—Shows all storagesets configured with the controller
- RAIDSETS—Shows all RAIDsets configured to the controller
- STRIPESETS—Shows all stripesets configured to the controller
- MIRRORSETS—Shows all mirrorsets configured to the controller
- SPARESET—Show the spareset configured to the controller
- FAILEDSET—Shows the failedset configured to the controller

storageset-name
Specifies the name of a particular storageset to be displayed. For example, SHOW STRIPE1 displays information about the stripeset named STRIPE1.

UNITS
Displays information for all units configured to the controller.

unit-name
Specifies the name of a particular unit to be displayed. For example, SHOW D102 displays information about the unit named D102.

THIS_CONTROLLER
OTHER_CONTROLLER
Specifies the controller to be displayed.

Switches

FULL
Displays additional information about each device, storageset, or controller.

Examples

This example shows how to display a listing of disks:

SHOW DISKS

```
Name          Type       Port Targ Lun       Used by
-----------------------------------------------------------
DISK20300     disk           2 3 0              D203
DISK20400     disk           2 4 0              D204
```

This example shows a full listing of devices attached to the controller:

SHOW DEVICES FULL

```
Name          Type                      Port Targ  Lun        Used by
------------------------------------------------------------------------------
DISK11200     disk                         1   12    0        R0

        Switches:
          NOTRANSPORTABLE
          TRANSFER_RATE_REQUESTED = ASYNCHRONOUS (ASYNCHRONOUS negotiated)
        Size: 8378028 blocks
DISK11400     disk                         1   14    0        R0

        Switches:
          NOTRANSPORTABLE
          TRANSFER_RATE_REQUESTED = ASYNCHRONOUS (ASYNCHRONOUS negotiated)
        Size: 8378028 blocks
DISK11500     disk                         1   15    0        R0

        Switches:
          NOTRANSPORTABLE
          TRANSFER_RATE_REQUESTED = ASYNCHRONOUS (ASYNCHRONOUS negotiated)
        Size: 8378028 blocks
DISK21200     disk                         2   12    0        S0

        Switches:
          NOTRANSPORTABLE
          TRANSFER_RATE_REQUESTED = ASYNCHRONOUS (ASYNCHRONOUS negotiated)
        Size: 8377528 blocks
        Configuration being backed up on this container
DISK21400     disk                         2   14    0        S0
          DEC      RZ28D    (C) DEC 0008
        Switches:
          NOTRANSPORTABLE
          TRANSFER_RATE_REQUESTED = ASYNCHRONOUS (ASYNCHRONOUS negotiated)
        Size: 4108970 blocks
        Configuration being backed up on this container
DISK21500     disk                         2   15    0        S0

        Switches:
          NOTRANSPORTABLE
          TRANSFER_RATE_REQUESTED = ASYNCHRONOUS (ASYNCHRONOUS negotiated)
        Size: 8377528 blocks
        Configuration being backed up on this container
```

This example shows how to display a complete listing of the mirrorset named MIRR1:

SHOW MIRR1

```
Name          Storageset                    Uses            Used by
------------------------------------------------------------------------------
MIRR1         mirrorset                     DISK50300       S0
                                            DISK60300
        Switches:
          POLICY (for replacement) = BEST_PERFORMANCE
          COPY (priority) = NORMAL
          READ_SOURCE = LEAST_BUSY
          MEMBERSHIP = 2, 2 members present
        State:
          NORMAL
          DISK60300 (member  0) is NORMAL
          DISK50300 (member  1) is NORMAL
        Size: 17769177 blocks
```

This example shows the full information for a controller:

SHOW THIS_CONTROLLER FULL

```
Controller:

        Not configured for dual-redundancy
        Device port SCSI address 7
        Time: NOT SET
Host port:
        SCSI target(s) (0, 2, 4, 5)
        Preferred target(s) (0, 2, 4)
        TRANSFER_RATE_REQUESTED = 20MHZ
        Host Functionality Mode = A
        Command Console LUN is target 0, lun 4
Cache:
        64 megabyte write cache, version 4
        Cache is GOOD
        Battery is GOOD
        No unflushed data in cache
        CACHE_FLUSH_TIMER = DEFAULT (10 seconds)
        NOCACHE_UPS
Mirrored Cache:
        64 megabyte write cache, version 4
        Cache is GOOD
        Battery is GOOD
        No unflushed data in cache
Extended information:
        Terminal speed 19200 baud, eight bit, no parity, 1 stop bit
        Operation control: 00000001  Security state code: 75580
        Configuration backup disabled
```

This example shows how to display the current settings for the EMU:

SHOW EMU

```
EMU CABINET SETTINGS
    SENSOR_1_SETPOINT   35  DEGREES C
    SENSOR_2_SETPOINT   35  DEGREES C
    SENSOR_3_SETPOINT   35  DEGREES C
    FANSPEED AUTOMATIC
```

SHUTDOWN *controller*

Flushes all user data from the specified controller's write-back cache (if present) and shuts down the controller. The controller does not automatically restart. All units accessed through the failed controller failover to the surviving controller.

Syntax

SHUTDOWN *controller*

Parameter

controller

Indicates which controller is to shut down. Specify OTHER_CONTROLLER or THIS_CONTROLLER.

Switches

IGNORE_ERRORS

NOIGNORE_ERRORS (Default)

Controls the reaction of the controller based on the status of write-back cache.

Caution The IGNORE_ERRORS and IMMEDIATE switches cause the controller to keep unflushed data in the write-back cache until it restarts and is able to write the data to devices. Do not perform any hardware changes until the controller flushes the cache.

Specify IGNORE_ERRORS to instruct the controller to shutdown even if the data within write-back cache cannot be written to the devices.

Specify NOIGNORE_ERRORS to instruct the controller to stop operation if the data within write-back cache cannot be written to the devices.

IMMEDIATE_SHUTDOWN

NOIMMEDIATE_SHUTDOWN (Default)

Instructs the controller when to shutdown.

Specify IMMEDIATE_SHUTDOWN to cause the controller to shutdown immediately without checking for online devices or before flushing data from the write-back cache to devices.

Specify NOIMMEDIATE_SHUTDOWN to cause the controller not to shutdown without checking for online devices or before all data has been flushed from the write-back cache to devices.

Examples

This example shows how to shut down “this controller”:

```
SHUTDOWN THIS_CONTROLLER
```

This example shows how to shut down the other controller, even if it cannot write all of the write-back cached data to the units:

```
SHUTDOWN OTHER_CONTROLLER IGNORE_ERRORS
```

See also

RESTART *controller*
SELFTEST *controller*

UNMIRROR

Converts a one-member mirrorset back to a non-mirrored disk drive and deletes its mirrorset from the list of known mirrorsets. This command can be used on mirrorsets already members of higher-level containers (stripesets or units).

The UNMIRROR command is not valid for disk drives having a capacity greater than the capacity of the existing mirrorset. If a mirrorset is comprised of disk drives with different capacities, the mirrorset capacity is limited to the size of the smallest member; larger members contain unused capacity. If a member with unused capacity is the last remaining member of a mirrorset, the UNMIRROR command cannot be used to change the disk drive back to a single-disk unit. This change would cause a change in the reported disk capacity, possibly confusing the operating system.

Syntax

UNMIRROR *disk-name*

Parameter

disk-name
Specifies the name of the normal mirrorset member to be removed from a mirror storageset.

Example

This example shows how to convert DISK10300 back to a single device:

```
UNMIRROR DISK10300
```

See also

ADD MIRRORSET
MIRROR
REDUCE
RUN CLONE
SET *mirrorset-name*

Glossary

This glossary defines terms pertaining to the HSZ70 array controller. It is not a comprehensive glossary of computer terms.

adapter A device that converts the protocol and hardware interface of one bus type into another without changing the function of the bus.

array controller *See* controller.

autospare A controller feature that automatically replaces a failed disk drive. To aid the controller in automatically replacing failed disk drives, you can enable the AUTOSPARE switch for the failedset causing physically replaced disk drives to be automatically placed into the spareset. Also called “autonewspare.”

bad block A data block that contains a physical defect.

backplane The electronic printed circuit board into which you plug subsystem devices—for example, the SBB or power supply.

BBR Bad Block Replacement. A replacement routine that substitutes defect-free disk blocks for those found to have defects. This process takes place in the controller, transparent to the host.

block Also called a sector. The smallest collection of consecutive bytes addressable on a disk drive. In integrated storage elements, a block contains 512 bytes of data, error codes, flags, and the block’s address header.

bootstrapping A method used to bring a system or device into a defined state by means of its own action. For example, a machine routine whose first few instructions are enough to bring the rest of the routine into the computer from an input device.

cache memory A portion of memory used to accelerate read and write operations.

CDU Cable distribution unit. The power entry device for StorageWorks cabinets. The CDU provides the connections necessary to distribute power to the cabinet shelves and fans.

channel Another term for a SCSI bus. *See also* SCSI.

chunk A block of data written by the host.

chunk size The number of data blocks, assigned by a system administrator, written to the primary RAIDset or stripeset member before the remaining data blocks are written to the next RAIDset or stripeset member.

CLI Command line interpreter. The configuration interface to operate the controller software.

cold swap A method of device replacement that requires the entire subsystem to be turned off before the device can be replaced. *See also* hot swap and warm swap.

configuration file A file that contains a representation of a storage subsystem's configuration.

container (1) Any entity that is capable of storing data, whether it is a physical device or a group of physical devices. (2) A virtual, internal, controller structure representing either a single disk or a group of disk drives linked as a storageset. Stripesets and mirrorsets are examples of storageset containers the controller uses to create units.

controller A hardware device that, with proprietary software, facilitates communications between a host and one or more devices organized in an array. HS family controllers are examples of array controllers.

copying A state in which data to be copied to the mirrorset is inconsistent with other members of the mirrorset. *See also* normalizing.

copying member Any member that joins the mirrorset after the mirrorset is created is regarded as a copying member. Once all the data from the normal member (or members) is copied to a normalizing or copying member, the copying member then becomes a normal member. *See also* normalizing member.

data center cabinet A generic reference to large DIGITAL subsystem cabinets, such as the SW600-series and 800-series cabinets in which StorageWorks components can be mounted.

data striping The process of segmenting logically sequential data, such as a single file, so that segments can be written to multiple physical devices (usually disk drives) in a round-robin fashion. This technique is useful if the processor is capable of reading or writing data faster than a single disk can supply or accept the data. While data is being transferred from the first disk, the second disk can locate the next segment.

differential I/O module A 16 bit I/O module with SCSI bus converter circuitry for extending a differential SCSI bus. *See also* I/O module.

differential SCSI bus A bus in which a signal's level is determined by the potential difference between two wires. A differential bus is more robust and less subject to electrical noise than is a single-ended bus.

DILX Disk inline exerciser. The controller's diagnostic software used to test the data transfer capabilities of disk drives in a way that simulates a high level of user activity.

dirty data The write-back cached data that has not been written to storage media, even though the host operation processing the data has completed.

DOC DWZZA-On-a-Chip. An NCR53C120 SCSI bus extender chip used to connect a SCSI bus in an expansion cabinet to the corresponding SCSI bus in another cabinet.

dual-redundant configuration A controller configuration consisting of two active controllers operating as a single controller. If one controller fails, the other controller assumes control of the failing controller's devices.

DUART Dual universal asynchronous receiver and transmitter. An integrated circuit containing two serial, asynchronous transceiver circuits.

DWZZA A StorageWorks SCSI-bus-signal converter used to connect 8-bit single-ended devices to hosts with 16-bit differential SCSI adapters. This converter extends the range of a single-ended SCSI cable to the limit of a differential SCSI cable. *See also* SCSI bus signal converter.

DWZZB A StorageWorks SCSI bus signal converter used to connect a variety of 16-bit single-ended devices to hosts with 16-bit differential SCSI adapters. *See also* SCSI bus signal converter.

DWZZC The 16-bit SCSI table-top SCSI bus signal converter used to extend a differential SCSI bus, or connect a differential SCSI bus to a single ended SCSI bus. *See also* SCSI bus signal converter.

ECB External cache battery. The unit that supplies backup power to the cache module in the event the primary power source fails or is interrupted.

EMU Environmental monitoring unit. A unit that provides increased protection against catastrophic failures. Some subsystem enclosures include an EMU which works with the controller to detect conditions such as failed power supplies, failed blowers, elevated temperatures, and external air sense faults. The EMU also controls certain cabinet hardware including DOC chips, alarms, and fan speeds.

ESD Electrostatic discharge. The discharge of potentially harmful static electrical voltage as a result of improper grounding.

extended subsystem A subsystem in which two cabinets are connected to the primary cabinet.

external cache battery *See* ECB.

failedset A group of failed mirrorset or RAIDset devices automatically created by the controller.

failover The process that takes place when one controller in a dual-redundant configuration assumes the workload of a failed companion controller. Failover continues until the failed controller is repaired or replaced.

FCC Federal Communications Commission. The federal agency responsible for establishing standards and approving electronic devices within the United States.

FCC Class A This certification label appears on electronic devices that can only be used in a commercial environment within the United States.

FCC Class B This certification label appears on electronic devices that can be used in either a home or a commercial environment within the United States.

FD SCSI The fast, narrow, differential SCSI bus with an 8-bit data transfer rate of 10 MB/s. *See also* FWD SCSI and SCSI.

flush The act of writing dirty data from cache to a storage media.

forced errors A data bit indicating a corresponding logical data block contains unrecoverable data.

FRU Field replaceable unit. A hardware component that can be replaced at the customer's location by DIGITAL service personnel or qualified customer service personnel.

FWD SCSI A fast, wide, differential SCSI bus with a maximum 16-bit data transfer rate of 20 MB/s. *See also* SCSI and FD SCSI.

host The primary or controlling computer to which a storage subsystem is attached.

host adapter A device that connects a host system to a SCSI bus. The host adapter usually performs the lowest layers of the SCSI protocol. This function may be logically and physically integrated into the host system.

host compatibility mode A setting used by the controller to provide optimal controller performance with specific operating systems. This improves the controller's performance and compatibility with the specified operating system. The supported modes are: A, Normal (including DIGITAL UNIX®, OpenVMS, Sun®, and Hewlett-Packard® HP–UX); B, IBM AIX®; C, Proprietary; and D, Microsoft Windows NTTM Server.

hot disks A disk containing multiple hot spots. Hot disks occur when the workload is poorly distributed across storage devices and prevents optimum subsystem performance. *See also* hot spots.

hot spots A portion of a disk drive frequently accessed by the host. Because the data being accessed is concentrated in one area, rather than spread across an array of disks providing parallel access, I/O performance is significantly reduced. *See also* hot disks.

hot swap A method of device replacement that allows normal I/O activity on a device’s bus to remain active during device removal and insertion. The device being removed or inserted is the only device that cannot perform operations during this process. *See also* cold swap and warm swap.

HSOF Hierarchical Storage Operating Firmware. Software contained on a removable ROM program card that provides the operating system for the array controller.

initiator A SCSI device that requests an I/O process to be performed by another SCSI device, namely, the SCSI target. The controller is the initiator on the device bus. The host is the initiator on the host bus.

instance code A four-byte value displayed in most text error messages and issued by the controller when a subsystem error occurs. The instance code indicates when during software processing the error was detected.

I/O module A 16-bit SBB shelf device that integrates the SBB shelf with either an 8-bit single ended, 16-bit single-ended, or 16-bit differential SCSI bus. *See also* I/O Module.

JBOD Just a bunch of disks. A term used to describe a group of single-device logical units.

local connection A connection to the subsystem using either its serial maintenance port or the host’s SCSI bus. A local connection enables you to connect to one subsystem controller within the physical range of the serial or host SCSI cable.

local terminal A terminal plugged into the EIA-423 maintenance port located on the front bezel of the controller. *See also* maintenance terminal.

logical bus A single-ended bus connected to a differential bus by a SCSI bus signal converter.

logical unit A physical or virtual device addressable through a target ID number. LUNs use their target’s bus connection to communicate on the SCSI bus.

logical unit number A value that identifies a specific logical unit belonging to a SCSI target ID number. A number associated with a physical device unit during a task's I/O operations. Each task in the system must establish its own correspondence between logical unit numbers and physical devices.

LRU Least recently used. A cache term used to describe the block replacement policy for read cache.

maintenance terminal An EIA-423-compatible terminal used with the controller. This terminal is used to identify the controller, enable host paths, enter configuration information, and check the controller's status. The maintenance terminal is not required for normal operations.
See also local terminal.

MB/s Megabytes per second. A unit designation used to measure the SCSI bus bandwidth.

member A container that is a storage element in a RAID array.

metadata The data written to a disk for the purposes of controller administration. Metadata improves error detection and media defect management for the disk drive. It is also used to support storageset configuration and partitioning. Non-transportable disks also contain metadata to indicate they are uniquely configured for StorageWorks environments. Metadata can be thought of as "data about data."

mirroring The act of creating an exact copy or image of data.

mirrored write-back caching A method of caching data that maintains two copies of the cached data. The copy is available if either cache module fails.

mirrorset *See* RAID level 1.

nominal membership The desired number of mirrorset members when the mirrorset is fully populated with active devices. If a member is removed from a mirrorset, the actual number of members may fall below the "nominal" membership.

non-redundant controller configuration (1) A single controller configuration. (2) A controller configuration which does not include a second controller.

normal member A mirrorset member that, block-for-block, contains the same data as other normal members within the mirrorset. Read requests from the host are always satisfied by normal members.

normalizing Normalizing is a state in which, block-for-block, data written by the host to a mirrorset member is consistent with the data on other normal and normalizing members. The normalizing state exists only after a mirrorset is initialized. Therefore, no customer data is on the mirrorset.

normalizing member A mirrorset member whose contents is the same as all other normal and normalizing members for data that has been written since the mirrorset was created or lost cache data was cleared. A normalizing member is created by a normal member when either all of the normal members fail or all of the normal members are removed from the mirrorset. *See also* copying member.

NVM Non-Volatile Memory. A type of memory—the contents of which survive loss of power.

OCP Operator control panel. The control or indicator panel associated with a device. The OCP is usually mounted on the device and is accessible to the operator.

other controller The controller in a dual-redundant pair that's connected to the controller that's serving your current CLI session. *See also* this controller.

PCM Polycenter Console Manager.

PCMCIA Personal Computer Memory Card Industry Association. An international association formed to promote a common standard for PC card-based peripherals to be plugged into notebook computers. The card commonly known as a PCMCIA card is about the size of a credit card.

parity A method of checking if binary numbers or characters are correct by counting the ONE bits. In odd parity, the total number of ONE bits must be odd; in even parity, the total number of ONE bits must be even. Parity information can be used to correct corrupted data. RAIDsets use parity to improve the availability of data.

parity bit A binary digit added to a group of bits that checks to see if there are errors in the transmission.

parity RAID *See* RAIDset.

partition A logical division of a container, represented to the host as a logical unit.

port (1) In general terms, a logical channel in a communications system. (2) The hardware and software used to connect a host controller to a communications bus, such as a SCSI bus or serial bus.

Regarding the controller, the port is: (1) the logical route for data in and out of a controller that can contain one or more channels, all of which contain the same type of data. (2) The hardware and software that connects a controller to a SCSI device.

primary cabinet The primary cabinet is the subsystem enclosure that contains the controllers, cache modules, external cache batteries, and the PVA module.

program card The PCMCIA card containing the controller's operating software.

PTL Port-Target-LUN. The controller's method of locating a device on the controller's device bus.

PVA module Power Verification and Addressing module.

quiesce The act of rendering bus activity inactive or dormant. For example, "quiesce the SCSI bus operations during a device warm-swap."

RAID Redundant Array of Independent Disks. Represents multiple levels of storage access developed to improve performance or availability or both.

RAID level 0 A RAID storageset that stripes data across an array of disk drives. A single logical disk spans multiple physical disks, allowing parallel data processing for increased I/O performance. While the performance characteristics of RAID level 0 is excellent, this is the only RAID level that does not provide redundancy. Raid level 0 storagesets are sometimes referred to as stripesets.

RAID level 0+1 A RAID storageset that stripes data across an array of disks (RAID level 0) and mirrors the striped data (RAID level 1) to provide high I/O performance and high availability. This RAID level is alternatively called a striped mirrorset. Raid level 0+1 storagesets are sometimes referred to as striped mirrorsets.

RAID level 1 A RAID storageset of two or more physical disks that maintains a complete and independent copy of the entire virtual disk's data. This type of storageset has the advantage of being highly reliable and extremely tolerant of device failure. Raid level 1 storagesets are sometimes referred to as mirrorsets.

RAID level 3 A RAID storageset that transfers data parallel across the array's disk drives a byte at a time, causing individual blocks of data to be spread over several disks serving as one enormous virtual disk. A separate redundant check disk for the entire array stores parity on a dedicated disk drive within the storageset. *Contrast* RAID level 5.

RAID Level 5 A RAID storageset that, unlike RAID level 3, stores the parity information across all of the disk drives within the storageset. *Contrast* RAID level 3.

RAID level 3/5 A DIGITAL-developed RAID storageset that stripes data and parity across three or more members in a disk array. A RAIDset combines the best characteristics of RAID level 3 and RAID level 5. A RAIDset is the best choice for most applications with small to medium I/O requests, unless the application is write intensive. A RAIDset is sometimes called parity RAID. Raid level 3/5 storagesets are sometimes referred to as RAIDsets.

RAIDset *See* RAID level 3/5.

read caching A cache management method used to decrease the subsystem's response time to a read request by allowing the controller to satisfy the request from the cache memory rather than from the disk drives.

reconstruction The process of regenerating the contents of a failed member's data. The reconstruct process writes the data to a spareset disk and then incorporates the spareset disk into the mirrorset, striped mirrorset, or RAIDset from which the failed member came. *See also* regeneration.

reduced Indicates that a mirrorset or RAIDset is missing one member because the member has failed or has been physically removed.

redundancy The provision of multiple interchangeable components to perform a single function in order to cope with failures and errors. A RAIDset is considered to be redundant when user data is recorded directly to one member and all of the other members include associated parity information.

regeneration

(1) The process of calculating missing data from redundant data. (2) The process of recreating a portion of the data from a failing or failed drive using the data and parity information from the other members within the storageset. The regeneration of an entire RAIDset member is called reconstruction. *See also* reconstruction.

RFI

Radio frequency interference. The disturbance of a signal by an unwanted radio signal or frequency.

replacement policy

The policy specified by a switch with the SET FAILEDSET command indicating whether a failed disk from a mirrorset or RAIDset is to be automatically replaced with a disk from the spareset. The two switch choices are AUTOSPARE and NOAUTOSPARE.

SBB

StorageWorks building block. (1) A modular carrier plus the interface required to mount the carrier into a standard StorageWorks shelf. (2) any device conforming to shelf mechanical and electrical standards installed in a 3.5-inch or 5.25-inch carrier, whether it is a storage device or power supply.

SCSI

Small computer system interface. (1) An ANSI interface standard defining the physical and electrical parameters of a parallel I/O bus used to connect initiators to devices. (2) a processor-independent standard protocol for system-level interfacing between a computer and intelligent devices including hard drives, floppy disks, CD-ROMs, printers, scanners, and others.

SCSI-A cable

A 50-conductor (25 twisted-pair) cable generally used for single-ended, SCSI-bus connections.

SCSI bus signal converter

Sometimes referred to as an adapter. (1) A device used to interface between the subsystem and a peripheral device unable to be mounted directly into the SBB shelf of the subsystem. (2) a device used to connect a differential SCSI bus to a single-ended SCSI bus. (3) A device used to extend the length of a differential or single-ended SCSI bus. *See also* DWZZA, DWZZB, DWZZC, and I/O module.

SCSI device (1) A host computer adapter, a peripheral controller, or an intelligent peripheral that can be attached to the SCSI bus. (2) Any physical unit that can communicate on a SCSI bus.

SCSI device ID number A bit-significant representation of the SCSI address referring to one of the signal lines, numbered 0 through 7 for an 8-bit bus, or 0 through 15 for a 16-bit bus. *See also* target ID number.

SCSI ID number The representation of the SCSI address that refers to one of the signal lines numbered 0 through 15.

SCSI-P cable A 68-conductor (34 twisted-pair) cable generally used for differential bus connections.

SCSI port (1) Software: The channel controlling communications to and from a specific SCSI bus in the system. (2) Hardware: The name of the logical socket at the back of the system unit to which a SCSI device is connected.

signal converter *See* SCSI bus signal converter.

single ended I/O module A 16-bit I/O module. *See also* I/O module.

single-ended SCSI bus An electrical connection where one wire carries the signal and another wire or shield is connected to electrical ground. Each signal's logic level is determined by the voltage of a single wire in relation to ground. This is in contrast to a differential connection where the second wire carries an inverted signal.

spareset A collection of disk drives made ready by the controller to replace failed members of a storageset.

storage array An integrated set of storage devices.

storage array subsystem *See* storage subsystem.

storageset (1) A group of devices configured with RAID techniques to operate as a single container. (2) Any collection of containers, such as stripesets, mirrorsets, striped mirrorsets, and RAIDsets.

storage subsystem The controllers, storage devices, shelves, cables, and power supplies used to form a mass storage subsystem.

storage unit The general term that refers to storagesets, single-disk units, and all other storage devices that are installed in your subsystem and accessed by the host. A storage unit can be any entity that is capable of storing data, whether it is a physical device or a group of physical devices.

StorageWorks A family of DIGITAL modular data storage products which allow customers to design and configure their own storage subsystems. Components include power, packaging, cabling, devices, controllers, and software. Customers can integrate devices and array controllers in StorageWorks enclosures to form storage subsystems.

StorageWorks systems include integrated SBBs and array controllers to form storage subsystems. System-level enclosures to house the shelves and standard mounting devices for SBBs are also included.

stripe The data divided into blocks and written across two or more member disks in an array.

striped mirrorset See RAID level 0+1.

stripeset *See* RAID level 0.

stripe size The stripe capacity as determined by n–1 times the chunksize, where n is the number of RAIDset members.

striping The technique used to divide data into segments, also called chunks. The segments are striped, or distributed, across members of the stripeset. This technique helps to distribute hot spots across the array of physical devices to prevent hot spots and hot disks.

Each stripeset member receives an equal share of the I/O request load, improving performance.

surviving controller The controller in a dual-redundant configuration pair that serves its companion’s devices when the companion controller fails.

tape A storage device supporting sequential access to variable sized data records.

Tape Inline Exerciser *See* TILX.

target (1) A SCSI device that performs an operation requested by an initiator. (2) Designates the target identification (ID) number of the device.

target ID number The address a bus initiator uses to connect with a bus target. Each bus target is assigned a unique target address.

this controller The controller that is serving your current CLI session through a local or remote terminal. *See also* other controller.

TILX Tape inline exerciser. The controller’s diagnostic software to test the data transfer capabilities of tape drives in a way that simulates a high level of user activity.

Ultra SCSI bus A wide, fast-20 SCSI bus.

unit A container made accessible to a host. A unit may be created from a single disk drive or tape drive. A unit may also be created from a more complex container such as a RAIDset. The controller supports a maximum of eight units on each target. *See also* target and target ID number.

unwritten cached data Sometimes called unflushed data. *See* dirty data.

UPS Uninterruptible power supply. A battery-powered power supply guaranteed to provide power to an electrical device in the event of an unexpected interruption to the primary power supply. Uninterruptible power supplies are usually rated by the amount of voltage supplied and the length of time the voltage is supplied.

VHDCI Very high-density-cable interface. A 68-pin interface. Required for ultra-SCSI connections.

virtual terminal A software path from an operator terminal on the host to the controller's CLI interface, sometimes called a host console. The path can be established via the host port on the controller (using HSZ term) or via the maintenance port through an intermediary host.

warm swap A device replacement method that allows the complete system remains online during device removal or insertion. The system bus may be halted, or quiesced, for a brief period of time during the warm-swap procedure.

write-back caching A cache management method used to decrease the subsystem's response time to write requests by allowing the controller to declare the write operation "complete" as soon as the data reaches its cache memory. The controller performs the slower operation of writing the data to the disk drives at a later time.

write-through caching A cache management method used to decrease the subsystem's response time to a read. This method allows the controller to satisfy the request from the cache memory rather than from the disk drives.

write hole The period of time in a RAID level 1 or RAID level 5 write operation when there is an opportunity for undetectable RAIDset data corruption. Write holes occur under conditions such as power outages, where the writing of multiple members can be abruptly interrupted. A battery backed-up cache design eliminates the write hole because data is preserved in cache and unsuccessful write operations can be retried.

write-through cache A cache management technique for retaining host write requests in read cache. When the host requests a write operation, the controller writes data directly to the storage device. This technique allows the controller to complete some read requests from the cache, greatly improving the response time to retrieve data. The operation is complete only after the data to be written is received by the target storage device.

This cache management method may update, invalidate, or delete data from the cache memory accordingly, to ensure that the cache contains the most current data.

Index

D

E

F

Q

R

S

T

U

V

W