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Hitachi Adaptable Modular Storage 2000 Family Power Savings User Guide

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Hitachi Data Systems

MK-97DF8045-04

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Preface

This guide describes how to use the Power Saving feature, which powers down hard disk drive (HDDs) spindles in any selected RAID group via custom scripts.

This preface includes the following information:

- Intended audience
- Product version
- Release notes and readme
- Document revision level
- Changes in this revision
- Document organization
- Document conventions
- Convention for storage capacity values
- Accessing product documentation
- Getting help

Intended audience

This document is intended for system administrators, Hitachi Data Systems representatives, and Authorized Service Providers who install, configure, and operate Hitachi Adaptable Modular System (AMS) 2000 family storage systems.

Product version

This document applies to Hitachi AMS 2000 Family firmware version 0890/A or later.

Release notes and readme

Read the release notes and readme file before installing and using this product. They may contain requirements or restrictions that are not fully described in this document and/or updates or corrections to this document.

Document revision level

Revision	Date	Description
MK-97DF8045-00	November 2007	Initial release.
MK-97DF8045-01	February 2008	Revision 01, supersedes and replaces MK- 97DF8045-00.
MK-97DF8045-02	August 2009	Revision 02, supersedes and replaces MK- 97DF8045-01.
MK-97DF8045-03	November 2009	Revision 03, supersedes and replaces MK- 97DF8045-02.
MK-97DF8045-04	April 2010	Revision 04, supersedes and replaces MK- 97DF8045-03.

Changes in this revision

The following information has been added for this release:

- Updated the graphic in Step 5 on page 3-2.
- Updated the graphic in Step 7 on page 4-2.
- Updated Table 4-1 Power Saving Details, on page 4-3.
- Updated the section “Powering down,” beginning on page 4-4.
- Updated the section “Powering up,” beginning on page 4-6.
- Updated the section “Viewing power saving status,” beginning on page 7-3.
- Updated the section “Powering down,” beginning on page 7-4.
- Updated the section “Powering up,” beginning on page 7-5.
- Updated Table A-1 in Appendix A, Specifications

Document organization

Thumbnail descriptions of the chapters are provided in the following table. Click the chapter title in the first column to go to that chapter. The first page of every chapter or appendix contains links to the contents.

Chapter / Appendix Title	Description
Chapter 1, Introduction	This chapter provides an overview of the Power Saving feature for the Hitachi Adaptable Modular Storage series.
Chapter 2, Specifications	This chapter provides information on the effects of Power Saving, its requirements, and some operating system notes.
Chapter 3, Preparation	This chapter provides instructions for installing, uninstalling, enabling, and disabling Power Saving.
Chapter 4, Using Navigator 2	This chapter provides instructions for viewing Power Saving modes, and powering up or down disks using Navigator 2.
Chapter 5, Troubleshooting	This chapter provides information to help you identify and resolve possible problems when using Power Saving.
Chapter 6, Examples of setting up Power Saving	This chapter provides use case examples when implementing Power Saving in the Hitachi Data Protection Suite (HDPS) using the Navigator 2 CLI and Account Authentication for a Windows and UNIX environment.
Chapter 7, CLI operations	This chapter describes how to perform basic Power Saving operations using the CLI.
Appendix A, General specifications	This appendix provides general specifications for Power Saving.
Appendix B, Acronyms and abbreviations	This chapter provides acronyms and abbreviations used in this document.
Index	This chapter provides a detailed and linked list of topics in this manual.

Document conventions

This document uses the following symbols to draw attention to important safety and operational information.

Symbol	Meaning	Description
	Tip	Tips provide helpful information, guidelines, or suggestions for performing tasks more effectively.
	Note	Notes emphasize or supplement important points of the main text.
	Caution	Cautions indicate that failure to take a specified action could result in damage to the software or hardware.
	WARNING	Warnings indicate that failure to take a specified action could result in loss of data or serious damage to hardware.

The following typographic conventions are used in this document.

Convention	Description
Bold	Indicates text on a window, other than the window title, including menus, menu options, buttons, fields, and labels. Example: Click **OK**.
Italic	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: copy *source-file target-file* Angled brackets (< >) are also used to indicate variables.
screen/code	Indicates text that is displayed on screen or entered by the user. Example: `# pairdisplay -g oradb`
< > angled brackets	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: `# pairdisplay -g <group>` Italic font is also used to indicate variables.
[ ] square brackets	Indicates optional values. Example: [a | b] indicates that you can choose a, b, or nothing.
{ } braces	Indicates required or expected values. Example: { a | b } indicates that you must choose either a or b.
| vertical bar	Indicates that you have a choice between two or more options or arguments. Examples: [a | b] indicates that you can choose a, b, or nothing. { a | b } indicates that you must choose either a or b.
underline	Indicates the default value. Example: [a | b]

Convention for storage capacity values

Physical storage capacity values (e.g., disk drive capacity) are calculated based on the following values:

Physical capacity unit	Value
1 KB	1,000 bytes
1 MB	1,000 KB or $1{,}000^2$ bytes
1 GB	1,000 MB or $1{,}000^3$ bytes
1 TB	1,000 GB or $1{,}000^4$ bytes
1 PB	1,000 TB or $1{,}000^5$ bytes
1 EB	1,000 PB or $1{,}000^6$ bytes

Logical storage capacity values (e.g., logical device capacity) are calculated based on the following values:

Logical capacity unit	Value
1 block	512 bytes
1 KB	1,024 (2^{10}) bytes
1 MB	1,024 KB or 1024^2 bytes
1 GB	1,024 MB or 1024^3 bytes
1 TB	1,024 GB or 1024^4 bytes
1 PB	1,024 TB or 1024^5 bytes
1 EB	1,024 PB or 1024^6 bytes

Accessing product documentation

The AMS 2000 Family user documentation is available on the Hitachi Data Systems Portal: https://portal.hds.com. Please check this site for the most current documentation, including important updates that may have been made after the release of the product.

This documentation set consists of the following documents.

Release notes

- Adaptable Modular Storage System Release Notes
- Storage Navigator Modular 2 Release Notes

Please read the release notes before installing and/or using this product. They may contain requirements and/or restrictions not fully described in this document, along with updates and/or corrections to this document.

Installation and getting started

The following documents provide instructions for installing an AMS 2000 Family storage system. They include rack information, safety information, site-preparation instructions, getting-started guides for experienced users, and host connectivity information. The symbol ☞ identifies documents that contain initial configuration information about Hitachi AMS 2000 Family storage systems.

☞ **AMS2100/2300 Getting Started Guide**, MK-98DF8152

Provides quick-start instructions for getting an AMS 2100 or AMS 2300 storage system up and running as quickly as possible.

☞ **AMS2500 Getting Started Guide**, MK-97DF8032

Provides quick-start instructions for getting an AMS 2500 storage system up and running as quickly as possible.

AMS 2000 Family Site Preparation Guide, MK-98DF8149

Contains site planning and pre-installation information for AMS 2000 Family storage systems, expansion units, and high-density expansion units. This document also covers safety precautions, rack information, and product specifications.

AMS 2000 Family Fibre Channel Host Installation Guide, MK-08DF8189

Describes how to prepare Hitachi AMS 2000 Family Fibre Channel storage systems for use with host servers running supported operating systems.

AMS 2000 Family iSCSI Host Installation Guide, MK-08DF8188

Describes how to prepare Hitachi AMS 2000 Family iSCSI storage systems for use with host servers running supported operating systems.

Storage and replication features

The following documents describe how to use Storage Navigator Modular 2 (Navigator 2) to perform storage and replication activities.

Storage Navigator 2 Advanced Settings User's Guide, MK-97DF8039

Contains advanced information about launching and using Navigator 2 in various operating systems, IP addresses and port numbers, server certificates and private keys, boot and restore options, outputting configuration information to a file, and collecting diagnostic information.

Storage Navigator Modular 2 User's Guide, MK-99DF8208

Describes how to use Navigator 2 to configure and manage storage on an AMS 2000 Family storage system.

AMS 2000 Family Dynamic Provisioning Configuration Guide, MK-09DF8201

Describes how to use virtual storage capabilities to simplify storage additions and administration.

Storage Navigator 2 Storage Features Reference Guide for AMS, MK-97DF8148

Contains concepts, preparation, and specifications for Account Authentication, Audit Logging, Cache Partition Manager, Cache Residency Manager, Data Retention Utility, LUN Manager, Performance Monitor, SNMP Agent, and Modular Volume Migration.

AMS 2000 Family Copy-on-write SnapShot User Guide, MK-97DF8124

Describes how to create point-in-time copies of data volumes in AMS 2100, AMS 2300, and AMS 2500 storage systems, without impacting host service and performance levels. Snapshot copies are fully read/write compatible with other hosts and can be used for rapid data restores, application testing and development, data mining and warehousing, and nondisruptive backup and maintenance procedures.

AMS 2000 Family ShadowImage In-system Replication User Guide, MK-97DF8129

Describes how to perform high-speed nondisruptive local mirroring to create a copy of mission-critical data in AMS 2100, AMS 2300, and AMS 2500 storage systems. ShadowImage keeps data RAID-protected and fully recoverable, without affecting service or performance levels. Replicated data volumes can be split from host applications and used for system backups, application testing, and data mining applications while business continues to operate at full capacity.

AMS 2000 Family TrueCopy Remote Replication User Guide, MK-97DF8052

Describes how to create and maintain multiple duplicate copies of user data across multiple AMS 2000 Family storage systems to enhance your disaster recovery strategy.

AMS 2000 Family TrueCopy Extended Distance User Guide, MK-97DF8054

Describes how to perform bi-directional remote data protection that copies data over any distance without interrupting applications, and provides failover and recovery capabilities.

AMS 2000 Data Retention Utility User's Guide, MK-97DF8019

Describes how to lock disk volumes as read-only for a certain period of time to ensure authorized-only access and facilitate immutable, tamper-proof record retention for storage-compliant environments. After data is written, it can be retrieved and read only by authorized applications or users, and cannot be changed or deleted during the specified retention period.

Storage Navigator Modular 2 online help

Provides topic and context-sensitive help information accessed through the Navigator 2 software.

Hardware maintenance and operation

The following documents describe how to operate, maintain, and administer an AMS 2000 Family storage system. They also provide a wide range of technical information and specifications for the AMS 2000 Family storage systems. The symbol ☞ identifies documents that contain initial configuration information about Hitachi AMS 2000 Family storage systems.

☞ **AMS 2100/2300 Storage System Hardware Guide**, MK-97DF8010

Provides detailed information about installing, configuring, and maintaining an AMS 2100/2300 storage system.

☞ **AMS 2500 Storage System Hardware Guide**, MK-97DF8007

Provides detailed information about installing, configuring, and maintaining an AMS 2500 storage system.

☞ **AMS 2000 Family Storage System Reference Guide**, MK-97DF8008

Contains specifications and technical information about power cables, system parameters, interfaces, logical blocks, RAID levels and configurations, and regulatory information about AMS 2100, AMS 2300, and AMS 2500 storage systems. This document also contains remote adapter specifications and regulatory information.

AMS 2000 Family Storage System Service and Upgrade Guide, MK-97DF8009

Provides information about servicing and upgrading AMS 2100, AMS 2300, and AMS 2500 storage systems.

AMS 2000 Family Power Savings User Guide, MK-97DF8045 — this document

Describes how to spin down volumes in selected RAID groups when they are not being accessed by business applications to decrease energy consumption and significantly reduce the cost of storing and delivering information.

Command and Control (CCI)

The following documents describe how to install the Hitachi AMS 2000 Family Command Control Interface (CCI) and use it to perform TrueCopy and ShadowImage operations.

AMS 2000 Family Command Control Interface (CCI) Installation Guide, MK-97DF8122

Describes how to install CCI software on open-system hosts.

AMS 2000 Family Command Control Interface (CCI) Reference Guide, MK-97DF8121

Contains reference, troubleshooting, and maintenance information related to CCI operations on AMS 2100, AMS 2300, and AMS 2500 storage systems.

AMS 2000 Family Command Control Interface (CCI) User's Guide, MK-97DF8123

Describes how to use CCI to perform TrueCopy and ShadowImage operations on AMS 2100, AMS 2300, and AMS 2500 storage systems.

Command Line Interface (CLI)

The following documents describe how to use Hitachi Storage Navigator Modular 2 to perform management and replication activities from a command line.

Storage Navigator Modular 2 Command Line Interface (CLI) Unified Reference Guide, MK-97DF8089

Describes how to interact with all Navigator 2 bundled and optional software modules by typing commands at a command line.

Storage Navigator 2 Command Line Interface Replication Reference Guide for AMS, MK-97DF8153

Describes how to interact with Navigator 2 to perform replication activities by typing commands at a command line.

Dynamic Replicator documentation

The following documents describe how to install, configure, and use Hitachi Dynamic Replicator to provide AMS Family storage systems with continuous data protection, remote replication, and application failover in a single, easy-to-deploy and manage platform.

Dynamic Replicator - Scout Release Notes, RN-99DF8211

Dynamic Replicator - Scout Host Administration Guide, MK-98DF8212

Dynamic Replicator - Scout Installation and Configuration Guide, MK-98DF8213

Dynamic Replicator - Scout Quick Start Guide, MK-98DF8214

Dynamic Replicator - Scout Host Troubleshooting Guide, MK-98DF8215

Dynamic Replicator DR-Scout ICAT Utility Guide, MK-98DF8216

Dynamic Replicator - Scout RX Server Deployment Guide, MK-98DF8217

Dynamic Replicator VX Solution for Oracle (Solaris), MK-98DF8218

Dynamic Replicator - Scout Solution for SharePoint 2007, MK-98DF8219

Dynamic Replicator - Scout Solution for MySQL (Windows), MK-98DF8220

Protecting Citrix XenServer Using Hitachi Dynamic Replicator - Scout, MK-98DF8221

Dynamic Replicator Quick Install/Upgrade Guide, MK-98DF8222

Dynamic Replicator - Scout Protecting MS SQL Server, MK-98DF8223

Dynamic Replicator - Scout - Protecting Microsoft Exchange Server, MK-98DF8224

Dynamic Replicator - Scout File Server Solution, MK-98DF8225

Dynamic Replicator - Scout ESX - Protecting ESX Server (RCLI), MK-99DF8226

Getting help

If you need to contact the Hitachi Data Systems support center, please provide as much information about the problem as possible, including:

- The circumstances surrounding the error or failure.
- The exact content of any messages displayed on the host system(s).
- The exact content of any messages displayed on Storage Navigator Modular 2.
- The Storage Navigator Modular 2 configuration information. This information is used by service personnel for troubleshooting purposes.

The Hitachi Data Systems customer support staff is available 24 hours a day, seven days a week. If you need technical support, please log on to the Hitachi Data Systems Portal for contact information: https://portal.hds.com

Comments

Please send us your comments on this document: doc.comments@hds.com. Include the document title, number, and revision, and refer to specific section(s) and paragraph(s) whenever possible.

Thank you! (All comments become the property of Hitachi Data Systems.)

1

Introduction

This chapter provides an overview of the Power Saving feature for the Hitachi Adaptable Modular Storage series.

This chapter covers the following key topics:

- Overview
- Power down best practices
- Power saving operations

Overview

Information technology (IT) executives are increasingly aware of how energy usage and costs affects their company and the environment.

For example, many companies are maxing out the power equipment in their data centers, which is needed to run and cool computing gear.

Excessive power and cooling demands can lead to failures, and as many data centers are running at dangerous levels of power consumption, they are at risk of failing due to a power shortfall. Many data centers will not have enough power or cooling capacity to meet demands by 2008 and they are at risk of experiencing data center downtime.

The Hitachi Adaptable Modular Storage (AMS) series enables companies to reduce energy consumption and significantly reduce the cost of storing and delivering information.

The Power Saving feature, which can be invoked on an as-needed basis, reduces rising energy and cooling costs, and strengthens your security infrastructure. Power Saving reduces electricity consumption by powering down the spindles of unused drives (stopping the rotation of unused disk drives) that configure a redundant array of independent disks (RAID) group. The drives can then be powered back up quickly when the application requires them.

Power Saving is particular useful for businesses that have large archived data or virtual tape library applications where the data is accessed infrequently or for a limited period of time.

In keeping with the Hitachi commitment to environmental responsibility without compromising availability or reliability, the Power Savings Service is available on Fibre Channel (FC) and serial ATA (SATA) disk drives on all AMS and WMS systems.

Power down best practices

You can power down the following:

- ShadowImage drive groups involved in backup to tape
- Virtual tape library (VTL) drive groups involved in backups
- Local or internal backups
- Drive groups within archive storage
- Unused drive groups

You can deliver savings by doing the following:

- Reduce electrical power consumption of idled hard drives
- Reduce cooling costs related to heat generated by the hard drives
- Extend the life of your hardware

Power saving operations

To use Power Saving, you must have a RAID group in the array. For the target RAID groups that cannot issue the power down instruction, see Power saving requirements on page 2-2.

NOTE: When a fibre channel HDD is in power down status, the LED blinks every 4 seconds. When a serial ATA HDD is in power down status, the LED is off and does not blink.

Power down

1. Make sure every volume is unmounted.
2. When LVM is used for the disk management, deport the volume or disk groups.
3. Using Navigator 2, power down the RAID group.
4. Using Navigator 2, confirm the RAID group status for one minute after powering down.

Power up

1. Using Navigator 2, power up the RAID group.
2. Using Navigator 2, confirm the RAID group status for several minutes after the powering up.
3. When you refer to the Power Saving Status and see that Normal (Spin Up) is displayed after a while, the power up is completed. Make a host mount the logical unit included in the RAID group (if the host uses the logical unit).

2

Specifications

This chapter provides information on the effects of Power Saving, its requirements, and some operating system notes.

This chapter covers the following key topics:

- Power saving effects
- Power saving requirements
- Operating system notes

Power saving effects

Table 2-1 lists the effects of Power Saving.

Table 2-1: Power Saving Effects

Expansion Cabinet Type	During input/output (I/O) operation Unit: validation authority (VA)	During Power Saving (Unit: VA)	Effect: Percentage of the saving of the electric power consumption
RKAJ	520	300	42%
RKAJAT	480	240	50%

NOTE: When you refer to the Power Saving Modes and Normal (Spin Up) appears, the power-up is completed. If the host uses a logical unit, it must mount it.

Power saving requirements

This section describes what is required for Power Saving.

Start of the power down operation

AMS monitors commands when it receives a power down instruction from a host or a program. The power down can fail if the system detects commands within one minute from the initial power down instruction. When issuing the power down instruction to multiple RAID groups, each RAID groups is spun down respectively. However, the monitoring continues until all RAID groups are spun down.

RAID groups that cannot power down

- The RAID group that includes the system drives (drives 0 to 4 of the basic cabinet)
- The RAID group that includes the SCSI Enclosure Service (SES) drives of the fibre channel drives (drives 0 to 3 of each extended cabinet
- The RAID group for ShadowImage, TrueCopy, or TCE, including a primary volume (P-VOL) or a S-VOL in a pair status other than SMPL and PSUS
- The RAID group for SnapShot, including a V-VOL
- The RAID group, including a volume whose pair is not released during the Volume Migration, or is released after the Volume Migration is completed
- The RAID group, including a logical unit that is being formatted
- The RAID group, including a logical unit to which the parity correction is being performed
- The RAID group, including a logical unit for POOL

- The RAID group, including a logical unit for the differential management logical unit (DM-LU).
- The RAID group, including a logical unit for the command device.
- The RAID group, including a system logical unit for the network-attached storage (NAS).

Things that can hinder power down or command monitoring

- The instruction to power down cannot be issued while the microcode is replaced
- The I/O command from the host
- The paircreate, paircreate -split, pairresync, or pairresync -restore command of ShadowImage
- The pairresync -restore command of SnapShot
- The paircreate, paircreate -nocopy, pairresync, pairresync -swaps, or pairresync -swapp command of TrueCopy
- The paircreate, paircreate -nocopy, or pairresync command of TrueCopy Extended (TCE)
- Executing Volume Migration
- Creating a logical unit
- Deleting the RAID group
- Formatting a logical unit
- Executing the parity correction of a logical unit
- Setting a logical unit for POOL
- Setting a logical unit for DM-LU
- Setting a logical unit for the command device
- Setting a system logical unit for NAS
- Setting a user logical unit for NAS

Number of times the same RAID group can be powered down

The same RAID group can be powered down up to seven times a day.

Extended power down (health check)

To prevent the drive heads from sticking to the disk surface, RAID groups that are powered down for 30 days are powered up for 6 minutes, and then powered down again. Although the drives are powered up temporarily, no host I/O can be accepted in this period.

When the power down and the health check instructed by Navigator 2 are completed, you can change the date when the RAID groups are powered down.

The RAID groups accept instructions to power up from Navigator 2 during the health check, and enter power up status. The RAID groups do not enter power down status immediately after they accept the instruction. Instead, they continue the operation, undergo the health check for 6 minutes, and then power down.

When the planned power down is done during the health check, the health check is performed again for 6 minutes after the power is turned on.

If the RAID groups are powered down for 30 days, they are powered up and a health check is performed. After the health check is completed and no problems occur, the system powers the RAID groups down again. This happens every time the RAID groups are powered down for 30 days.

Turning off of the array

The power down information is still valid even if the array is turned off and then on. When the array is turned on, all the installed drives are spun up one time, and the drives that were spun down when the array was turned off remain spun down.

When you restart the array or perform the planned shutdown, execute the power down after verifying that the command monitoring is not being performed.

Time required for powering up

The power up time of RAID groups depends on the number of drives that configure the RAID group. Typical power up times are shown below.

- 2 to 15 drives: 45 seconds
- 16 to 30 drives: 90 seconds
- 31 or more drives: (Number of drives) / 15 X 45

For example, if the number of drives configuring the RAID group is 80, the power up time is 240 seconds, because 80 divided by 15 and then multiplied by 45, is 373.

NOTE: A system drive is the drive where the firmware is stored. An SES (SCSI Enclosure Service) drive is where the information in each extended cabinet is stored. When the command monitoring is operating, the power down fails; the operation instructed by the command is suppressed in the power down status.

Operating system notes

This section describes notes for each operating system.

Advanced Interactive eXecutive (AIX)

- If the host reboots while the RAID group is spun down, the Ghost Disks occurs. When using the volume concerned, delete the Ghost Disks and validate the defined disks after completing the power up of the RAID group concerned.

- When the LVM is used, after making the volume group of LVM including a logical unit of the RAID group to be spun down offline, power down the RAID group.

Linux

- When the LVM is used, power down the volume group after making the volume group offline and exporting it. When the LVM is not used, power down the volume group after unmounting it.
- When middleware such as Veritas Storage Foundation for Windows is used, specify power down after deporting the disk group.

Hewlett Packard UNIX (HP-UX)

After making the volume group of LVM including a logical unit of the RAID group to be spun down offline, power down the RAID group.

Windows

- Mount or unmount the volume using the command control interface (CCI) command (***Note***).

For example:

pairdisplay -x umount D:\hd1

- When middleware such as Veritas Storage Foundation for Windows is used, deport the disk group. Do not use the mounting or unmounting function of CCI.

Solaris

- When Sun Volume Manager is used, perform the power down after releasing the disk set from Solaris.
- When middleware such as Veritas Storage Foundation for Windows is used, specify power down after deport the volume group.

NOTE: For more information, see the Hitachi Adaptable Modular Storage and Workgroup Modular Storage Command Control Interface (CCI) User and Reference Guide, and the Hitachi Simple Modular Storage Command Control Interface (CCI) User's Guide.

3

Preparation

This chapter provides instructions for installing, uninstalling, enabling, and disabling Power Saving using Navigator 2. To do this with the CLI, see CLI operations on page 7-1.

- Installing
- Uninstalling
- Enabling or disabling

NOTE: Installing, uninstalling, enabling, and disabling Power Saving is set for each array. Before installing and uninstalling, make sure the array is operating correctly. If a failure such as a controller blockade has occurred, you cannot install or uninstall Power Saving.

Installing

You must install Power Saving before you can use this feature. To install Power Saving, you must have the key code or key file.

1. Start Navigator 2.
2. Log in as a registered user.
3. Select the AMS system where you are installing Power Saving.
4. Click **Show & Configure Array**.
5. Click **Install Licenses**, as shown in Figure 3-1.

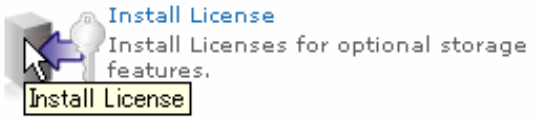

Figure 3-1: Install License Icon

The Install License window appears (Figure 3-2).

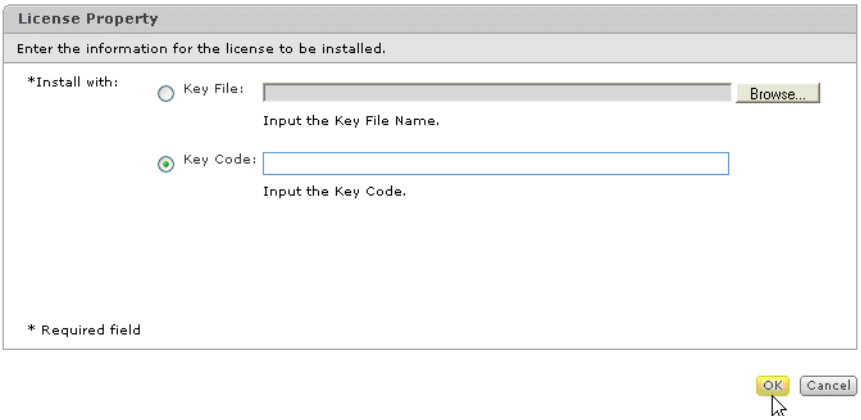

Figure 3-2: Install License Window

6. If you are using the key code, click the **Key Code** radio button, then set up the key code. If you are using the key file, click the **Key File** radio button, and then set up the path for the key file. When you are done, click **OK.**
7. If you use the key file, make sure that Power Saving is selected, and then click **Confirm** (Figure 3-3).

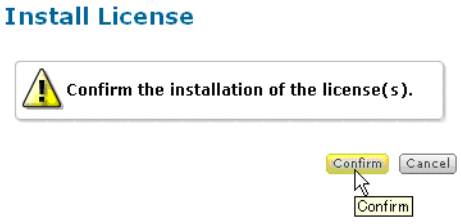

Figure 3-3: Confirmation Dialog Box

8. Click **Close** to complete the license installation (Figure 3-4).

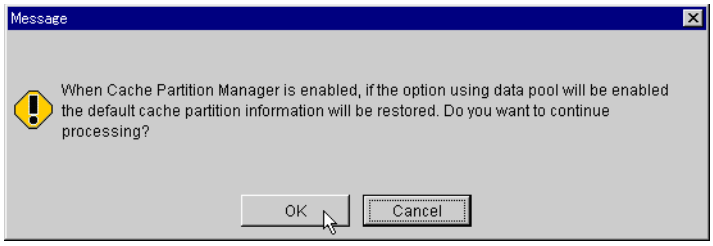

Figure 3-4: Install License Completion

Uninstalling

To uninstall Power Saving, you must have the key code or key file for this feature and you must use Navigator 2.

NOTE: RAID groups must not exit in power down, failure, and health check states.

1. Start Navigator 2.
2. Log in as a registered user.
3. Select the AMS system where you are uninstalling Power Saving.
4. Click **Show & Configure Array**. Figure 3-5 appears.

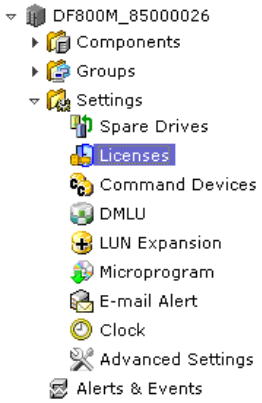

Figure 3-5: Licenses Icon

5. Click **Licenses**. The licenses list appears.

6. Click **De-Install License**. The License Property window appears, as shown in Figure 3-6.

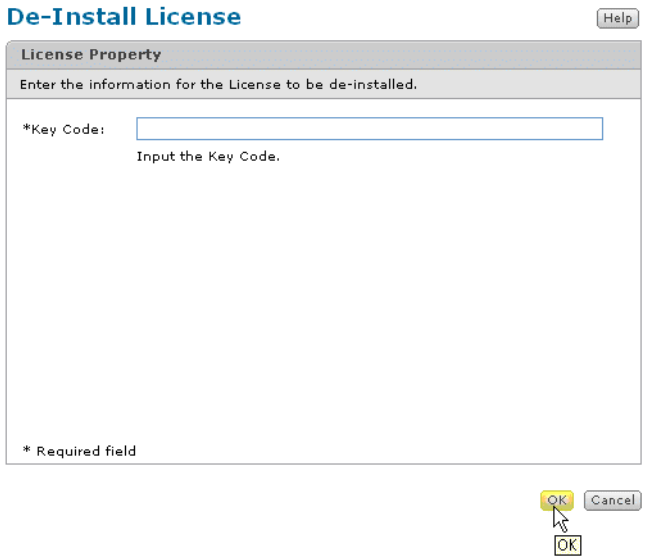

Figure 3-6: License Property Window

7. Enter a key code, and then click **OK**.
8. Click **Close** to finish uninstalling Power Saving.

Enabling or disabling

Power Saving can be disabled or enabled.

NOTE: RAID groups must not exit in the power down, failure, and health check states.

1. Start Navigator 2.
2. Log in as a registered user.
3. Select the AMS system where you are enabling or disabling Power Saving.
4. Click **Show & Configure Array**. Figure 3-7 appears.

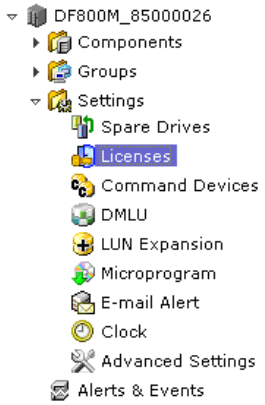

Figure 3-7: Licenses Icon

5. Click **Licenses**. The licenses list appears.
6. Click **Change Status.** The License Property window appears, as shown in Figure 3-8.

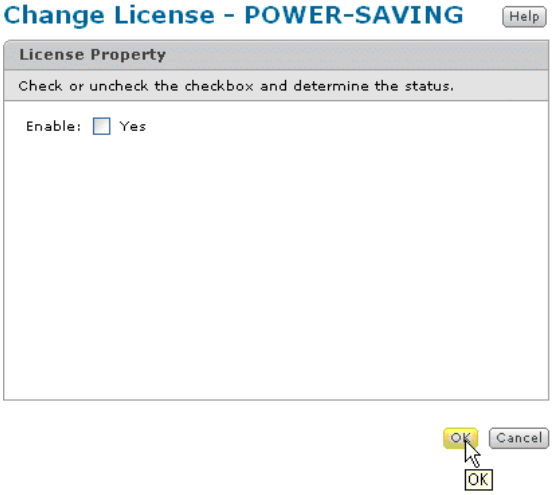

Figure 3-8: License Property Window

7. Select **Yes** to enable Power Saving; otherwise, clear the checkbox.
8. Click **Close** to finish.

4

Using Navigator 2

This chapter provides instructions for viewing Power Saving modes, and powering up or down disks using Navigator 2. To do this with the CLI, see CLI operations on page 7-1.

- Viewing Power Saving status
- Powering down
- Powering up
- Viewing logical unit information in a RAID group

Viewing Power Saving status

The disk drive information displayed by an operating system or a program when the disk drive is spun down and spun up may be different because reading or writing to a disk drive cannot be performed in power down status.

1. Start Navigator 2.
2. Log in as a registered user.
3. Select the AMS system where you are enabling or disabling Power Saving.
4. Click **Show & Configure Array**.
5. Click **Advanced Settings**.
6. Click **Open Advanced Settings**. After a couple of minutes, a dialog box appears.
7. Click the **Power Saving** icon. The power saving information appears (Figure 4-1).

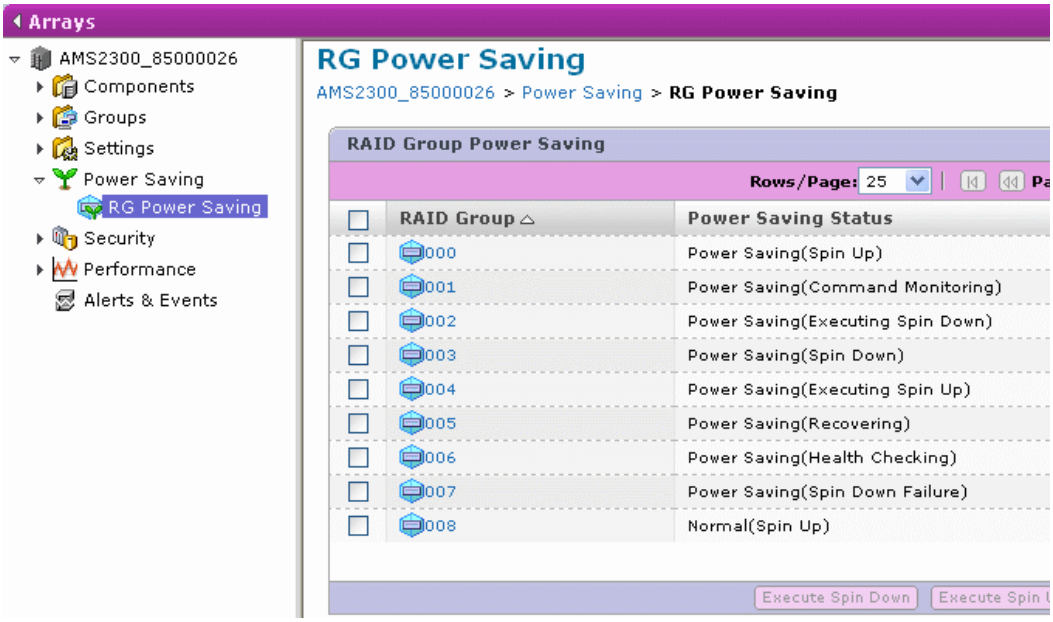

Figure 4-1: Power Saving Information

Table 4-1: Power Saving Details

Items	Contents
RAID Group	The RAID group appears.
Power Saving Status	The power saving information appears. Normal (Spin Up): The status in which the drive is operating (being operated). Normal (Command Monitoring): The status in which an issue of a host command is monitored before the drive is spun down. Power Saving (Executing Spin Down): The status in which the spin-down processing of a drive is being executed. Power Saving (Spin Down): The status in which the drive is being spun down. Power Saving (Spin Up Executing): The status in which the spin-up processing of a drive is being executed. Power Saving (Recovering): The status in which the completion of a failure recovery processing is being waited. Power Saving (Health Checking): The status in which the drive has been spun up in order to prevent its head from sticking the disk surface. Normal (Spin Down Failure: Error): The status in which the spin-down processing failed because of a failure. Normal (Spin Down Failure: Host Command): The status in which the spin-down processing failed because of an issue of a host command. Normal (Spin Down Failure: Non-Host Command): The status in which the spin-down processing failed because of an issue of a command other than a host command. Normal (Spin Down Failure: Host Command/Non-Host Command): The status in which the spin-down processing failed because of an issue of a host command and a command other than a host command.

NOTE: The Power Saving Mode includes the power up and down of the drives that configure the RAID group. The RAID group does not show the mode of each drive.

Powering down

For the RAID groups that are not available, see Power saving requirements on page 2-2. You can specify more than one RAID group.

1. Start Navigator 2.
2. Log in as a registered user.
3. Select the system you want to view information about.
4. Click **Show & Configure Array**.
5. Select the **RG Power Saving** icon in the **Power Saving** tree view.
6. Select the RAID group that you will spin down and click **Execute Spin Down**.
7. The logical unit information included in the specified RAID group is displayed. Verify that the spin-down does not cause a problem, and click Confirm.

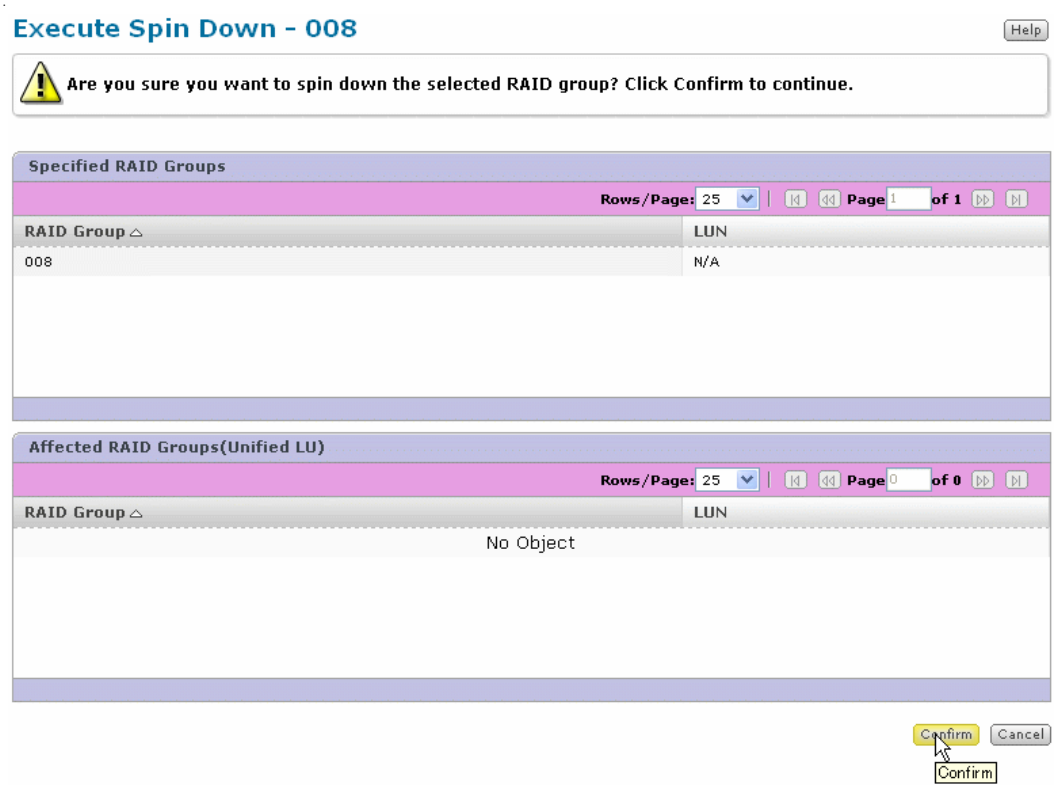

Figure 4-2: Specifying Spin Down

8. Add a check mark to the box and click **Confirm**.

Figure 4-3: RAID Group Spin Down Confirmation Message

9. The resulting message appears. Click **Close**.

Figure 4-4: Execute Spin Down

10. After you power down one RAID group, check the power saving status after one or two minutes have passed. When you power down two or more RAID groups, check the status after two or more minutes have passed.

Table 4-2: Power Down Errors and Recommended Action

Cause	Recommended Action
Host Command	A command was issued by a host to a logical unit that is included in the RAID group to which an instruction to power down had been issued. Check if the RAID group instructed to power down is correct. When the RAID group is correct, instruct it to power down in the status in which no command has been issued.
Non-Host Command	Each logical unit in the paired state, such as PAIR, must be included in the RAID group instructed to power down. Check that the RAID group instructed to power down is correct, and reissue the instruction to power down.
Error	A failure has occurred in the RAID group that was instructed to power down. After a recovery from the failure is completed, issue an instruction to power down again.

Notes

- Only one power down instruction per minute can be issued. Before powering down, make sure that all volumes are unmounted. After powering down the LVM volume group offline, power down the RAID group.
- Do not use RAID group volumes that are going to be powered down.
- If there is a mounted volume, unmount it.
- When the logical volume manager (LVM) is used for the disk management, (for example, Veritas) unmount the volume or disk groups.
- Before issuing a power down instruction, verify that all previously issued power down instructions are completed. If the power down fails, verify that the RAID group you want to power down is not in use, and then power it down again.
- When issuing a power down instruction, if a command is issued by a host or a program during the command monitoring, the power down fails. When the array restarts or performs the planned shutdown during the command monitoring, the monitoring continues after the array restarts.
- If a host or a program issues a command after the array restarts, the power down fails.
- In power down status, data reading or writing in a RAID group logical unit cannot be done. Instruct the RAID group to power up, verify that the Power Saving Mode in the operation window of Navigator is Normal (Power Up), and then perform the data reading/writing.
- An instruction to power down in the middle of the power up cancels the original instruction. Only the final instruction occurs.

Powering up

Power up a RAID group after it has been powered down. You can specify more than one RAID group.

1. Start Navigator 2.
2. Log in as a registered user.
3. Select the system and RAID group you want to power up.
4. Click **Show & Configure Array**.
5. Select the **RG Power Saving** icon in the **Power Saving** tree view.
6. Select the RAID group that you will spin up.
7. Click **Execute Spin Up**.
8. The logical unit information included in the specified RAID group is displayed. Verify that the spin-up does not cause a problem, and click **Confirm**.

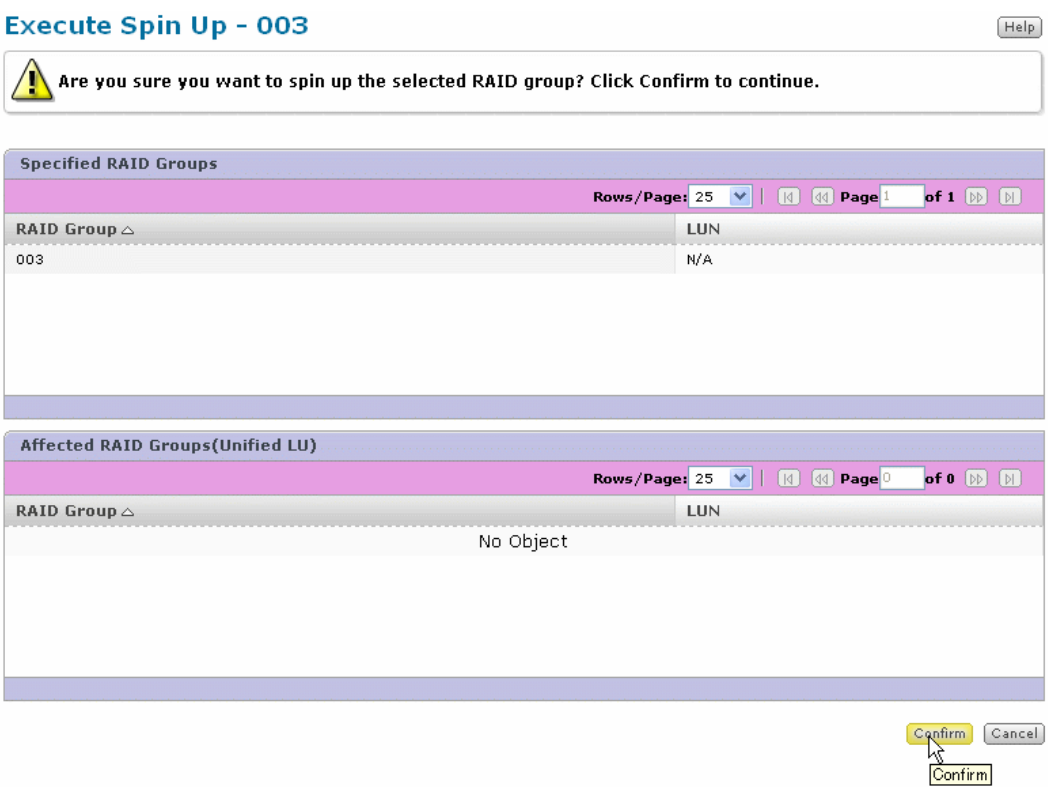

Figure 4-5: Specifying Spin Up

9. The resulting message appears. Click **Close**.

Figure 4-6: Confirmation message

Notes

- Depending on the status of the array, more time may be required to complete the power up.
- An instruction to power up in the middle of the power down cancels the original instruction. Only the final instruction occurs.

NOTE: When you refer to the Power Saving Mode and Normal (Spin Up) appears, the power up is completed. If the host uses a logical unit, it must mount to it.

Viewing logical unit information in a RAID group

This section describes how to view logical unit information for a RAID group.

1. Start Navigator 2.
2. Log in as a registered user.

3. Select the system you want to view information on.
4. Click **Show & Configure Array**.
5. Click **Advanced Settings**.
6. Click **Open Advanced Settings**. After a couple of minutes, a dialog box appears.
7. Click the **Power Saving** icon. Figure 4-7 appears.

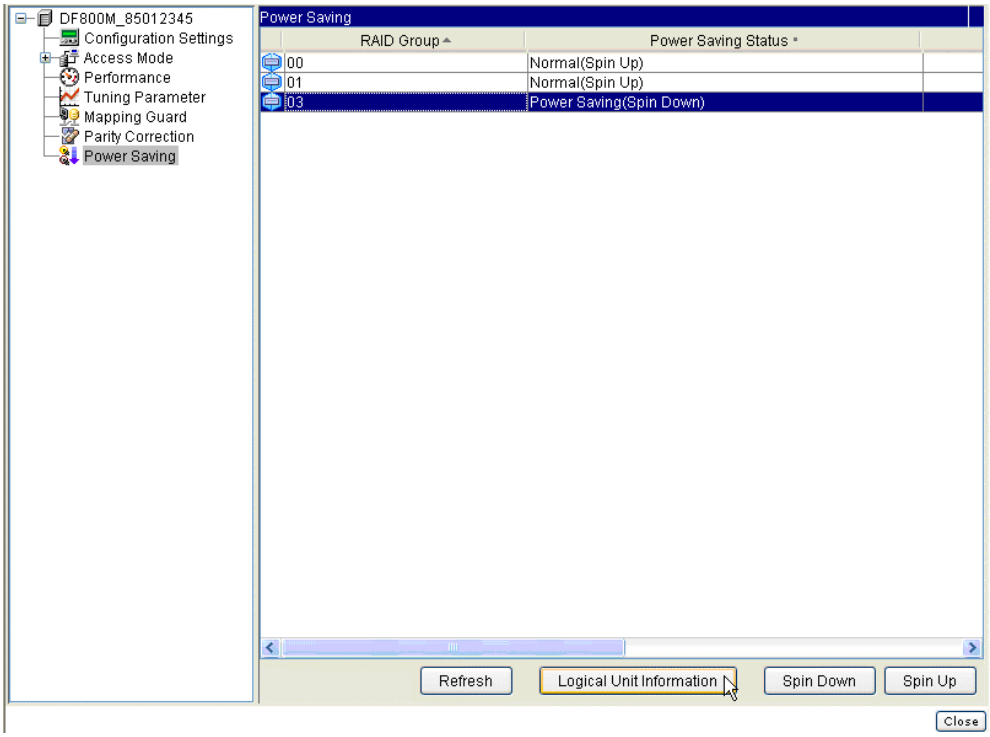

Figure 4-7: Array System Viewer

8. Click **Logical Unit Information**.
9. When you are done, click **Close**.

5

Troubleshooting

This chapter provides information to help you identify and resolve problems when using Power Saving.

- Failure notes

Failure notes

- When the system or the spare drive at the position of the FC SES drive is used, you must perform the backup in the same way as that the Spare Drive Operation Mode Fixed, even if the Spare Drive Operation Mode is set to Variable.
- When a failure occurs during the power down in a RAID group other than RAID 0, the array lets the RAID group power up and then makes it power down after restoring the failure. However, if a failure occurs while a RAID group is spun down, the drives being spun down are spun up and the power down fails. The drives are not spun down automatically after the failed drive is replaced.
- The drives in the power down status in the cabinet where a FC SES failure occurs are spun up. After the SENC failure is restored, the RAID group that has been instructed to power down is spun down.

6

Examples of setting up Power Saving

This chapter provides use case examples when implementing Power Saving in the Hitachi Data Protection Suite (HDPS) using the Navigator 2 CLI and Account Authentication for a Windows and UNIX environment.

These use cases are only examples, and are only to be used as reference. Your particular use case may vary.

- Overview
- Security
- HDPS AUX-Copy plus aging and retention policies
- HDPS Power Saving vaulting
- HDPS sample scripts

Overview

These use cases focus on integrating Power Saving with HDPS by creating a power up and power down script which is called by the application before and after executing a disk-to-disk backup.

Power Saving implementations require the following:

- Detailed knowledge of the data environment; Service Level agreements; policies and procedures
- Knowledge in developing storage scripts
- A WMS or AMS array
- Storage Navigator GUI and CLI
- Power Savings feature enabled on the array
- Account authentication feature enabled on the array
- LUN Mapping
- Power up script
- Power down script

Power Saving powers down and powers up hard disk drives (HDDs) that contain logical units. You must be aware of where the target data is located, which applications access the data, and how often and what happens if the data is not available. Storage layout is critical. Target Power Saving storage should have a minimal number of application access (preferably only one application). Data availability service level agreements (SLAs) must be understood and modified if required.

To simplify the implementation of Power Saving, Hitachi provides sample scripts. These sample scripts are provided as a learning tool only and are not intended for production use. You must be familiar with script writing and the Navigator 2 CLI.

Security

This use case provides two levels of security. The first level is the array built-in security provided by Hitachi Account Authentication. Account authentication is required, and provides role based array security for the Navigator GUI and protection from rogue scripts.

The second level of security is provided by the HDPS (CommVault) console. Only authorized users can login to the CommVault console and schedule backups.

Account authentication requires that external scripts obtain the appropriate credentials (usernames/passwords). After the appropriate credentials are obtained, the scripts run in the context of that user. The scripts are stored on the MediaAgent and their permissions are dictated by the host operating system.

Set the account authentication password by using the simple network manager (SNM) CLI to specify the following environment parameters and commands.

%set STONAVM_ACT=on

set User ID and password with the auacountenv command

[Manual operation] Only once at setting-up account authentication.

% accountenv -set -uid xxxxxx (xxxxxx: User ID)

Are you sure you want to set the account information? (y/n [n]): y

Please input password. password: yyyyyyy (where yyyyyyy is the password).

To bypass having to answer the confirmation questions: Confirming Command Execution (% set STONAVM_RSP_PASS=on)

HDPS AUX-Copy plus aging and retention policies

AUX-Copy is an HDPS feature that copies a data set which can then be powered down.

In Figure 6-1, HDPS is copying data from the P-VOL to the S-VOL using the auxiliary copy function. After the data is copied, Power Saving powers down the RAID group.

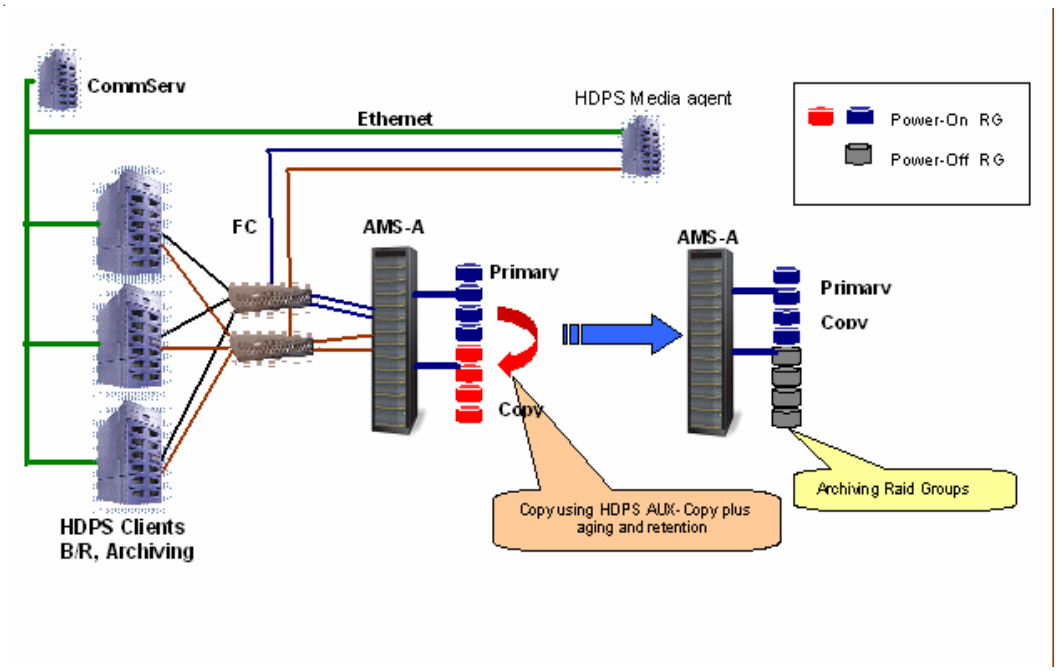

Figure 6-1: HDPS AUX-Copy Plus Aging and Retention

HDPS Power Saving vaulting

Figure 6-2 and Figure 6-3 show the HDPS Power Saving vaulting process.

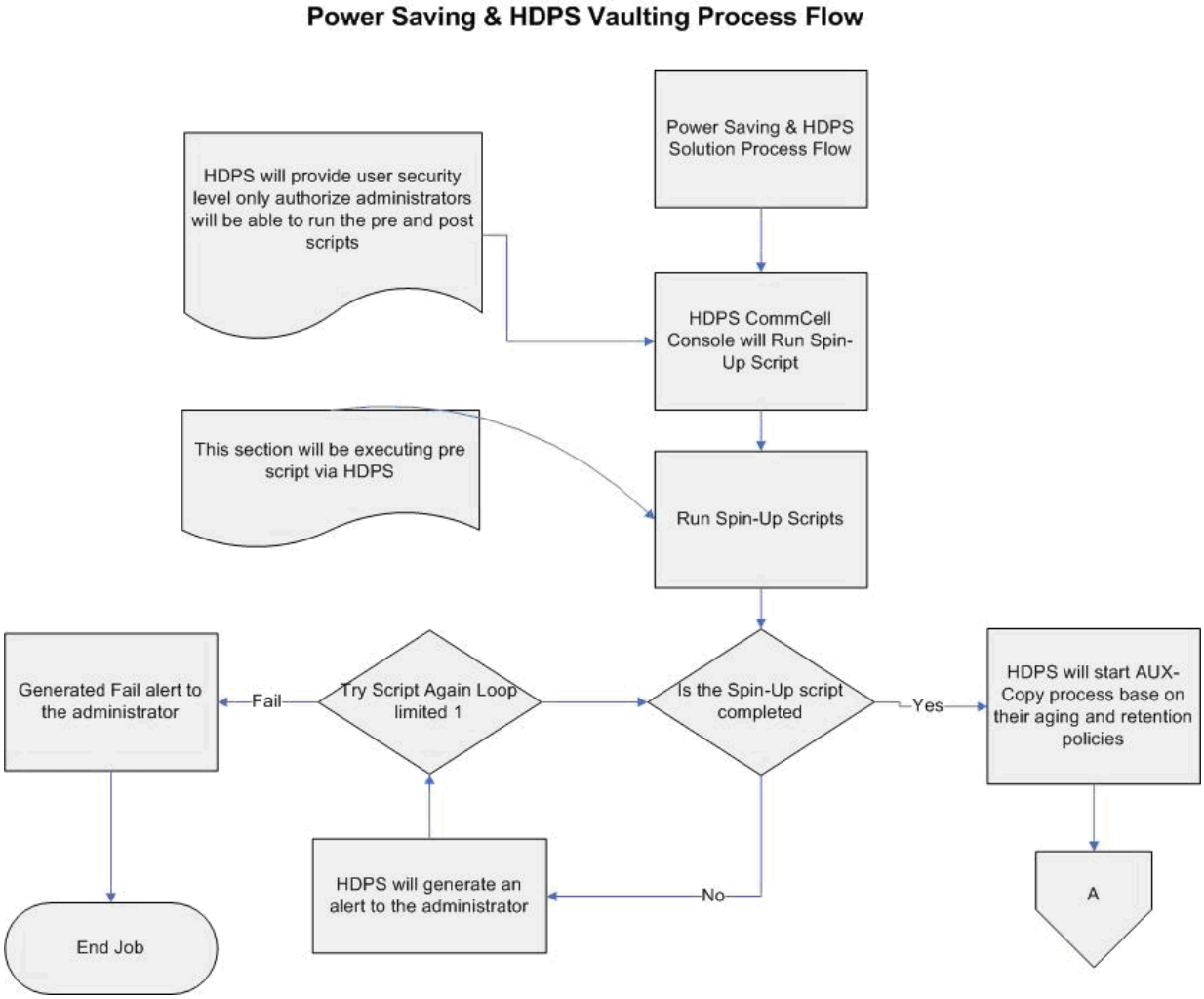

Figure 6-2: HDPS With Power Saving Process Flow (1/2)

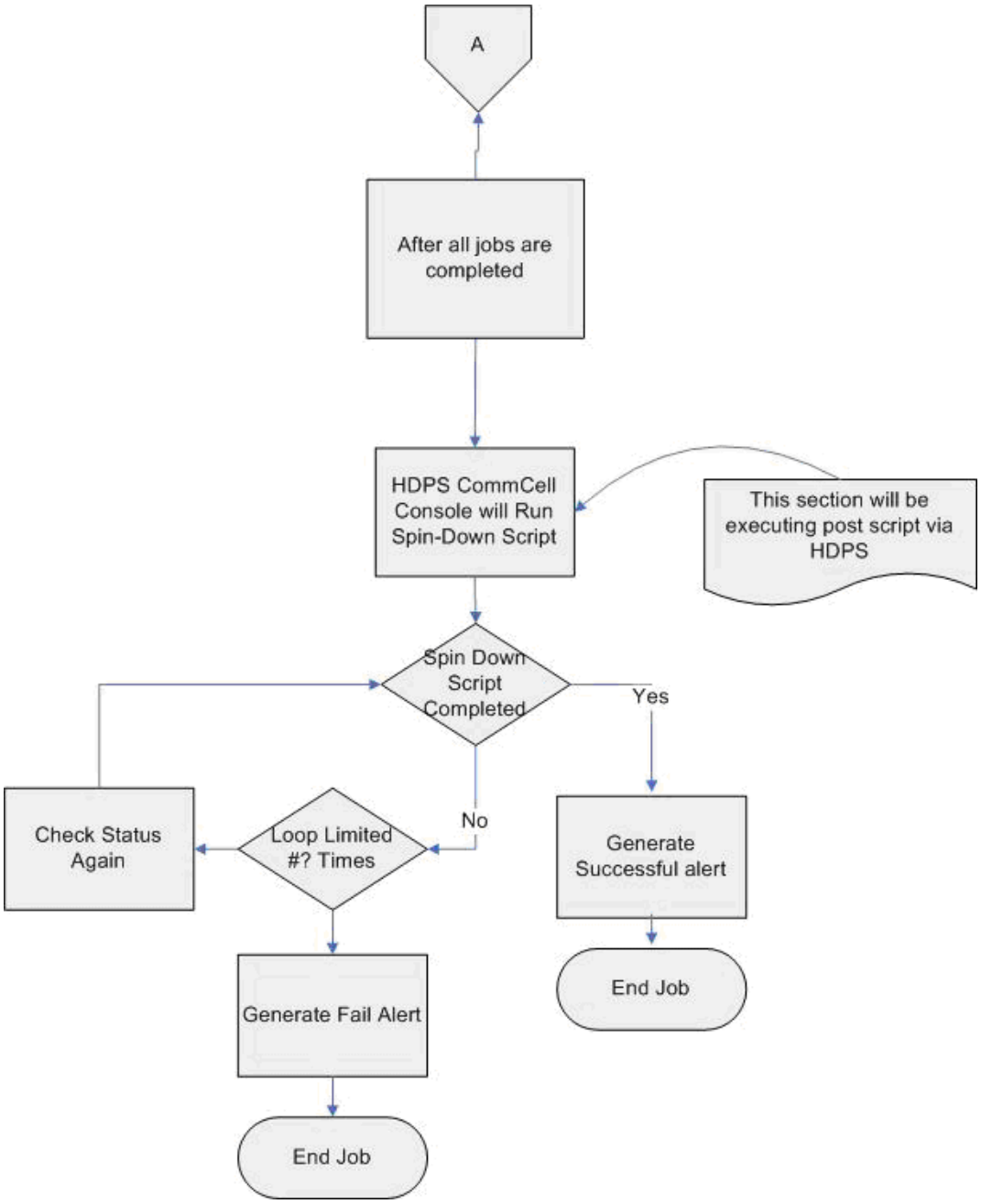

Figure 6-3: HDPS With Power Saving Process Flow (2/2)

HDPS sample scripts

This section provides examples of how Power Saving scripts can be written and used in a HDPS Windows and UNIX environment. These are only snapshots of sample scripts, and do not include the whole script. Sample scripts are included in the installation CD. For customized scripts, contact your service delivery team.

```
echo off

setlocal

if not defined GALAXY_BASE set GALAXY_BASE=C:\Program Files\CommVault
Systems\Galaxy\Base

##########################################################################################
##RUN POWER ON SCRIPT HERE

##########################################################################################

set PATH=%PATH%;%GALAXY_BASE%



set tmpfile="aux_script.bat.tmp"



qlogin -cs “gordon.marketing.commvault.com” -u “cvadmin” -p “jhN;0w7” > c:\loginerr.txt

if %errorlevel% NEQ 0 (

        echo Login failed. > c:\cmdlog.txt

        goto :EOF )



qoperation auxcopy -af “c:\aux_script.bat.input”  > %tmpfile%

if %errorlevel% NEQ 0 (

        for /F “tokens=1* usebackq" %%i in (%tmpfile%) do echo %%i %%j

        echo Failed to start job.

        goto end )
```

Windows scripts

This is only a snapshot of a sample Power Saving script for Windows, and does not include the whole script.

Power down and power up

This is a snapshot of the sample script when powering down and up in Windows.

```
'/*++

'Copyright (c) Hitachi Data Systems Corporation

'@Module Name:

'    hds-ps-script.vbs

'@Description:

'    Script to power up and power down raid groups for a given set of volumes.

'@Revision History:

'    08/07/2007 (HDS)

'          v1.0  - Initial script version

'--*/

'////////////////////////////////////////////

'//

'//Customer specific setting

'Set the SNM User Name / password / CLI directory

const HDS_DFUSER=""

const HDS_DFPASSWD=""

const HDS_STONAVM_HOME="C:\Program Files\Storage Navigator Modular CLI"
```

Using a Windows power up and power down script

This is an example of how to use a script when setting up Power Saving for Windows.

1. Create a single logical unit on a RAID group. The Raid Group can be any size and type.
2. Install SNM CLI on the host where the scripts are going to run (Media Server).
3. Register the arrays with SNM CLI. Refer the Storage Navigator Modular CLI User Guide for command details.

   ```
   auunitadd –unit <name> -LAN –ctl0 <ip of ctl0> -ctl1 <ip of ctl1>
   ```

4. Create a user account ID that HDPS (Hitachi Data Protection Suite) will use to power down the drives using the SNM CLI.

   ```
   auaccount –unit <name> -add –uid <userid> -account enable –rolepattern 000001
   ```

5. Install the scripts in the same directory where SNM CLI is installed.
   a. Copy the script files **hds-ps-app.exe** and **hds-ps-script.vbs** to the SNM CLI directory.

      The hds-ps-app.exe is a stand-alone executable used by the Windows power saving script to obtain Windows volume ID information and AMS Array information (for example, the array serial number and LU number).

      The power saving script captures the output of the hds-ps-app.exe when performing various script actions.

      hds-ps-app.exe -volinfo <volume drive letter or mount point>

      displays the Windows volume ID information.

      hds-ps-app.exe -diskextents <volume drive letter or mount point> displays the Windows disk mapping information for the volume.

      hds-ps-app.exe -psluinfo <volume drive letter or mount point> displays all the volume information required by the power saving script.

   b. Set these variables in the script under Customer specific setting.

      –HDS_STONAVM_HOME

set to install the SNM CLI directory (specify the complete path. For example C:\Program Files\Storage Navigator Modular CLI.

      HDS_DFUSER

set to the user ID you defined when you created your account.

      HDS_DFPASSWD

set to the password you defined when you created your account.

6. Log files: The script files generate a log file (pslog.txt) under the directory <SNM CLI path>\PowerSavings.
7. Map files: The script generates a volume map file (.psmap) under the directory <SNM CLI path>\PowerSavings.

CAUTION! Do not delete *.psmap files under the PowerSavings directory because they are required by the script to power up raid groups.

8. Error codes: The script returns the following error codes.
   - 0 - The script completed successfully.
   - 1 - Invalid argument/parameter passed to the script.
   - 2 - The specified volume is not valid.
   - 3 - The unmount volume operation failed.
   - 4 - The mount volume operation failed.
   - 5 - Power down failed.
   - 6 - The customer specific settings in the script are not valid.

Powering down

This is an example of how to use the sample script when powering down in Windows.

This unmounts the list of volumes (separated by a space) and powers down the raid group that supports it. The list of volumes can be drive letters or mount points.

```
cscript –nologo  hds-ps-script.vbs  -powerdown <list of volumes>
```

For example:

```
cscript  –nologo  hds-ps-script.vbs -powerdown y: c:\mount
```

Powering up

This is an example of how to use the sample script when powering up in Windows.

This mounts the list of volumes (separated by space) and powers up the raid group that supports it. The list of volumes can be drive letters or mount points.

```
cscript –nologo  hds-ps-script.vbs  -powerup <list of volumes>
```

For example:

```
cscript  –nologo  hds-ps-script.vbs -powerup y: c:\mount
```

UNIX scripts

This is only a snapshot of a Power Saving sample script for UNIX, and does not include the whole script.

Power down

This is a snapshot of the sample script when powering down in UNIX.

```
#!/bin/ksh

# PowerOff.ksh

# Arguments:

#  1 - Mount Point to issue Power Saving OFF function

# Prerequisites:

#  1 - Mountpoint is set in /etc/vfstab file

# Version History:

#  v1.0 - HDS.com : Initial Development

###### Only change these variables ######

# Set STONAVM_HOME to where Storage Navigator Modular is installed

export STONAVM_HOME=/opt/snm7.11

# Set SNMUserID to the userid create in Account Authentication

SNMUserID=jpena
```

```
# Set SNMPasswd to the password for the userid set as SNMUserID
SNMPasswd=sac1sac1
## Don't change anything below ##
# Assign mount point parameter to variable
if [[ "$1" = "" ]] then
  echo Usage: $0 "<Mount_Point>"
  echo Example: $0 /backup01
  exit 1
fi
MntPoint=$1
# Check to see if Mount Point is currently mounted
RC=`mount -p | grep " $MntPoint " | wc -l`
if [[ $RC -eq 0 ]] then
  echo Mount Point \"$MntPoint\" is not currently mounted
  exit 2
```

Power up

This is a snapshot of the sample script when powering up in UNIX.

```
#!/bin/ksh
# PowerOn.ksh
# Arguments:
#  1 - Mount Point to issue Power Saving ON function
# Prerequisites:
#  1 - Mountpoint is set in /etc/vfstab file
# Version History:
#  v1.0 - Joe.Pena@HDS.com : Initial Development
###### Only change these variables ######
# Set STONAVM_HOME to where Storage Navigator Modular is installed
export STONAVM_HOME=/opt/snm7.11
# Set SNMUserID to the userid create in Account Authentication
SNMUserID=jpena
# Set SNMPasswd to the password for the userid set as SNMUserID
SNMPasswd=sac1sac1
## Don't change anything below ##
# Assign mount point parameter to variable
if [[ "$1" = "" ]] then
  echo Usage: $0 "<Mount_Point>"
```

```
  echo Example: $0 /backup01
  exit 1
fi
MntPoint=$1
# Check to see if Mount Point is currently mounted
RC=`mount -p | grep " $MntPoint " | wc -l`
if [[ $RC -ne 0 ]] then
  echo Mount Point \"$MntPoint\" is currently mounted
  exit 2
```

Using a UNIX power down and power up script

This is an example of how to use the sample script when setting up Power Saving for UNIX.

1. Create a single LDEV (LU) on a Raid group. The Raid Group can be any size and type.
2. Install SNM CLI on the host where the scripts are going to run (Media Server).
3. Register the arrays with SNM CLI.

   ```
   auunitadd –unit <name> -LAN –ctl0 <ip of ctl0> -ctl1 <ip of ctl1>
   ```

4. Create a user account ID that HDPS (Hitachi Data Protection Suite) will use to power down the drives using the SNM CLI.

   ```
   auaccount –unit <name> -add –uid <userid> -account enable –rolepattern 000001
   ```

5. Install the scripts in the same directory where SNM CLI is installed.
   a. **`PowerOn.ksh`**, **`PowerOff.ksh`**, and **`inqraid.exe`**. Make sure all have a permission of -r-x------ and are owned by the root. The **`inqraid`** command tool confirms and displays details of the HDD connection between the array and the host computer. For more information, see the Command Control Interface (CCI) User's and Reference Guide.
   b. Set the variables in the script.

      ```
      STONAVM_HOME
      ```

   set to install the SNM CLI directory.

      ```
      SNMUserID
      ```

   set to the userid you defined when you created your account.

      ```
      SNMPasswd
      ```

   set to the password you defined when you created your account.
6. Make sure that all the file systems that are going to be mounted and unmounted are in the mount tab file for your operating system. For example:

   ```
   Solaris - /etc/vfstab
   ```

Powering down

This is an example of how to use the sample script when powering down in UNIX. This unmounts the file system and powers down the raid group that supports it.

```
PowerOff.ksh
```

For example:

```
PowerOff.ksh /backup01
```

Powering up

This is an example of how to use the sample script when powering up in UNIX. This mounts the file system and powers up the raid group.

```
PowerOn.ksh
```

For example:

```
PowerOn.ksh /backup01
```

7

CLI operations

This chapter describes how to perform basic Power Saving operations using the CLI.

- Installing
- Uninstalling
- Enabling or disabling
- Viewing power saving status
- Powering down
- Powering up

NOTE: Installing, uninstalling, enabling, and disabling Power Saving is set for each array. Before installing and uninstalling, make sure that the array is in operating correctly. If a failure such as a controller blockade has occurred, you cannot install or uninstall Power Saving.

Installing

You must install Power Saving before you can use this feature. To install Power Saving, you must have the key code or key file.

1. From the command prompt, register the array where you are installing Power Saving, and the connect to the array.
2. Refer to the following examples.

   When Cache Partition Manager is enabled:

```
% auopt -unit array-name -lock off -keycode manual-attached-keycode

Are you sure you want to unlock the option?

 (y/n [n]): y

When Cache Partition Manager is enabled, if the option using data pool will be enabled the default
cache partition information will be restored.

Do you want to continue processing? (y/n [n]): y

The option is unlocked.

%
```

When Cache Partition Manager is disabled or not installed:

```
% auopt -unit array-name -refer

Option NameType      Term     Status

POWER-SAVINGPermanent ---      Enable

%
```

Uninstalling

To uninstall Power Saving, the key code is required, and you cannot have a RAID groups powering down.

1. From the command prompt, connect to the array where you are uninstalling Power Saving.
2. Refer to the following examples.

```
% auopt -unit array-name -lock on -keycode manual-attached-keycode

Are you sure you want to lock the option?

 (y/n [n]): y

The option is locked.

%
```

To verify the uninstallation:

```
% auopt -unit array-name -refer

DMEC002015: No information displayed.

%
```

Enabling or disabling

When enabling or disabling Power Saving, you cannot have a RAID groups powering down.

1. From the command prompt, connect to the array where you are enabling or disabling Power Saving.
2. This example shows how to change the status from enable to disable. To change the status from disable to enable, specify **enable** after the **–st** option.

```
% auopt -unit array-name -option POWER-SAVING -st disable

Are you sure you want to disable the option?

 (y/n [n]): y

The option has been set successfully.

%
```

3. Execute the **auopt** command to verify that the Power Saving feature status has changed.

```
% auopt -unit array-name -refer

Option NameType      Term     Status

POWER-SAVINGPermanent ---      Disable

%
```

Viewing power saving status

1. From the command prompt, connect to the appropriate array.
2. Execute the **aupowersave** command to display Power Saving information.

```
% aupowersave –unit disk array-name –refer -lu

Power Saving Information of RAID Group

RAID Group Power Saving Status

      1  Normal(Spin Up)

      2  Power saving(Spin Down)

      3  Power saving(Spin Down Executing)

      4  Normal(Command Monitoring)


Power Saving Information of Logical Unit

LUN  RAID Group  Power Saving Status

 0         0  Normal

 1         0  Normal

 2         1  Power saving

%
```

Powering down

1. From the command prompt, connect to the array where you are powering down the RAID group.
2. Execute the **aupowersave** command to power down the specified RAID group.

```
% aupowersave –unit array-name –spindown –rg 4

Are you sure you want specified RAID group(s) to spin down?

 (y/n [n]): y

If you spin down the RAID group(s), logical units will stop accepting access from the host.

Please confirm host is not using logical units.

Are you sure you want to spin down the RAID group(s)? (y/n [n]): y

The RAID group(s) will be spun down.

Are you sure you want to execute? (y/n [n]): y

The spin down of RAID group 4 has been required.

The spin down of RAID group(s) have been required successfully.

%
```

When using Navigator 2 version 6.0 or later, you can specify the **-powersaving** option instead of **-spindown option**.

```
% aupowersave –unit array-name –powersaving –rg 4

Are you sure you want specified RAID group(s) to be Power Saving state?

 (y/n [n]): y

If you change to power saving state the RAID group(s), logical units will stop accepting access from the
host.

Please confirm host is not using logical units.

Are you sure you want the RAID group(s) to be in Power Saving state? (y/n [n]): y

The RAID group(s) will go into the Power Saving state.

Are you sure you want to execute? (y/n [n]): y

The spin down of RAID group 4 has been required.

The spin down of RAID group(s) have been required successfully.

%
```

3. When you power down a RAID group, check the power saving mode after one to two minutes. When you power down more than one RAID group, check the status after several minutes. Refer to Table 4-2 on page 4-5 if one of the following does not appear:
   - Normal (Spin Down Failure: Host Command)
   - Normal (Spin Down Failure: Non-Host Command)
   - Normal (Spin Down Failure: Error)

Powering up

1. From the command prompt, connect to the array of which you are powering up the RAID group.
2. Execute the **aupowersave** command to power up the specified RAID group.

```
% aupowersave –unit array-name –spinup –rg 4

Are you sure you want specified RAID group(s) to spin up?

(y/n [n]): y

The spin up of RAID group 4 has been required.

The spin up of RAID group(s) have been required successfully.

%
```

When using Navigator 2 version 6.0 or later, you can specify the **-normal** option instead of **-spinup** option.

```
% aupowersave –unit array-name –normal –rg 4

Are you sure you want specified RAID group(s) to be Normal state?

(y/n [n]): y

The changing RAID group 4 to Normal state has been required.

The changing to Normal state has been required successfully.

%
```

3. Execute the **aupowersave** command to verify whether power up is completed (refer to Viewing power saving status on page 7-3) and mount the logical unit included in the RAID group if the host is using it.

A

General specifications

This appendix provides general specifications for Power Saving.

❒ General specifications

General specifications

Table A-1 lists general specifications for Power Saving.

Table A-1: General Specifications

Item	Specification
Firmware	Version 0832/B or more is required for AMS2100 or AMS2300 array if the hardware rev. is 0100. Version 0840/A or more is required for AMS2500 array if the hardware rev. is 0100. Version 0890/A or more is required for AMS2100/AMS2300/AMS2500 if the hardware rev. is 0200.
Hitachi Storage Navigator Modular 2	Version 3.21 or more is required for management PC for AMS2100 or AMS2300 array if the hardware rev. is 0100. Version 4.00 or more is required for management PC for AMS2500 array if the hardware rev. is 0100. Version 9.00 or more is required for management PC for AMS2100/AMS2300/AMS2500 if the hardware rev. is 0200.
Power Saving license	Account authentication enabled to prevent duplicate entries of user passwords. For more information, see the *Hitachi Storage Navigator 2 Storage Features Reference Guide for AMS.*
RAID level	Any RAID level supported by the array.
Start of the spin-down operation	Issue of commands by a host or an application program to the RAID group that is instructed to spin down is monitored (command monitoring) for one minute after the spin-down instruction is issued. The spin-down is done when no command is issued during the command monitoring. When a command is issued during the command monitoring, the disk array and RAID group are judged to be in use and therefore the spin-down fails.
When an instruction to spin down is issued to two or more RAID groups at the same time	RAID groups are spun down in ascending order of the RAID group numbers. The command monitoring is done for one minute for the first RAID group. For the second and following RAID groups, the command monitoring is done until the spin down occurs.

Table A-1: General Specifications

Item	Specification
RAID groups which cannot issue the instruction to spin down	• The RAID group that includes the system drives (drives #0 to #4 of the basic cabinet for AMS2100/AMS2300, drives #0 to #4 of the first expansion cabinet for AMS2500). The system drive is the drive where the firmware is stored. • The RAID group for ShadowImage, TrueCopy, or TCE including a P-VOL or an S-VOL in a pair status other than following Simplex, Split, Takeover • The RAID group including a volume whose pair is not released during the Volume Migration or after the Volume Migration is completed • The RAID group including a logical unit being formatted • The RAID group including a logical unit to which the parity correction is being performed • The RAID group including a logical unit for data pool • The RAID group including a logical unit for DMLU • The RAID group including a logical unit for command device • The expanding RAID group • The RAID group that the drive firmware is being replaced
Items that will restrain the operation during the spin-down or command monitoring	• I/O command from a host • The ShadowImage pair operation including a copy process Creating pairs, re-synchronizing pairs, restoring pairs • The SnapShot pair operation including a copy process Restoring pairs • The TrueCopy or TCE pair operation including a copy process Creating pairs (including no copy), re-synchronizing pairs, swapping pairs (pair status changes to Takeover) • Executing Volume Migration • Creating a logical unit • Deleting the RAID group • Formatting a logical unit • Executing the parity correction of a logical unit • Setting a logical unit for data pool • Setting a logical unit for DMLU • Setting a logical unit for command device • Expansion of a RAID group • Logical unit growth
Number of times the same RAID group is spun down	Up to seven times a day.
Scheduling function	An instruction to spin down or spin up can be issued using a scheduling function provided by JP1, etc.

Table A-1: General Specifications

Item	Specification
Action to be taken for the long time spin-down (health check)	In order to prevent the drive heads from sticking to the disk surfaces, a RAID group which has been kept spun down for 30 days is spun up for six minutes. It is then spun down again. Although the drives are spun up temporarily, no host I/O can be accepted in this period. The opportunity to update the start-up date of spin-down is the time when the spin-down and the health check instructed by Navigator 2 are completed. Neither of the following is included in the spin-down completion opportunities for the update: • Completion of the spin-down of a RAID group, which has been kept spun down, after it is rebooted following the planned shutdown, or • powering off with or without data volatilization; completion of the spin-down of a RAID group, which was spun up when it had been spun down for the purpose of recovery from a failure, after it was waiting for the completion of the recovery from the failure. The RAID group accepts an instruction to spin up given by Navigator 2 during the health check and it enters the status of spin-up. The RAID group does not enters a status of spin-down immediately after it accepts the instruction but it continues the operation, undergoes the health check for six minutes, and then it spins down again. When the planned shutdown is done during the health check, the health check is performed again for six minutes after the power is turned on.
Action to be taken for powering off the disk array	The information on the set spin-down is taken over even if the disk array is powered off and then powered on. When rebooting the disk array, the disk array does not spin up the drives that were spun down.
Time required for the spin-up of one RAID group	The time required for the spin-up of one RAID group varies depending on the number of drives that configure the RAID group. The normal spin-up time is as shown below. • 2 to 15 drives: Within 45 seconds normally • 16 to 30 drives: Within 90 seconds normally • 31 or more drives: (Number of drives) ÷15x45 seconds Example: When the number of drives configuring the RAID group is 80. The time required for the spin-up = 80÷15x45 seconds = 240 seconds
Unified LU	The unified LU is put in the same status as being spun down if one of the configured RAID groups has been spun down, so that the same restrictions with the LU in the spun down status are applied to the operation to prevent a host I/O, etc.

B

Acronyms and abbreviations

This appendix lists commonly used acronyms and abbreviations.

Acronym or Abbreviation	Definition
AMS	Adaptable Modular Storage
AIX	Advanced Interactive eXecutive
ATA	Advanced Technology Attachment
CCI	command control interface
CLI	command line interface
DM-LU	differential management logical unit
FC	fibre channel
GUI	graphical user interface
HDD	hard disk drive
HDPS	Hitachi Data Protection Suite
HP-UX	Hewlett Packard UNIX
I/O	input/output
LVM	logical volume manager
NAS	network-attached storage
PSUS	pair suspended-split
P-VOL	primary volume
RAID	redundant array of independent disks
SATA	serial ATA
SES	SCSI Enclosure Service
SLA	service level agreement
SMPL	Simplex
SNM	Storage Navigator Modular
SNMP	simple network management protocol
S-VOL	secondary volume
TCE	TrueCopy Extended
VA	validation authority
VTL	virtual tape library

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