



Overland
Storage

SnapSAN™ Disk Spin Down

User Guide

S3000/S5000



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Preface

This User Guide describes how to use the power saving function (PowerControl) provided by Disk Spin Down. The power saving function consists of the operation control function provided in the disk array subsystem and software. It enables the start/stop operation of a pool to which a volume belongs based on the volume usage status. In addition, it enables the stop operation of an unused physical disk or spare disk. This guide assumes that you are familiar with computer hardware, data storage, and network administration terminology and tasks. It also assumes you have basic knowledge of Internet SCSI (iSCSI), Serial-attached SCSI (SAS), Serial ATA (SATA), Storage Area Network (SAN), and Redundant Array of Independent Disks (RAID) technology.

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Product Documentation and Firmware Updates

Overland Storage SnapSAN product documentation and additional literature are available online, along with the latest release of the SnapSAN 3000/5000 software.

Point your browser to:

<http://docs.overlandstorage.com/snapsan>

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Conventions

This user guide exercises several typographical conventions:

Information contained in this guide has been reviewed for accuracy, but not for product warranty because of the various environments, operating systems, or settings involved. Information and specifications may change without notice

Convention	Description & Usage
Boldface	Words in a boldface font (Example) indicate items to select such as menu items or command buttons.
Ctrl-Alt-r	This type of format details the keys you press simultaneously. In this example, hold down the Ctrl and Alt keys and press the r key.
NOTE	A Note indicates neutral or positive information that emphasizes or supplements important points of the main text. A note supplies information that may apply only in special cases—for example, memory limitations or details that apply to specific program versions.
IMPORTANT 	An Important note is a type of note that provides information essential to the completion of a task or that can impact the product and its function.
CAUTION 	A Caution contains information that the user needs to know to avoid damaging or permanently deleting data or causing physical damage to the hardware or system.
WARNING 	A Warning contains information concerning personal safety. Failure to follow directions in the warning could result in bodily harm or death.
Menu Flow Indicator (>)	Words in bold font with a greater than sign between them indicate the flow of actions to accomplish a task. For example, Setup > Passwords > User indicates that you should press the Setup button, then the Passwords button, and finally the User button to accomplish a task.

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Overview

The power saving function is software to reduce power consumption by rotating not-always used physical disks only when needed. To implement ecology-friendly society, the power saving function controls rotation stop and start of a pool to which the volumes belong according to use state of volumes (logical disks) and rotation stop and start of unused PDs/spare PDs according to use state of physical disk and provides the fundamental function to support power saving operation linked to business and power saving operation during disk array management, in consideration of rising importance of reducing load against environment.

This chapter describes the basics, such as an overview, hardware configuration, and software configuration of the power saving function.

The power saving function has the following two functions:

Volume-related Power Saving Function

The power saving function manages the use state of volumes on a volume basis and controls rotation stop and start of a pool to which the volumes belong according to the use state of volumes.

The target of this function is a pool that does not need to be always running from the operation characteristic point of view.

After data has been read from or written to each volume bound on a pool, the use of the volumes are stopped by the user's power saving (ControlCommand - PowerControl) operation.

While all volumes bound on a pool are not in use, the system can reduce power consumption by stopping the rotation of all physical disks that configure the pool.

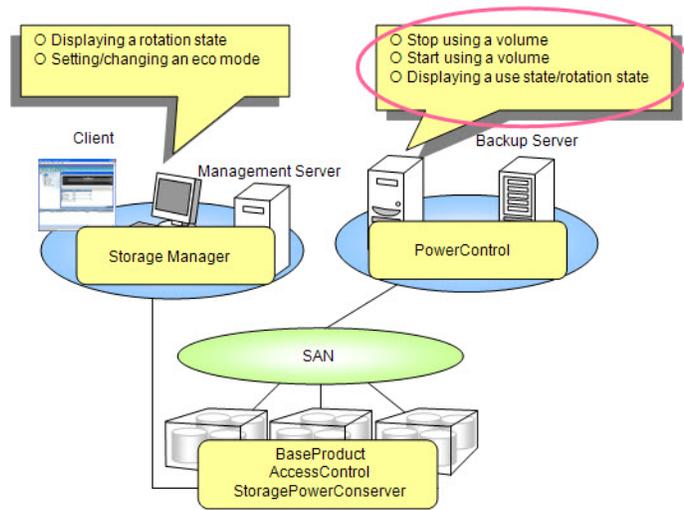


Figure 1-1: Power Saving Function

Physical disk-related power saving function

The power saving function manages the use state of physical disks and automatically controls rotation stop and start of physical disks not used as pool (that is, unused PDs/spare PDs).

If the user enables the eco mode for unused PDs/spare PDs in the disk array after constructing the operation environment, the system can reduce power consumption by automatically stopping unused PDs/spare PDs.

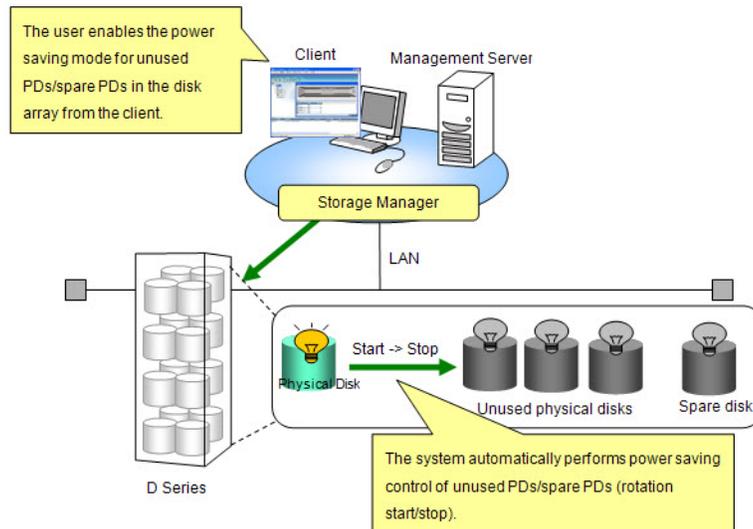


Figure 1-2: Power Saving - Physical Disks

System Configuration

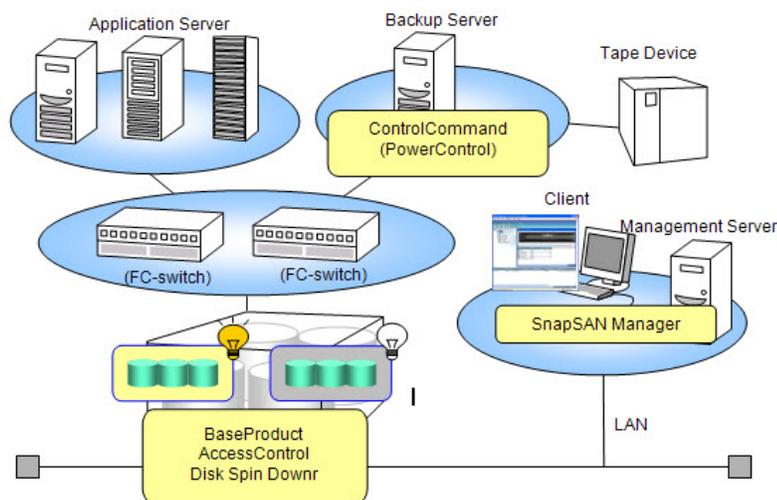


Figure 1-3: System Configuration

Hardware Configuration

To install power saving function for use, the following hardware devices are needed.

Disk Array

A disk array on which the power saving function (Disk Spin Down) is installed is needed.

(*) If the physical disk is an SSD, operation stopping control is not exercised. Therefore, power saving operations cannot be performed for the volumes in a pool made up of SSDs. In addition, even if power saving is effectively set up for unused and spare disks, SSDs are not stopped.

Management Server/Client

A management server, where SnapSAN Manager is installed, monitors disk arrays. This device allows you to manage disk arrays, monitor the rotation state, and set the eco mode.

Backup Server

Performs tasks including power saving operations on volumes in conjunction with services.

Software Configuration

To install the power saving function for use, the following software applications are required.

Disk Spin Down

Manages the use state of volumes on a volume basis, and provides the function to control rotation stop and start of a pool to which the volumes belong according to use state of volumes and rotation stop and start of unused PDs/spare PDs according to use state of physical disk.

ControlCommand

Includes PowerControl.

Provides the function to give operational instructions from a server to the power saving function for volumes (Disk Spin Down) using the command line interface.

BaseProduct

BaseProduct includes storage control software that administers basic control of the disk array and SnapSAN Manager software that enables you to monitor states of the disk array basically.

SnapSAN Manager

Provides the functions to display the configuration and state of the disk array.

Installation of Disk Spin Down enables display of the rotation state and use of the eco mode setting function.

AccessControl

Provides the function to set logical disks that can be accessed for each server.

Power Saving Function for Volumes

This chapter describes the power saving functions, and the power saving operations on volumes and physical disks. When using the power saving function for volumes, this function manages the use state of volumes on a volume basis and controls rotation stop and start of a pool to which the volumes belong according to the use state of volumes so that it implements the power saving operation in conjunction with operations. A "volume" here means any of logical disks bound in a disk array.

Use State

State set by a power saving operation on a volume-by-volume basis. This shows whether the volume can be used or not. The use state is set to each volume by the power saving operation, and indicates whether each volume can be used.

After a volume has been bound, the initial use state is "in use", in which state, the volume can be used for operation. After an operation has been executed, and if the volume is not used for a certain time, the use state is changed to "not in use" by the power saving operation. When the use state is changed to "not in use", the volume cannot be read and written from a server, and the data replication and the WORM functions cannot be used. To start using the volume that is in the "not in use" state again, you need to return the use state to "in use" by the power saving operation.

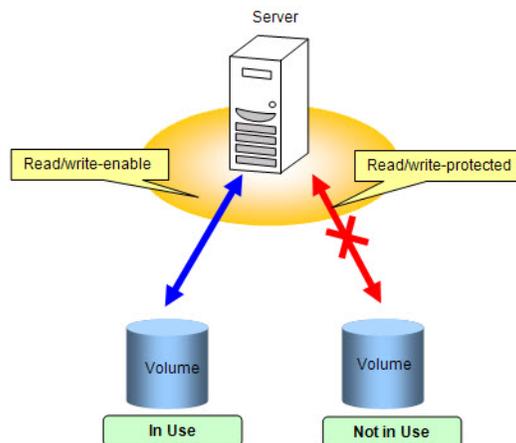


Figure 2-1: Volume Use State

Use State	I/O-Enabled/Disabled	Data Replication/WORM Operation Available/Not Available
In Use	Read/write-enabled	Available
Not In Use	Read/write-protected	Not available

Rotation State

Rotation state of all physical disks that configure a pool. This indicates the power saving state of the pool and all volumes that belong to the pool. The rotation state is the rotation state of all physical disks that configure a pool, and indicates the power saving state of the pool and all volumes that belong to the pool.

The rotation state varies depending on the use state of all volumes that belong to a pool.

If all volumes that belong to a pool are in the "not in use" state, rotation of all physical disks that constitute the pool are stopped and they are put in the power saving state. Therefore, the rotation state of the pool and all volumes that belong to the pool changes to "rotation stop".

If either of volumes that belong to a pool is put in the "in use" state, the power saving state is cancelled, and rotation state of all physical disks that constitute the pool is started. Therefore, the rotation state of the pool and all volumes that belong to the pool is returned to the normal state.

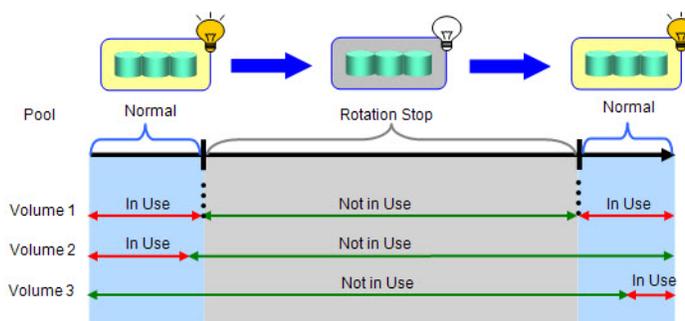


Figure 2-2: Rotation State Transition

Eco Mode for Pools

Attribute set by the SnapSAN Manager configuration setting on a pool-by-pool basis. This defines whether a power saving operation can be performed to a volume of the pool or not. The Eco mode for pools is the attribute set to each pool depending on the configuration setting of SnapSAN Manager, and stipulates whether to execute the power saving operation for the volumes that belongs to the pool.

Using the power saving function, you can set ON and OFF of the eco mode to each pool. This prevents the pool that is always running from being stopped by mistake in the environment where an always-rotating pool and a not-always-rotating pool coexist.

The initial power saving mode after binding a pool is "OFF". You cannot execute the power saving operation for the volumes that belong to the pool. When it is determined that the pool does not need to be always running, you can set the eco mode of the pool to "ON" in the configuration setting of SnapSAN Manager. When the eco mode of the pool is set to "ON", you can execute the power saving for the volumes that belong to the pool.

Eco Mode	Description
OFF	The eco mode is not available. A power saving operation cannot be performed to a volume belonging to the pool.
ON	The eco mode is available. A power saving operation can be performed to a volume belonging to the pool.

Power Saving Operations on Volumes

The power saving function provides the following operations.

Set/Change the Eco Mode for Pools

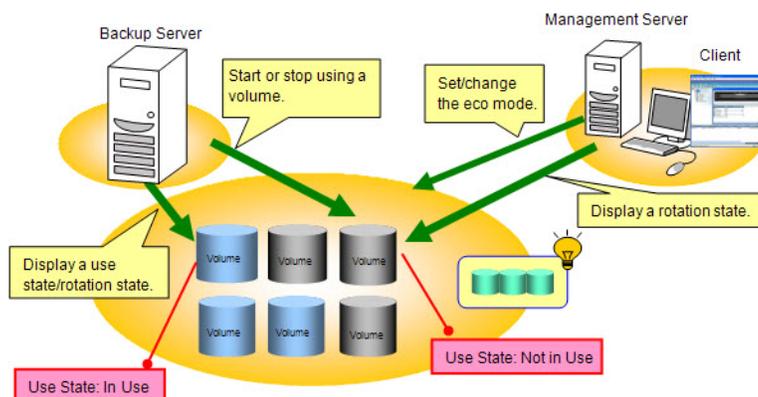


Figure 2-3: Power Saving

Start Using a Volume

Function to instruct a volume to start being used. By the start of use, the volume enters the in use state and can be read and written from a server. If the pool to which the volume belongs is in the rotation stop state, the rotation of the pool is started. This function instructs volumes to start being used. As use of a volume is started, the volume enters the in use state, and can be read and written from a server. If the rotation of the pool to which the volume belongs is stopped, the pool starts rotation. It takes time to start rotation of the pool.

You can start using a volume by a command operation from a server to which PowerControl has been installed.

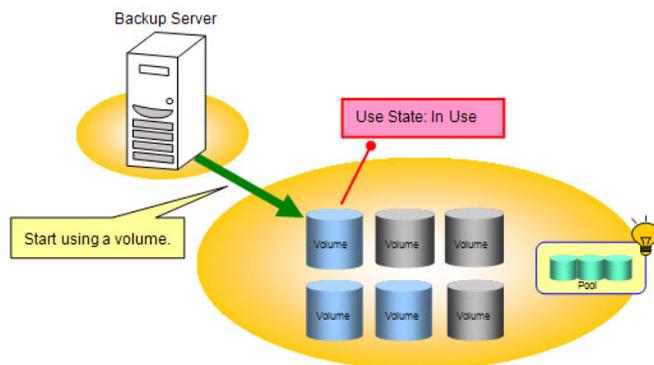


Figure 2-4: Start

To start using a volume, the following conditions must be satisfied.

- The target volume is unmounted.
- The volume list is not being created or refreshed.

Stop Using a Volume

Function to instruct a volume to stop being used. By the stop of use, the volume enters the not in use state and cannot be read and written from a server. If all volumes that constitute the pool to which the volumes belong are in the not in use state, the rotation of the pool is stopped. This function instructs a volume to stop being used. As use of a volume is stopped, the volume enters the not in use state, and cannot be read and written from a server. If all volumes that configure the pool to which the volume belongs are in the not in use state, the rotation of the pool is stopped.

You can stop using a volume by a command operation from a server to which PowerControl has been installed.

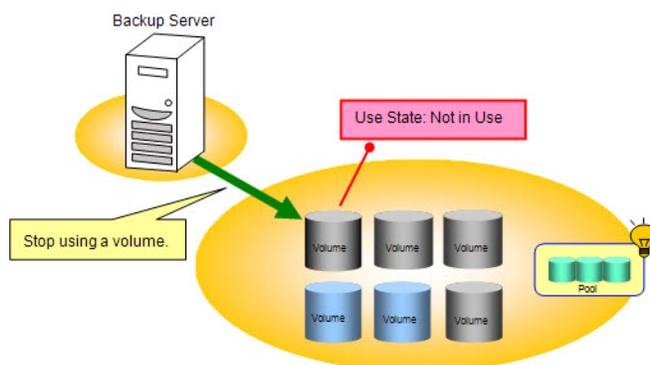


Figure 2-5: Stop Using a Volume

To stop using a volume, the following conditions must be satisfied.

- The target volume is not being used by the snapshot function.
- The target volume is not being used as a System Volume or Control Volume.

- The eco mode of a pool to which the target volume belongs is ON.
- The target volume is unmounted.
- If the target volume is paired as MV or RV for replication, replication must be in the Separated state.

The volume list is not being created or refreshed.

Displaying a Use State/Rotation State

Function to display a use state/rotation state of a volume or pool. This function displays the use state and the rotation state of a volume or a pool.

To display the use state and the rotation state of a volume or a pool, execute a command operation from a server to which PowerControl has been installed. To display the rotation state of a volume or a pool, execute a GUI operation of SnapSAN Manager.

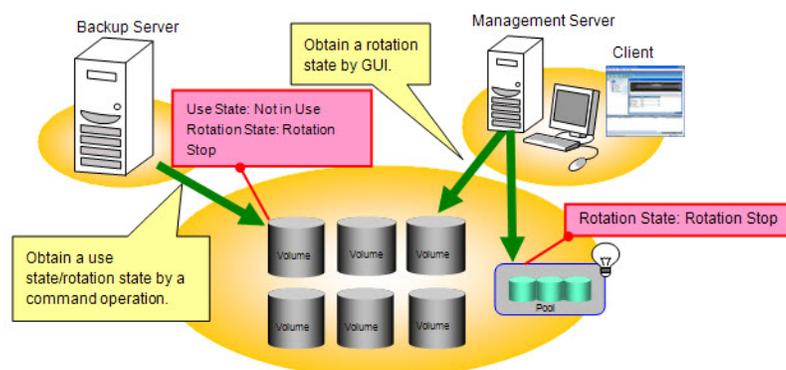


Figure 2-6: Use and Rotation State

To display a use state/rotation state of a volume or pool, the following condition must be satisfied.

- The volume list is not being created or updated (only for command operations).

Setting and Changing the Eco Mode for Pools

This function sets and changes the eco mode to a pool.

To set and change the eco mode, execute a GUI operation of SnapSAN Manager.

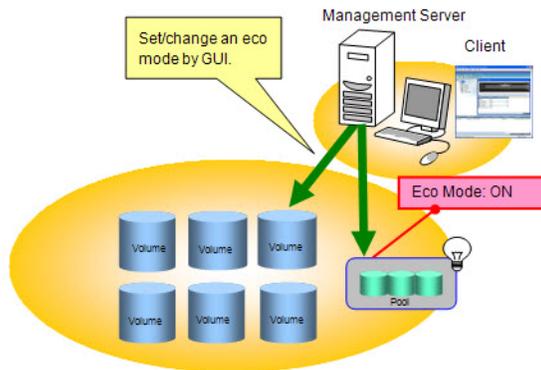


Figure 2-7: Set Change Eco Mode for Pools

To set/change the eco mode, the following condition must be satisfied.

*When changing the eco mode from ON to OFF, the target pool is not the rotation stop state.

Concurrent Use with Replication Function

This section describes the effects and methods when the data replication function and the power saving function are concurrently used.

The data replication is a function to create a Replication Volume (RV) of Master Volume (MV). Since the replication volume is physically independent from the master volume, it is suitable for the secondary use of volume, backup operation, and other operations requiring high performance and high reliability.

The power saving function manages the use state of volumes on a volume basis, and according to the use state of a volume, controls rotation stop and start of the pool to which the volumes belong to implement power saving operation linked to business.

For backup operation by data replication, it is general to use a replication volume only during backup execution. Therefore, the pool used for replication does not need to rotate all the time. After the backup is completed, execute the power saving function to stop using the replication volume. This operation enables power saving of the pool used for replication.

Example of Concurrent Operation with Replication Function

In the case of concurrent operation with replication function, it is allowed to execute the power saving function to operate the replication volumes from the application server.

- Bind the business volume used all the time and the replication volume used only during replication in different pools.
- Back up the data to RV regularly (for example, once per month) by the data replication function.
- Start using the replication volume before start of backup. After backup, stop using the replication volume.
- Since the pool to which the replication volume belongs rotates only during backup, this operation has the effect of reducing power consumption.

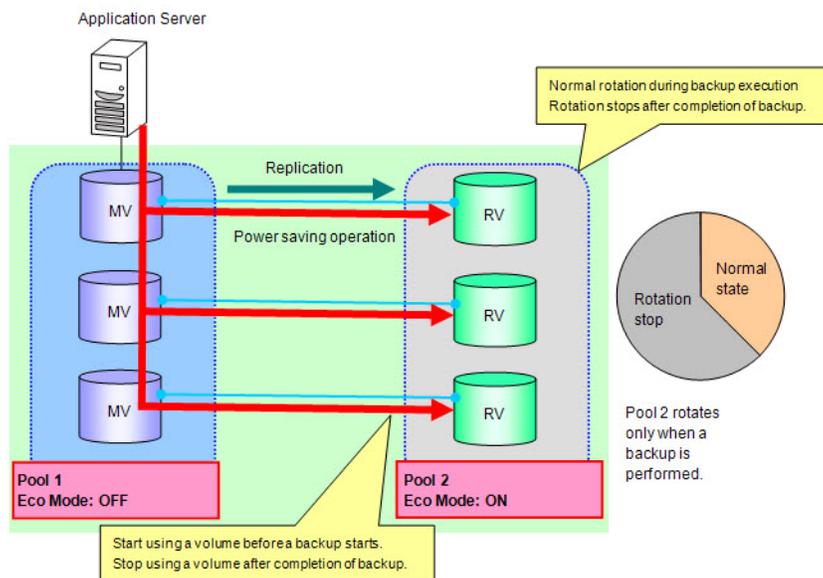


Figure 2-8: Concurrent Use of Data Replication and Power Saving

In the case of concurrent operation with replication function, it is allowed to execute the power saving function to operate the replication volumes from the application server.

- Bind the business volume used all the time and the replication volume used only during replication in different pools.
- Back up the data to RV regularly (for example, once per month) by the data replication function.
- Start using the replication volume before start of backup. After backup, stop using the replication volume.
- Since the pool to which the replication volume belongs rotates only during backup, this operation has the effect of reducing power consumption.

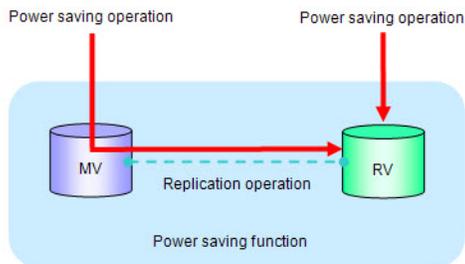


Figure 2-9: Concurrent Use of Replication and Power Saving

- Execution conditions of power saving operations and replication status

For the power saving operations to MV or RV, the execution conditions are defined depending on the replication status of pair of MV and RV.

Replication Status Operation	MV or RV			
	Replication rpl/preparing rpl/exec, rpl/sync	Separation sep/preparing sep/exec	separated	Restoration rst/preparing rst/exec, rst/sync
Start Using a Volume	-	-	✓	-
Stop Using a Volume	-	-	✓	-
Displaying a Use State/Rotation State	✓	✓	✓	✓

Execution conditions of replication operations and use state

For the replication operations to the pair, which is not in use by the power saving function, the execution conditions are defined depending on the use status of MV or RV.

Use State Operation	Pair	
	MV: In use RV: In use	Other than those on the left
Replication	✓	-
Separation	✓	-
Restoration	✓	-
Information Display	✓	✓

✓: Can be executed -: Cannot be executed

Operations in the Secure Mode

The ControlCommand secure mode prevents unauthorized volume operations from non-application servers by restricting the ControlCommand operations on the volumes not related to business. The PowerControl operation target volume is limited compared with conventional operation (normal mode operation).

The SnapSAN Manager Access Control function sets the secure mode to the LD Set. If the LD Set assigned to your server in the disk array is in the secure mode, volume operations on the relevant disk array from your server are performed in the secure mode.

If Replication and Mirroring (Remote Replication) is the secure mode for the remote disk array of which volumes are not directly connected to your server and that runs as Remote Replication's pair volume are the same as the operation mode of local disk array where the pair volume exists. That is, if the local disk array runs in the secure mode, operations for the remote disk array containing the pair volume are also performed in the secure mode.

If the operation mode of target disk array is the secure mode, the following operations are performed.

Operation	Description
Stopping of Local Disk Array Volumes	The operation target volume must be registered in the volume list.
Stopping Using Remote Disk Array Volumes through Remote Access	To stop using remote disk array volumes through remote access, the local disk array volume paired with the operation target volume must be registered in the volume list.

Physical Disk's Power Saving Function

Data access does not occur on unused Physical Disks (PDs)/spare PDs, which are physical disks not used as pool. Therefore, stopping rotation of these disks can reduce power consumption. The physical disk's power saving function realizes power saving operation by automatically controlling the rotation state of unused PDs/spare PDs.

The physical disk's power saving function is available to the devices supporting this function.

Rotation State

The rotation state indicates how the physical disk rotates, showing the power saving status in each physical disk.

The rotation state changes according to the usage state of physical disk.

In the following case, unused PDs/spare PDs stop rotation and enter into the power saving status.

- Use the configuration setting function to enable the eco mode for the unused PDs/spare PDs. If the eco mode is enabled, the unused PDs/spare PDs automatically stop and enter into the power saving status when the configuration setting function is terminated.

In the following cases, the power saving status of stopped unused PDs/spare PDs is automatically canceled and rotation is started.

- If the eco mode is enabled for the unused PDs/spare PDs, binding a pool when unused PDs are stopped, the power saving status of physical disk used for binding is automatically canceled, and rotation is started.
- If you disable the eco mode for the unused PDs/spare PDs using the configuration setting function, the stopped unused PDs/spare PDs are automatically started.

If the eco mode is enabled for unused PDs/spare PDs, the power saving status of spare disk automatically changes at switching or copying back when the physical disk fails.

- If a physical disk within the pool fails, the power saving status of stopped spare disk is automatically cancelled and the rotation is started so that the spare disk replaces the failed disk in the pool and start data repair.
- After you replace the failed disk in the pool, the copied back spare disk automatically stops rotation and enters into the power saving status.

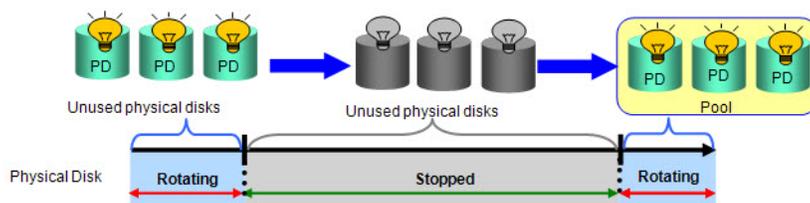


Figure 2-10: PD Rotation

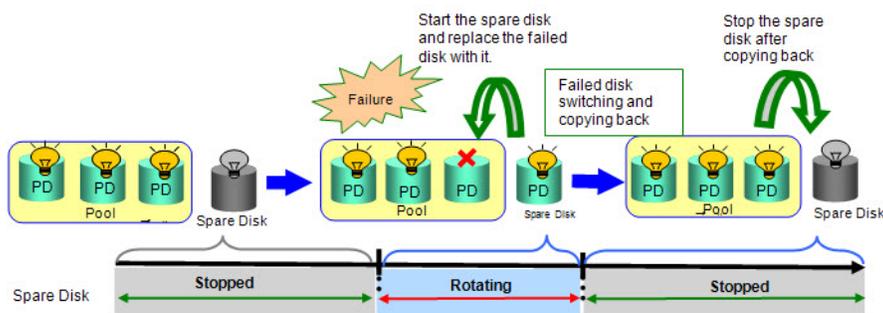


Figure 2-11: Spare Disk Rotation

Eco Mode for Unused PDs/Spare PDs

The eco mode for unused PDs/spare PDs is an attribute set on the disk array basis with the SnapSAN Manager configuration setting function. This attribute specifies the power saving operation for the unused PDs/spare PDs that belong to the relevant disk array.

To reduce power consumption by stopping unused PDs/spare PDs, you can "enable" the eco mode for unused PDs/spare PDs, stop their rotation and making them enter into the power saving status.

Not to stop these disks putting priority to the responsiveness of physical disks in case that they are used, "disable" the eco mode. In this case, unused PDs/spare PDs do not enter into the power saving status or stop rotation.

The eco mode is "disabled" immediately after the disk array is implemented (after initialization setting), the unused PDs/spare PDs that belong to the relevant disk array do not stop rotation. This is because disk responsiveness when needed is emphasized since a stopped disk takes some time to start rotation. To enable the eco mode for these disks, the user must explicitly make specification with SnapSAN Manager configuration setting function.

Note that the eco mode for unused PDs/spare PDs can be specified in the devices supporting this function.

Eco mode	Description
	The eco mode is disabled.
Disable	Unused PDs/spare PDs do not enter into the power saving status.

Eco mode	Description
	The eco mode is enabled.
Enable	Unused PDs/spare PDs enter into the power saving status.

Power Saving Operation of Physical Disk

The power saving function provides the following operations.

Displaying the rotation state

This function displays the rotation state of physical disk.

Setting or changing the eco mode

This function sets or changes the eco mode for unused PDs/spare PDs.

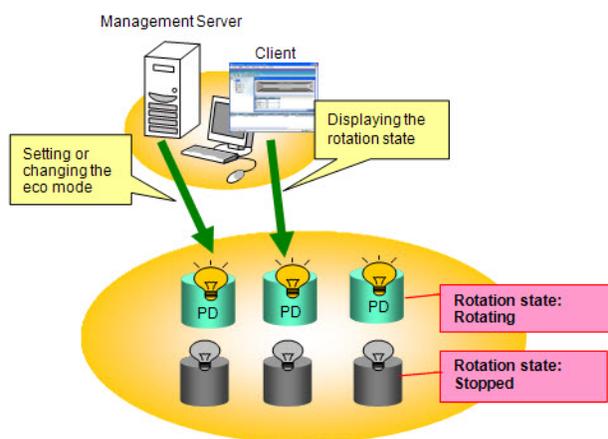


Figure 2-12: PD Power Saving Operation

Displaying the Rotation State of Physical Disk

This function displays the rotation state of physical disk.

The rotation state of physical disk can be checked by seeing the status display on the physical disk information list screen on the SnapSAN Manager status monitoring screen.

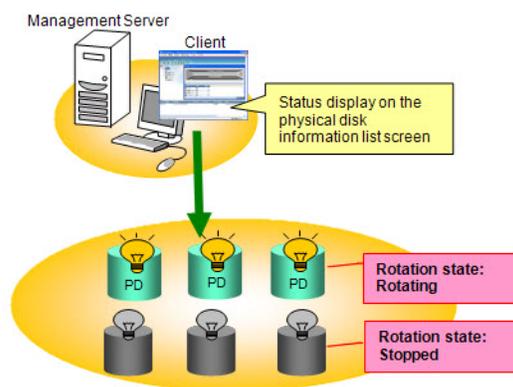


Figure 2-13: PD Rotation State

Setting and Changing the Eco Mode for Unused PDs/Spare PDs

This function sets or changes the eco mode for the unused PDs/spare PDs in the disk array. For this operation, use the SnapSAN Manager disk array configuration setting function.

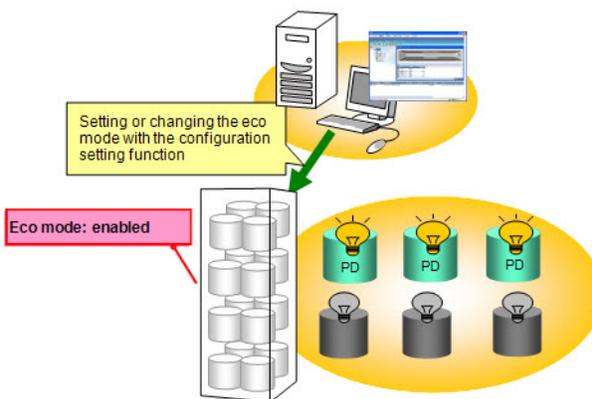
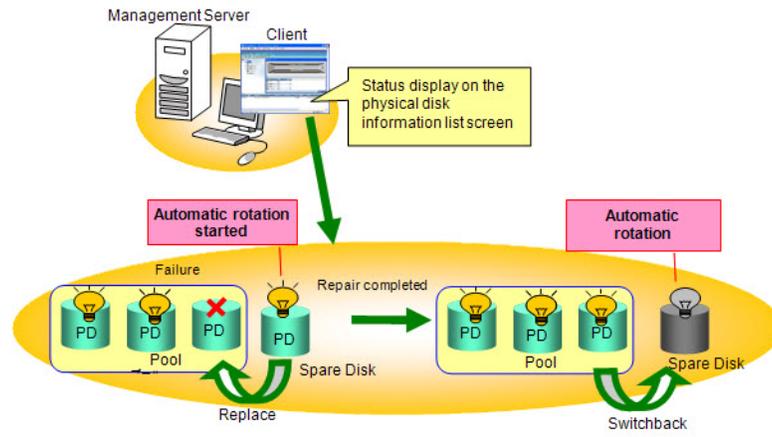


Figure 2-14: Eco Mode Setting

This function sets or changes the eco mode for the unused PDs/spare PDs in the disk array. For this operation, use the SnapSAN Manager disk array configuration setting function.



This chapter describes the concrete method of the power saving operation from a backup server with PowerControl. To implement power saving operations in conjunction with services, PowerControl provides commands for various operations such as to stop or start using each volume.

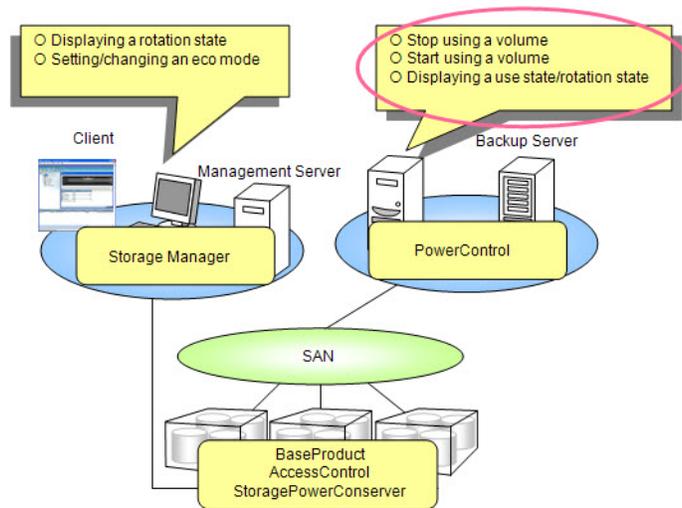


Figure 3-1: Power Saving Operation

No.	Command Name	Operation	Description	Target System	
				Windows	UNIX
1	SnapSAN Managervollist	Volume List Creation/Display	Associates logical disk (disk array side) information with system dependent information (server side) and displays the associated information.	✓	✓
2	SnapSAN Managerec_stop	Volume Use Stop	Stops using a volume.	✓	✓
3	SnapSAN Managerec_start	Volume Use Start	Starts using a volume.	✓	✓

No.	Command Name	Operation	Description	Target System	
				Windows	UNIX
4	SnapSAN Managerec_sense	Use State and Rotation State Display	Displays use state and rotation state of a volume.	✓	✓
5	SnapSAN Managerrc_sense	Logical Disk Information Display	Displays volume information (excluding use state and rotation state).	✓	✓
6	SnapSAN Managerrc_ldlist	Logical Disk Information Display	Obtains and displays logical disk list information (excluding use state and rotation state).	✓	✓
7	SnapSAN Managerrc_flush	File System Buffer Flush	Flushes the file system cache buffer.	✓	-
8	SnapSAN Managerrc_mount	Volume Mount	Mounts a volume (file system).	✓	-
9	SnapSAN Managerrc_unmount	Volume Unmount	Unmounts a volume (file system).	✓	-
10	SnapSAN Managerrc_scan	Disk Scanning	Scans for detecting available disks.	✓	-

✓: Targeted - : Not targeted

Using Control Volumes

When you use PowerControl, you should prepare a volume with which an I/O can be properly issued to a disk array, and perform operations via that specific volume (control volume).

Of logical disks connected to each server, select one logical disk for each disk array as a control volume (CV). Predefine the control volume as a volume to be used to issue an I/O to the disk array, and register the volume in the volume list. Once the control volume has been registered in the volume list, you do not have to worry about the presence or absence of the control volume during operation. The defined control volume is automatically used to issue an I/O to the disk array.

Connect control volumes and volumes subject to power saving operations to a backup server. On the server, control volumes must be registered in the Volume List in advance.

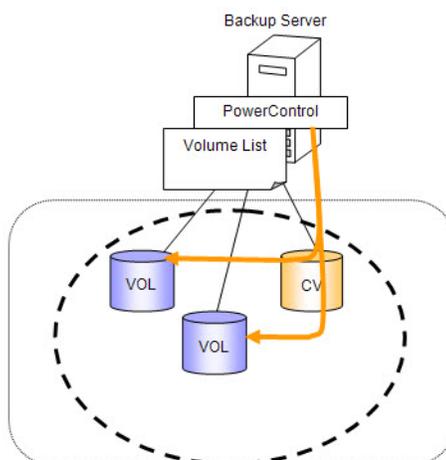


Figure 3-2: Volume Operations

You must note the following when setting control volumes.

- Use the relevant AccessControl function to set access control appropriately for logical disks to be used as volumes for power saving operations and logical disks to be used as control volumes. Then, connect the logical disks to individual servers. Before performing power saving operations, you must create a volume list on each server and register the target logical disks in the volume list in advance.
- Prepare one control volume for each disk array connected to the server. It is not recommended that you use the same logical disk as a control volume from two or more different servers.
- Low-capacity logical disks can be bound as logical disks dedicated to control volumes. There are no constraints on RAID types.
- When you have defined or changed control volumes, you must update the volume list. When you have added or deleted disk arrays, have rebind logical disks or changed their settings, or have added or deleted logical disks accessible from servers, you must update the volume list to reflect the current status.
- As a control volume, select a normal volume that is not used by the data replication, snapshot, or WORM function. Allocate the control volume as a dedicated volume and do not store business data in it.
- A control volume must not be bound in a pool including volumes to which a power saving operation is performed but in a pool which is always rotating.

Volume Types

Types of volumes that are specified as operation targets for power saving commands are as follows:

Type	Description	Identifier	Target System	
			Windows	UNIX
Logical disk name	Specifies a logical disk name set on the disk array side.	ld	✓	✓

Type	Description	Identifier	Target System	
			Windows	UNIX
Mount point volume name	Specifies a mount point volume name assigned to the volume by the system.	mvol	✓	✓
NTFS folder name	Specifies an NTFS folder name (path name) set to the volume.	mdir	✓	✓
Drive character	Specifies a drive character set to the volume.	drv	✓	✓
Special file name	Specifies a special file name assigned to the disk (logical disk) by the system.	sfn	✓	✓

✓: Targeted-: Not targeted

The identifier is a character string that indicates the volume type and is used in the following cases:

- When specifying a volume type by a power saving command argument (-volflg)
- When specifying a volume type by the power saving operation file

Power Saving Operation File

To perform batch processing of multiple volumes using a power saving command, or to operate a specific volume using multiple commands, use the power saving operation file. Using the power saving operation file allows the target volumes to be described in a file so that they can be managed and shared, thereby improving system operability and maintainability of power saving.

The following example shows a description in the power saving operation file:

• Example for the Windows system

```
# A volume is specified.
Id:vol001
drv:G
mvol:\?Volume{c621c48b-1234-11d8-5678-00e018fa017d}
```

• Example for the UNIX system

```
# A volume is specified.
Id:vol002
sfn:/dev/sdd
```

To specify the power saving operation file, use the -file option together with the power saving commands.

Log Output

PowerControl outputs log data regarding command-executed power saving operations and display requests to a command trace file.

This section describes the format of the command trace file and the information that is output to this file.

```

2007/04/13 16:40:12.861 host1 EC-CLI : 0000003504 Info ec_start iSM25000:-
2007/04/13 16:40:13.237 host1 EC-CLI : 0000003504 Info ec_start iSM25011:-
2007/04/13 16:40:32.516 host1 EC-CLI : 0000003865 Info ec_start iSM25000:-
2007/04/13 16:40:32.577 host1 EC-CLI : 0000003865 Info ec_start iSM25011:-
2007/04/13 16:40:40.417 host1 EC-CLI : 0000003866 Info ec_stop iSM25000:-
2007/04/13 16:40:41.462 host1 EC-CLI : 0000003866 Info ec_stop iSM25021:-
:

```

Figure 3-3: Command Trace File Example

Contents of the command trace file

- Input images and common information of power saving commands
- Execution results and common information of commands

The common information includes the time when the information was output and the identifier for the command issue process.

The content of the message that is displayed on the terminal at the time of command execution is output to the command trace file (in the case of a display command, the display result is not output).

Item Name	Operation
Date	Displays the date in the yyyy/mm/dd format.
Time	Displays the time in the hh:mm:ss.msec format.
Host Name	Displays the name of the host on which the command was executed.
Type	Displays the function type. EC-XXX:Power saving function PC-XXX:WORM function SC-XXX:Snapshot function RPL-XXX:Replication function
Process Number	Displays the number of the process that executed the command. The process number may be up to 10 decimal digits in length.
Error Level	Displays the error level.
Command Type	Displays the command type.
Message Id	Displays the message ID.
Message Text	Displays the message text.

Outline of the command trace file

Location of the command trace file

The command trace file is created under "installation-folder/etc".

Size of the command trace file

Up to five generations of files are created, each being 200 KB in size by default.

The file size and the number of generations can be changed by modifying the relevant environment variables.

- Name of the command trace file
- SnapSAN Manager_Log.log:Latest command trace file
- SnapSAN Manager_Log(n).log:Command trace file of n generations older
- Switch between generations

The switch of command trace file generations occurs when the file size of the current generation exceeds the size defined by the environment variable. If the maximum number of generations is reached, the file of the oldest generation is deleted.

Volume List Creation/Display

The function to create and display the volume list associates logical disk information (disk array side) with system dependent information (server side) and displays the associated information. Since it handles system dependent information, the function on the Windows system is different from the function on the UNIX system.

Power Saving Operation

The power saving commands provide the functions to operate volumes using the disk array's power saving functions as well as those to obtain and display a variety of information.

Volume Use Start Command

To start using a volume, use the SnapSAN Managerec_start command.

The SnapSAN Managerec_start command sets a target volume to an in use state, and then the volume can be read/written from a server. If a pool including the volume is already in rotation stop state, rotating the pool starts.

[Main Options]

For the SnapSAN Managerec_stop command, you can specify the following options.

Specification of the target volume (-vol volume -volflg vol_flg)

Specify the target volume and volume type to be used.

On the Windows system, when a specific partition is specified for a volume consisting of multiple partitions, all partitions in the volume become operation targets; therefore, the default setting does not allow the multiple partitions to be operated. Operations can be performed for a volume consisting of multiple partitions, by changing the settings in the option setting file. [Execution Conditions]

To start using a volume, the following conditions must be satisfied.

- The target volume is unmounted.
- The disk array storing the target volume is not in the freeze state.
- To specify a volume identifier other than a logical volume name, the target volume is registered in the volume list.
- The SnapSAN Manager-only special file must not be being created (UNIX version only).
- The volume list is not being created or updated.

Volume Use Stop Command

To stop using a volume, use the SnapSAN Managerec_stop command.

The SnapSAN Managerec_stop command sets a target volume to a not in use state, and then the volume cannot be read/written from a server. If all volumes in a pool including the target volume is in not in use state, rotating the pool stops.

[Main Options]

For the SnapSAN Managerec_stop command, you can specify the following options.

Specification of the target volume (-vol volume -volflg vol_flg)

Specify the target volume and volume type to stop using.

On the Windows system, when a specific partition is specified for a volume consisting of multiple partitions, all partitions in the volume become operation targets; therefore, the default setting does not allow the multiple partitions to be operated. Operations can be performed for a volume consisting of multiple partitions, by changing the settings in the option setting file.

[Execution Conditions]

To stop using a volume, the following conditions must be satisfied.

- The target volume is not being used by the snapshot function.
- The target volume is not a System Volume or control volume.
- The target volume is unmounted.
- The disk array storing the target volume is not in the freeze state.
- If the target volume is paired as MV or RV for replication, replication must be in the Separated state.
- The target volume is not being moved during performance optimization.
- To specify a volume identifier other than a logical volume name, the target volume is registered in the volume list.
- The volume list is not being created or refreshed.
- The SnapSAN Manager-only special file must not be being created (UNIX version only).
- The volume list is not being created or updated.
- The eco mode of the pool including the target volume is ON.

Use State/Rotation State Display Command

To display a use state/rotation state of a volume or pool, the SnapSAN Managerec_sense command is used.

[Main Options]

For the SnapSAN Managerec_sense command, you can specify the following options.

Specification of the target volume (-vol volume -volflg vol_flg)

Specify the target volume and volume type to be displayed.

On the Windows system, when a specific partition is specified for a volume consisting of multiple partitions, all partitions in the volume become operation targets; therefore, the default setting does not allow the multiple partitions to be operated. Operations can be performed for a volume consisting of multiple partitions, by changing the settings in the option setting file.

Display of the target pool (-pool poolnum -arrayname diskarray [-all])

Specify the number and disk array name (nickname) of the volume to be displayed.

To list the use states of all the volume of the pool, specify the -all option. If this option is omitted, the volume use states are not listed.

[Displayed Information]

SnapSAN Managerec_sense displays the following message when displaying volume use states.

Volume Rotation Information

LD Name *ld_name*

Pool Num *poolnum*

Disk Array Name *diskarray*

Rotation State *rotation_state*

Use State *use_state*

Access State *access_state*

Description

Information regarding the volume use state is displayed.

ld_name: Logical disk name

poolnum: Pool number

diskarray: Disk array name (Nickname)

rotation_state: Rotation state

Ready normal state

Attn. (stop) rotation stop

use_state: Use state

In use in use

Not in use not in use

access_state: Access state

Accessible accessible

Not Accessible not accessible

The following message is displayed when states of the pool are displayed.

When -all is not specified

Pool Rotation Information

Pool Num *poolnum*

Disk Array Name *diskarray*

Rotation State *rotation_state*

Eco Mode *eco_mode*

Description

Information regarding the pool use state is displayed.

poolnum: Pool number

diskarray: Disk array name (Nickname)

rotation_state: Rotation state

Readynormal state
Attn. (stop)rotation stop

eco_mode: Eco mode

OnEco mode is available.
OffEco mode is not available.

When `-all` is specified

Pool Rotation Information
Pool Num*poolnum*
Disk Array Name*diskarray*
Rotation State*rotation_state*
Eco Mode*eco_mode*
Volume Rotation Information List
LD NameUse StateAccess State
ld_nameuse_stateaccess_state

Description
Information regarding the pool use state is displayed.

poolnum: Pool number
diskarray: Disk array name (Nickname)
rotation_state: Rotation state

Readynormal state
Attn. (stop)rotation stop

eco_mode: Eco mode

OnEco mode is available.
OffEco mode is not available.

Information regarding the states of all volumes included in the pool is displayed.

ld_name: Logical disk name
use_state: Use state

In usein use
Not in usenot in use

access_state: Access state

Accessibleaccessible
NotAccessiblenot accessible

[Execution Conditions]

To display the volume use state or rotation state of a volume or pool, the following conditions must be satisfied.

- To specify a volume identifier other than a logical volume name, the target volume is registered in the volume list.
- The SnapSAN Manager-only special file must not be being created (UNIX version only).

- The volume list is not being created or updated.

Logical Disk Information Display Command

The logical disk information display command is the function to display logical disks and their information.

Disk Operations (Only on Windows)

The disk operation function, which functions only on the Windows system, controls and operates disks so as to operate the function such as data replication on the Windows system.

Disk operation commands provide functions necessary for Windows disk operation linking with the commands such as ReplicationControl commands rather than a function that replaces Windows "Disk Management".

These commands enable you to conduct operation that is comparable to the operation conducted on Linux.

Remote Operation at Concurrent Use with Replication Function

The remote operation is an indirect power saving operation to a volume of a disk array to which RV belongs from the server (OS) when the power saving function and the data replication function are used concurrently.

Execution syntax

When the power saving operation is performed to a volume of a disk array to which RV belongs by executing a command from the server (OS) that recognizes the MV, it is possible to specify the target volume only by the logical disk name. It is not possible to specify the target by a special file name or other types.

For other operations, execution syntaxes are the same as the normal execution syntax.

Execution range

The execution range of a power saving operation command is a volume recognized by the server and the volume of the disk array that is connected to the volume by Remote Replication.

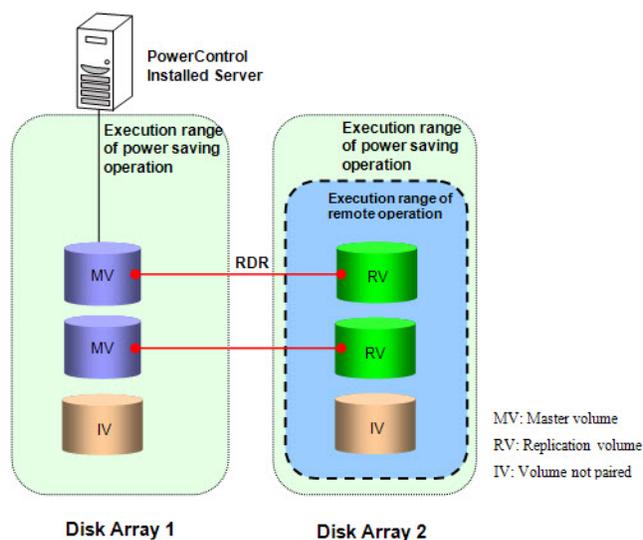


Figure 3-4: Execution Range

Execution conditions and notes

- The execution range of a power saving command is a volume recognized by the server and the volume of the disk array that is connected to the volume by Remote Replication.
- The target volume can be specified only by the logical disk name.
- To operate a disk array recognized by the server and a disk array ahead of one layer remotely, the link state between disk arrays needs to be normal. If one of the disk arrays is in the freeze state, remote operation cannot be executed.
- Although a disk array ahead of one layer can be operated remotely, a disk array ahead of two or more layers cannot be operated.
- The target volume must be unmounted.
- To protect paired volumes, the replication state must be Separated.
- Remote operations cannot be executed to the PowerControl installed server while the volume list is created or updated.

Operation with SnapSAN Manager

This chapter describes how to display the rotation state and manage the eco mode with SnapSAN Manager.

To use the power saving function, it is necessary that the Disk Spin Down license has been released.

SnapSAN Manager provides the function for displaying the rotation state by the power saving function and managing the eco mode. You can display the rotation state by the power saving function using the SnapSAN Manager client's GUI.

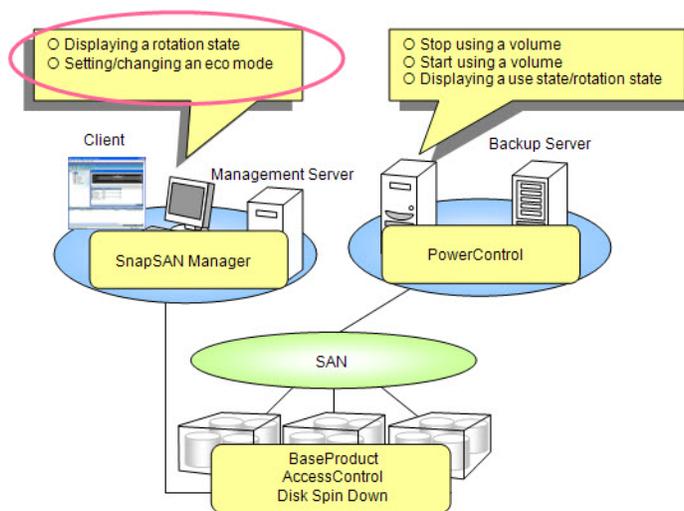


Figure 4-1: Rotation State with SnapSAN Manager

Displaying a Rotation State

SnapSAN Manager Main Window

The SnapSAN Manager main window is the first window that appears when you connect the SnapSAN Manager client to the SnapSAN Manager server. It displays the information about the configuration of the disk arrays monitored by SnapSAN Manager and the states of the resources.

The pool rotation state by the power saving function is displayed in the pool list screen and pool detail information screen of the SnapSAN Manager main window. The volume rotation state caused by the power saving function is displayed in the logical disk list screen and logical disk detail information screen.

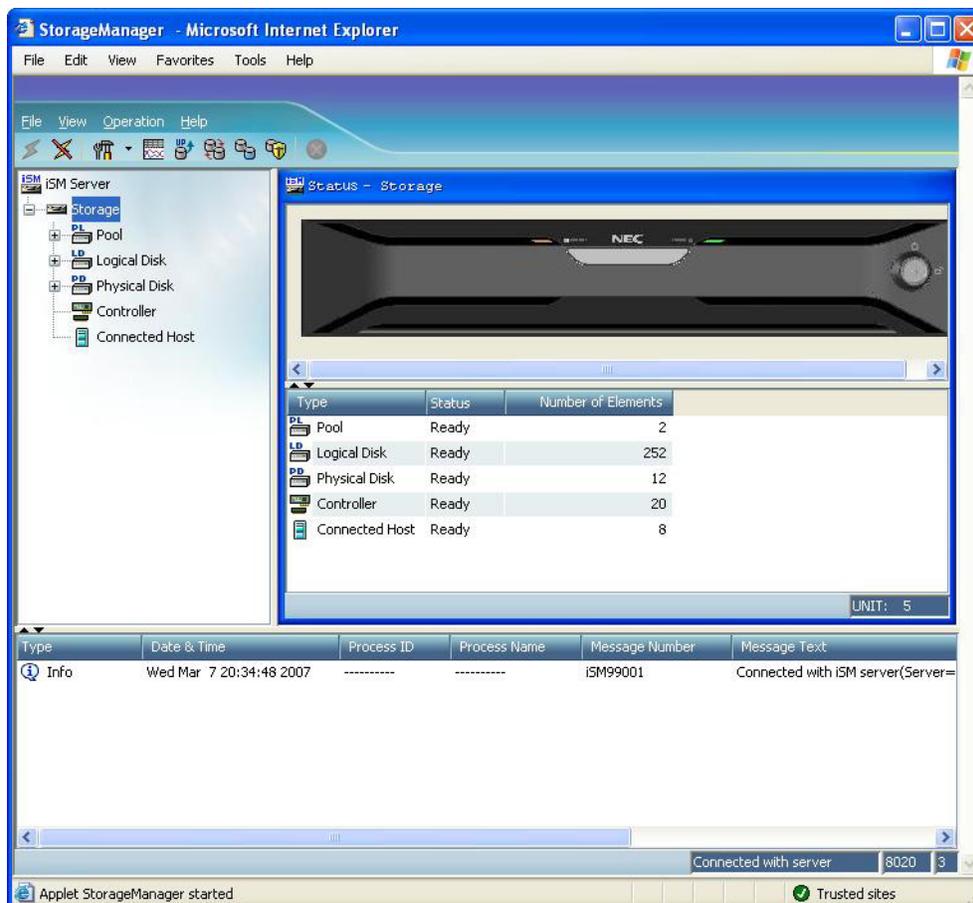


Figure 4-2: Main

Pool List Screen

A screen displayed by selecting (click the left button) [Pool] in configuration display area. It displays various attribute information such as pool name, operating state, and capacity.

The items below show the pool states.

Status

Displays the pool state and occurred event in any of the following at "State" column.

Ready: The pool is normally rotated.

Attn.(stop): The pool is in the rotation stop state.

Attn.(reduce): Reduction (RAID configuration redundancy disappears.)

Attn.(rebuilding): Being rebuilt (Data in the pool is being rebuilt.)

Attn.(preventive copy): Data is being copied to the spare disk. (RAID configuration redundancy is maintained.)

Attn.(copy back): Data is being written back from the spare disk. (RAID configuration redundancy is maintained.)

Fault: A "fault" occurred in the pool.

Pool Details Information Screen

The pool details information screen is displayed by selecting (clicking the left button on) an optional pool, right clicking the pool, and selecting [Properties] (or selecting [View] [State monitor] [Properties] from the menu) in configuration display area or information list display area.

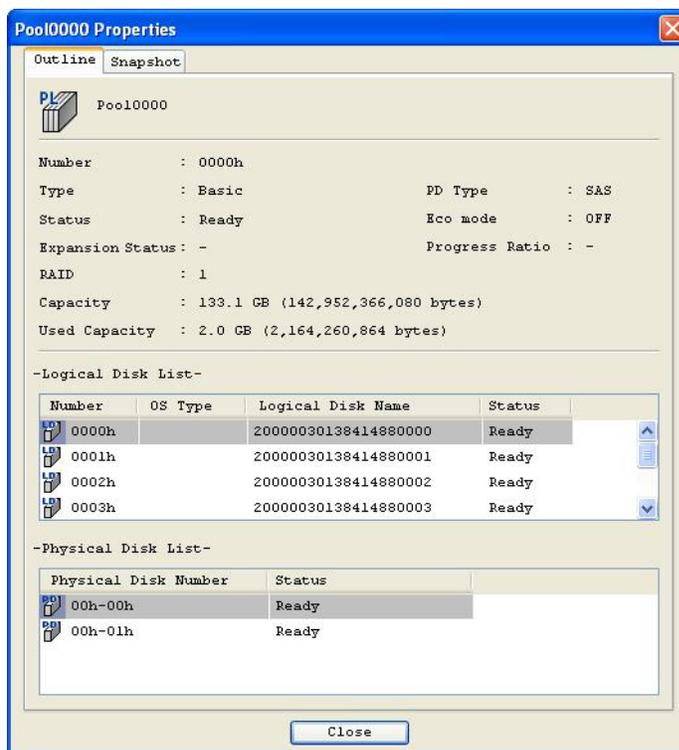


Figure 4-3: Pool Details

Status

Displays the pool state.

The display contents are the same as the pool list screen.

Eco Mode

Displays the eco mode of pool.

ON: The pool's eco mode is available.

OFF: The pool's eco mode is not available.

Logical Disk List Screen

A screen displayed by selecting (click the left button) [Logical Disk] in configuration display area displaying various attribute information such as logical disk name, state, and capacity.

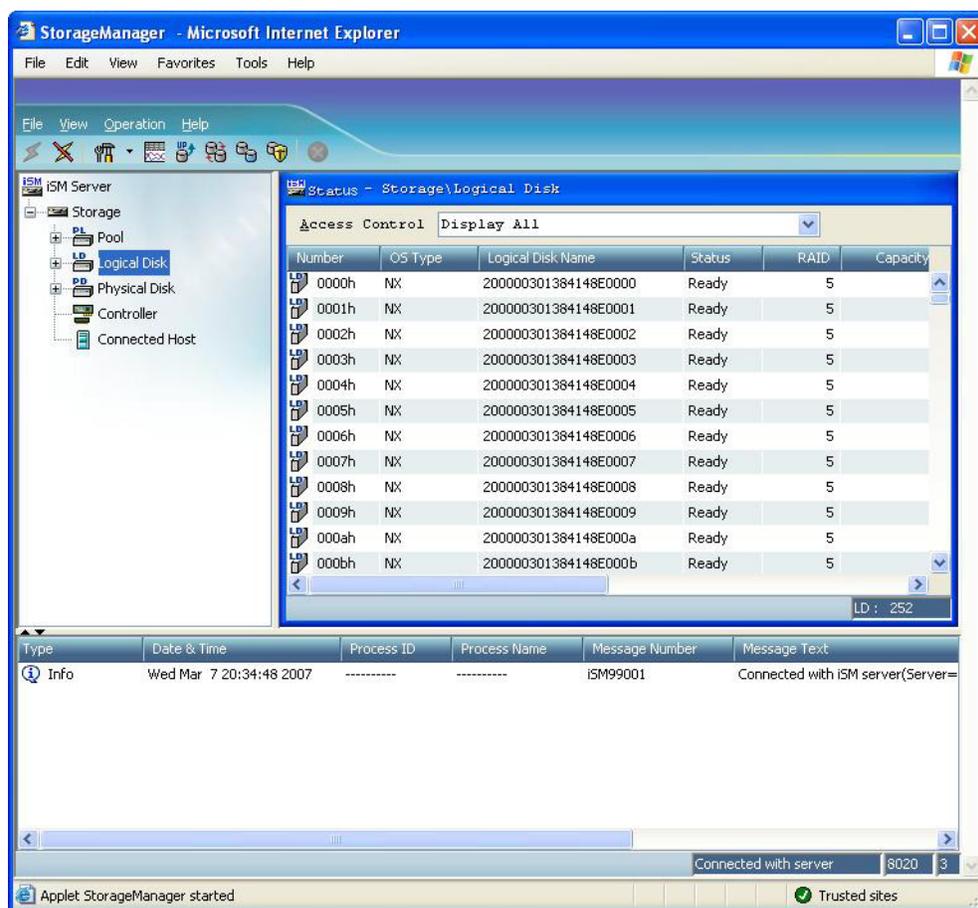


Figure 4-4: Logical Disk List

The items below show the logical disk states.

Status

Displays the logical disk state and occurred event in any of the following at "State" column.

Ready: The logical disk is normally rotated.

Ready (formatting): Being logically formatted.

*The logical disk is available, but an I/O response delay may occur until logical formatting completes.

Attn.(stop): The logical disk is in the rotation stop state.

Attn.(reduce): Reduction (RAID configuration redundancy disappears)

Attn.(rebuilding): Being rebuilt (Data in the pool is being rebuilt.)

Attn.(preventive copy): Data is being copied to the spare disk. (RAID configuration redundancy is maintained.)

Attn.(copy back): Data is being written back from the spare disk. (RAID configuration redundancy is maintained.)

Attn.(unformatted): The disk has not been formatted logically.

Attn.(formatting): Being logically formatted.

*The logical disk cannot be used until logical formatting completes.

Attn.(format fail): Logical formatting failed.

Attn.(expanding): The pool is being expanded.

Attn.(expand-fail): Pool expansion failed.

Fault: A "fault" occurred in the logical disk.

Fault (media error): A "media fault" occurred in the logical disk.

Logical Disk Details Information Screen

The logical disk details information screen is displayed by selecting (clicking the left button on) an optional pool, right clicking the logical disk, and selecting [Properties] (or selecting [View] [State monitor] [Properties] from the menu) in configuration display area or information list display area.

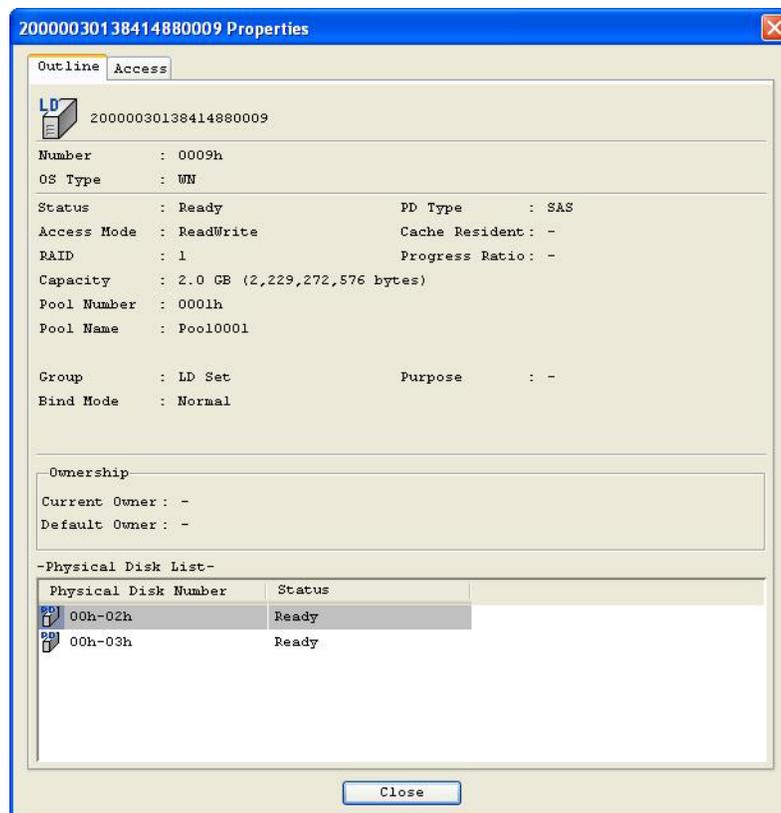


Figure 4-5: Logical Disk Details

Status

Displays the logical disk state.

The display contents are the same as the logical disk list (1) screen.

Physical Disk List Screen

A screen displayed by selecting (click the left button) [Physical Disk] in configuration display area displaying various attribute information such as the operating state and capacity of the physical disks.

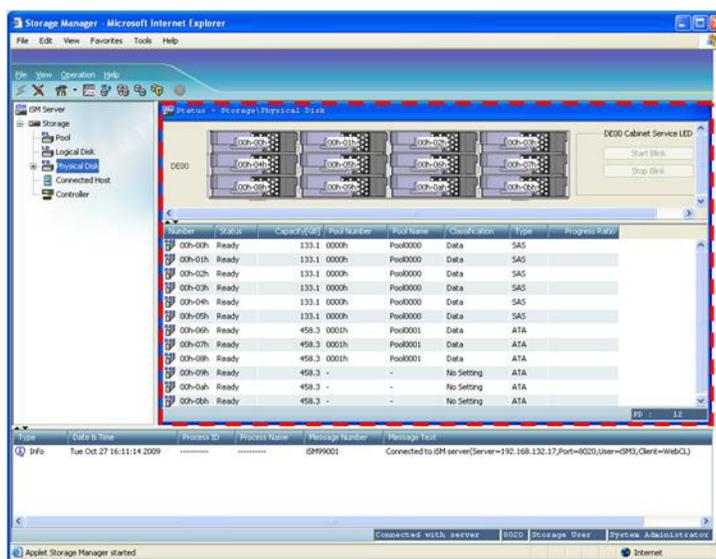


Figure 4-6: Physical Disk List

The items below show the physical disk states.

Status

Displays the physical disk operating state and occurred event in any of the following at "State" column.

Ready: The physical disk is normally rotated.

Info(inactive): Preventive maintenance is performed for the physical disk.

Attn.(rebuilding): The data is being rebuilt.

Attn.(powering up): The physical disk is being activated.

Ready (formatting): Being physically formatted.

Attn.(stop): The physical disk is in the rotation stop state.

Fault: A "fault" occurred in the physical disk.

Offline: The physical disk was disconnected or does not exist.

If the state of the physical disk is "Attn.(stop)", the physical disk is in the rotation stop state and the rotation is being stopped.

Physical Disk Details Information Screen

The physical disk details information screen is displayed by selecting (clicking the left button on) an optional pool, right clicking the physical disk, and selecting [Properties]-(or selecting [View] - [State monitor] - [Properties] from the menu) in configuration display area or information list display area.

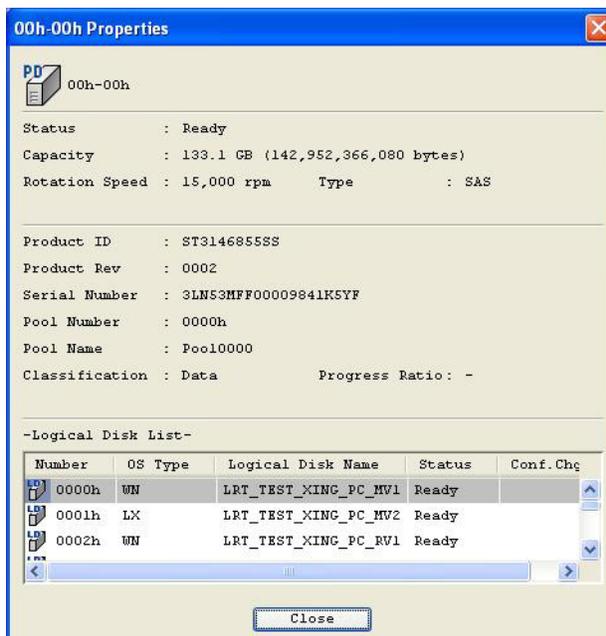


Figure 4-7: Physical Disk Details

Status

Displays the physical disk state.

The display contents are the same as the physical disk list screen.

Managing Eco Mode

Eco mode management manages the eco mode for pool and that for the unused PDs/spare PDs.

Setting/Changing Eco Mode for Pools

This function sets whether to enable or disable control of pool rotation. In the environment where an always-rotating pool and not-always-rotating pool coexist, to avoid specifying the always-rotating pool as the pool to be stopped, only the pool for which the eco mode is enabled by the power saving function is allowed to stop and start rotation. Setting and changing the eco mode for Pools can be done from the configuration setting of an SnapSAN Manager client.

To set and change the eco mode for pools, the Disk Spin Down license needs to be unlocked and the client user level needs to be administrator.

Operating Procedure (SnapSAN S3000/S5000)

To set and change the eco mode for pools, execute the following procedure.

Starting Eco Mode Setting

To start configuration setting of SnapSAN S3000/S5000 devices on the SnapSAN Manager which manages two or more devices, select the target disk array and then click [Configuration] [Disk Array] [Power Saving Settings] from the SnapSAN Manager main screen menu.

Click [Configuration] [Disk Array] [Power Saving Settings] directly from the SnapSAN Manager main screen menu when using the SnapSAN Manager server placed in the device or the SnapSAN Manager which manages only one device.

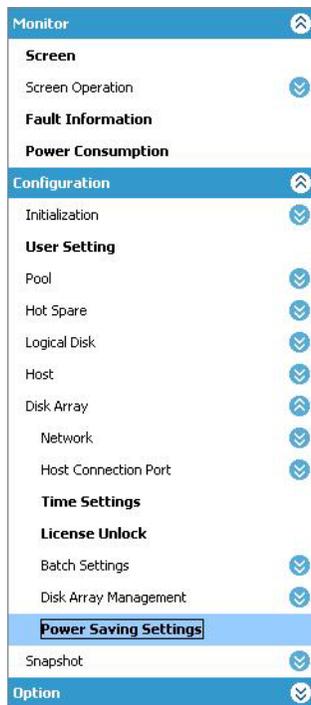


Figure 4-8: Selecting Power Saving Settings

Power saving settings can be changed for each pool. Specify whether to enable or disable the eco mode from the "Power saving setting of pool" section of this screen.

To enable the eco mode, select the check box for the target pool in "Pool list". To disable the eco mode, clear the check box.

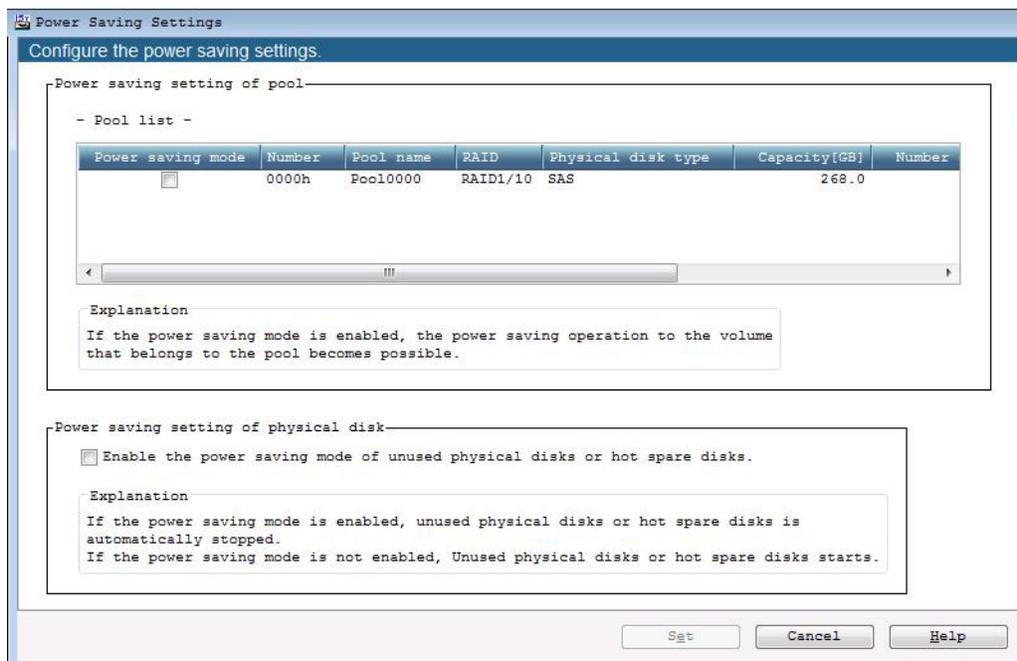


Figure 4-9: Power Saving Settings

Displaying Eco Modes for Pools

Specify enabling/disabling the eco mode for pools.

Check Box	Description
ON	The eco mode is enabled. Stopping and starting rotation of the corresponding pool and the stopping and starting using a volume are allowed.
OFF (default)	The eco mode is disabled. Stopping rotation of the corresponding pool and stopping using a volume are inhibited.

You cannot disable the eco mode for the pool of which rotation is being stopped.

Button operations

The operation described below is processed by clicking the button at the bottom of the [Power Save Settings] screen.

[Set] button

Either of the following confirmation dialog boxes are displayed before the execution of changing the eco mode. The lower dialog box is displayed after "Set" button is executed second time or more.

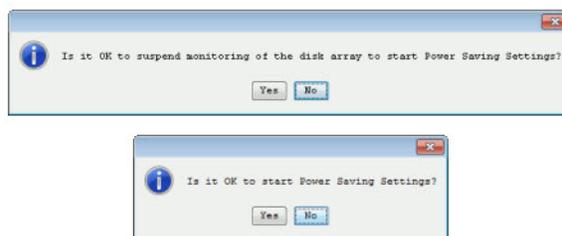


Figure 4-10: Confirmation

The power saving settings process is executed when [Yes] is clicked.

[Cancel] button

The confirmation dialog box to cancel setting is displayed. The wizard ends when [Yes] is clicked.

Set and Change the Eco Mode for Pools

Starting Configuration Setting

To start configuration setting, select the target disk array from the SnapSAN Manager main screen and then select -[Configuration] - [Configuration Settings] from the menu.

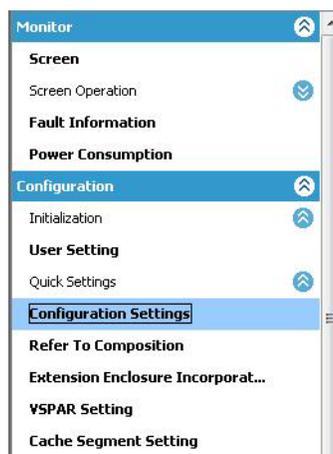


Figure 4-11: Select Config

If an SnapSAN Manager client has not been installed, the following message appears and configuration setting is not started.

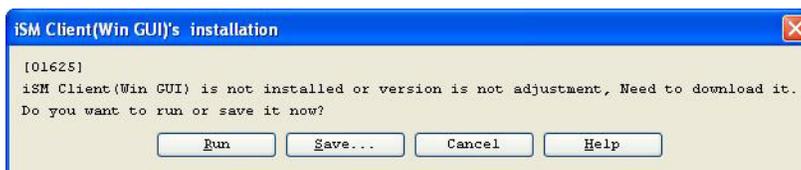


Figure 4-12: Downloading File

Acquiring Configuration Information Automatically

When configuration setting is started, configuration information is acquired from a server. Then the message box is displayed, and the configuration information is automatically acquired and saved in the default file.

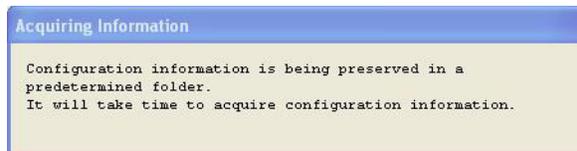


Figure 4-13: Acquiring Configuration Information

The configuration information can be saved in text format or CSV format.

Configuration Setting Menu Screen

Click [Storage Configuration Setting] (enclosed in the dotted line on this menu screen to display the LD Individual Bind/Unbind screen.

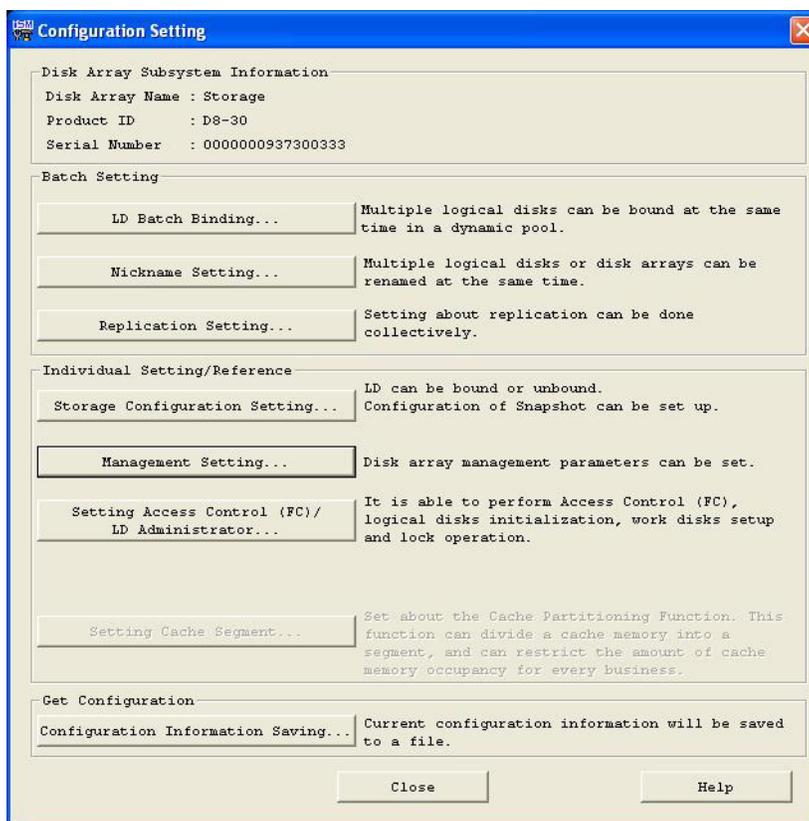


Figure 4-14: Configuration Setting Menu

LD Individual Bind/Unbind screen

As long as the license of the power saving function is unlocked, when you select the Basic Pool or the Dynamic Pool from the tree view in the configuration item display area, [Eco mode] appears on the pool list screen.

After selecting the target pool from the pool list of the detailed display area, click [Change Eco mode] to display the Changing Eco Mode screen.

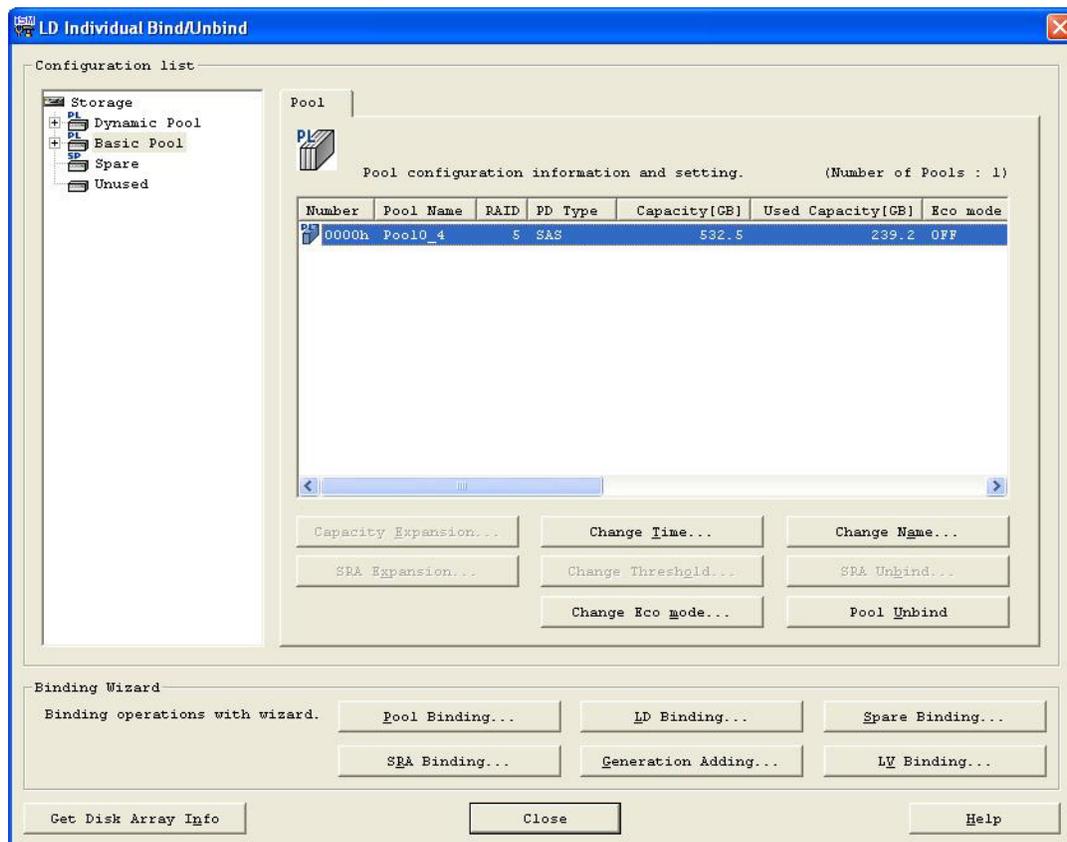


Figure 4-15: Setting ECO Mode

*Because SSDs do not support the power saving function, if the PD type of the selected pool is SSD, it is not possible to change to the eco mode.

Setting and Changing Eco Mode For Pools

Specify whether to enable or disable the eco mode from this screen.

To enable the eco mode, mark the check box and click the [OK] button. To disable the eco mode, uncheck the box and click the [OK] button.



Figure 4-16: Changing ECO Mode

<Eco mode for pools>

Specify enabling/disabling the eco mode for pools. You can specify either of the following eco mode.

Check Box	Description
ON	The eco mode is enabled. Stopping and starting rotation of the corresponding pool and the stopping and starting using a volume are allowed.
OFF (default)	The eco mode is disabled. Stopping rotation of the corresponding pool and stopping using a volume are inhibited. OFF cannot be set to the pool of which rotation is being stopped.

You cannot disable the eco mode for the pool of which rotation is being stopped.

When the eco mode is changed successfully, the following completion message appears.

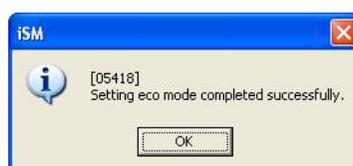


Figure 4-17: Eco Mode Change

Displaying Eco Mode for Pools

The eco mode for pools ON/OFF state by the power saving function is displayed in the pool list screen and pool detail information screen of the SnapSAN Manager main window.

Pool Details Information Screen

The pool details information screen is displayed by selecting (clicking the left button on) an optional pool, right clicking the pool, and selecting [Properties] - (or selecting [View] pool list screen - [State monitor] - [Properties] from the menu) in configuration display area or information list display area.

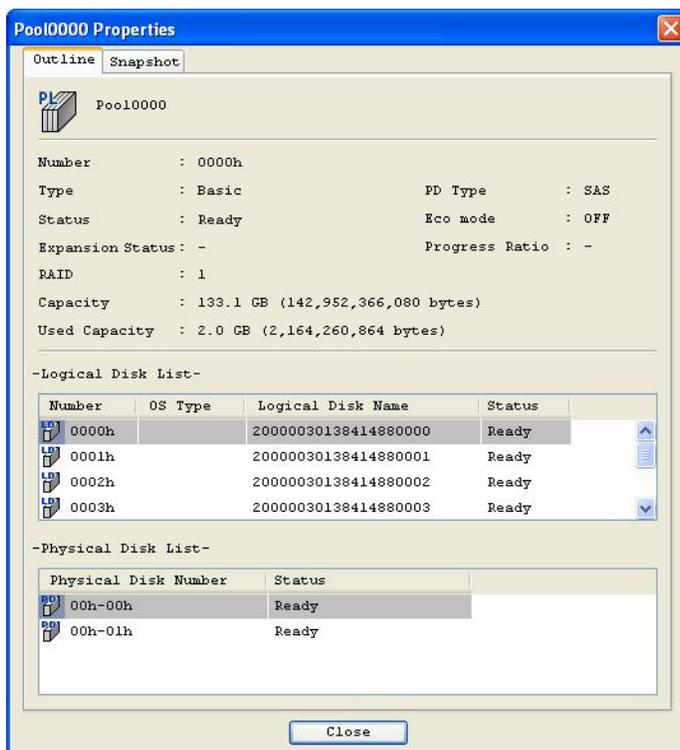


Figure 4-18: Pool Details

Eco mode

Displays the eco mode of pool.

ON: The pool's eco mode is available.

OFF: The pool's eco mode is not available.

Setting and Changing the Eco Mode for Unused PDs/Spare PDs

This function sets and changes the state that indicates whether to enable or disable control of unused PDs/spare PDs rotation. Immediately after a disk array is installed, the eco mode for unused PDs/spare PDs is set to disable. Therefore, to use the eco mode for unused PDs/spare PDs, a user must make the eco mode enable. Setting and changing the eco mode for unused PDs/spare PDs can be done from the configuration setting of an SnapSAN Manager client

This function can be used only for the supported disk array. The setting screen is not displayed on the unsupported disk array.

To set and change the eco mode for unused PDs/spare PDs, the Disk Spin Down license needs to be unlocked and the client user type needs to be Storage Group Administrative User or Storage Administrative User, and the client user level needs to be administrator.

Operating Procedure (SnapSAN S3000/S5000)

To set and change the eco mode for pools, execute the following procedure.

Starting eco mode setting

To start configuration setting of SnapSAN S3000/S5000 devices on the SnapSAN Manager which manages two or more disk arrays, select the target disk array and then click [Configuration] -[Disk Array] -[Power Saving Settings] from the SnapSAN Manager main screen menu.

Click [Configuration] -[Disk Array] - [Power Saving Settings] directly from the SnapSAN Manager main screen menu when using the SnapSAN Manager server placed in the device or the SnapSAN Manager which manages only one device.

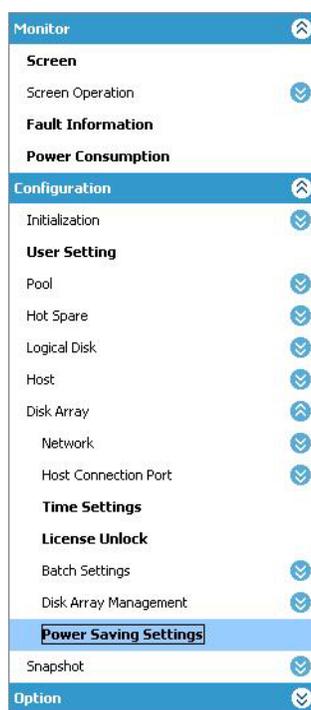


Figure 4-19: Power Saving Setting Selection

Eco Mode Setting For Physical Disk

The eco mode can be enabled for unused physical disks or hot spares.

If this function is enabled, unused physical disks and hot spares in operation are automatically stopped when configuration setting ends. Enabling this function can always remain unused physical disks and hot spares stopped.

If this function is disabled, the automatic stopping function mentioned above will not work and the mode to active all physical disks starts, which leads unused physical disks and hot spares currently stopping to start operation according with the mode change.

Select the check box to enable power saving setting of physical disks

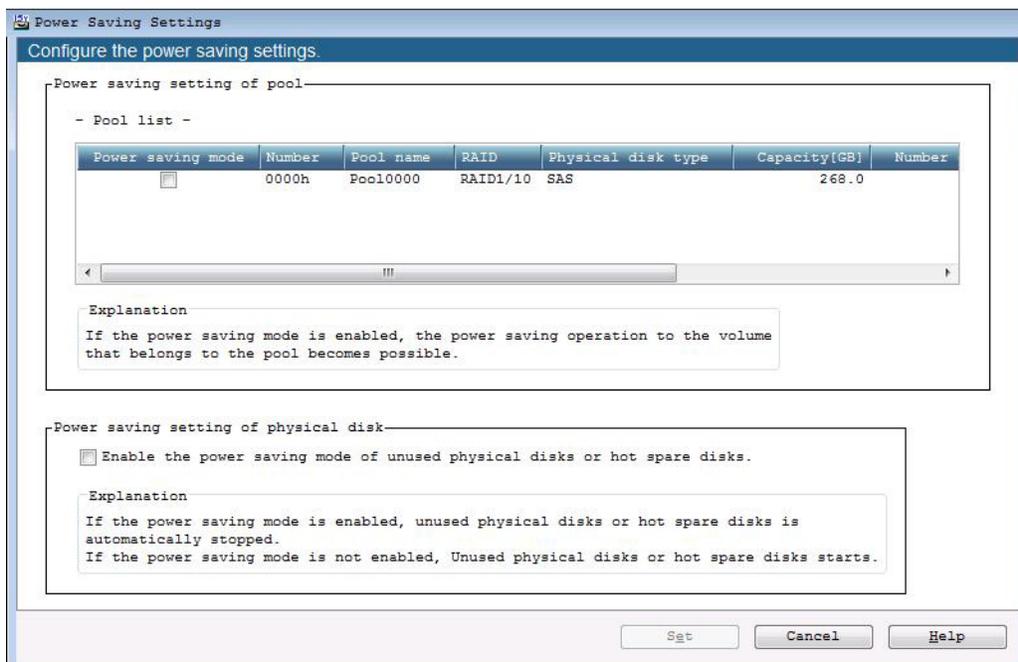


Figure 4-20: Power Saving Setting

Operation cannot be stopped for physical disks with the following numbers because configuration information of disk array is saved.

0h-0000h to 00h-0003h

Button Operations

The operation described below is processed by clicking the button at the bottom of the [Power Save Settings] screen.

[Set] button

Either of the following confirmation dialog boxes is displayed before the execution of changing the eco mode. The lower dialog box is displayed after "Set" button is executed second time or more.



Figure 4-21: Power Saving Setting Confirmation

Button operations

The operation described below is processed by clicking the button at the bottom of the [Power Save Settings] screen.

[Set] button

Either of the following confirmation dialog boxes is displayed before the execution of changing the eco mode. The lower dialog box is displayed after "Set" button is executed second time or more.

Operating Procedure (SnapSAN S3000/S5000)

To set and change the eco mode for unused PDs/spare PDs, execute the following procedure.

Starting configuration setting

To start configuration setting, select the target disk array from the SnapSAN Manager main screen and then select-[Configuration] - [Configuration Settings] from the SnapSAN Manager main screen menu

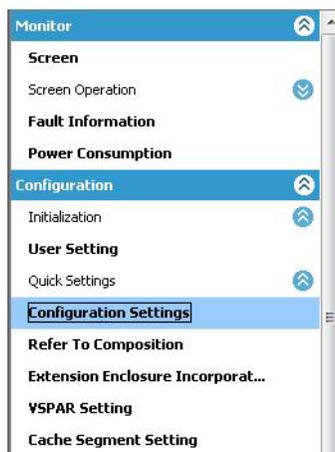


Figure 4-22: Configuration Setting Selection

If an SnapSAN Manager client has not been installed, the following message appears and configuration setting is not started.

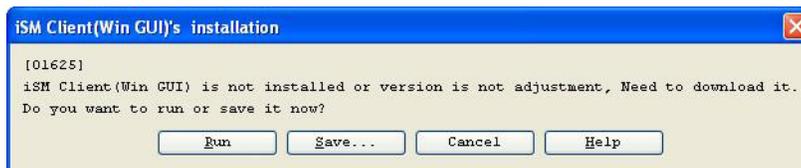


Figure 4-23: File Download

Acquiring Configuration Information Automatically

When configuration setting is started, configuration information is acquired from a server. Then the message box is displayed, and the configuration information is automatically acquired and saved in the default file.

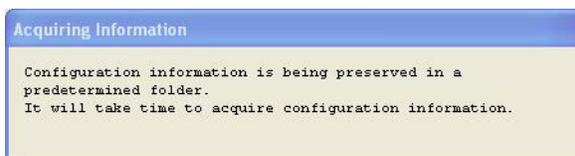


Figure 4-24: Acquiring Configuration Information

The configuration information can be saved in text format or CSV format.

Configuration Setting Menu Screen

Click [Management Setting] on this menu screen to display the Management Setting screen.

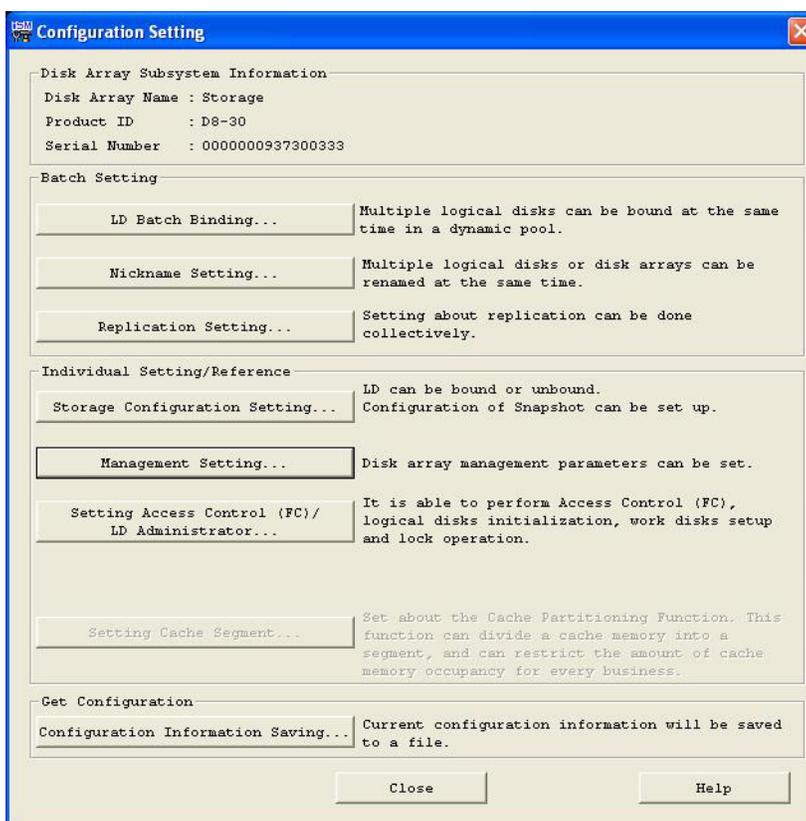


Figure 4-25: Configuration Setting Menu

Management Setting Screen

The operations regarding the eco mode can be performed on the Management Setting screen.

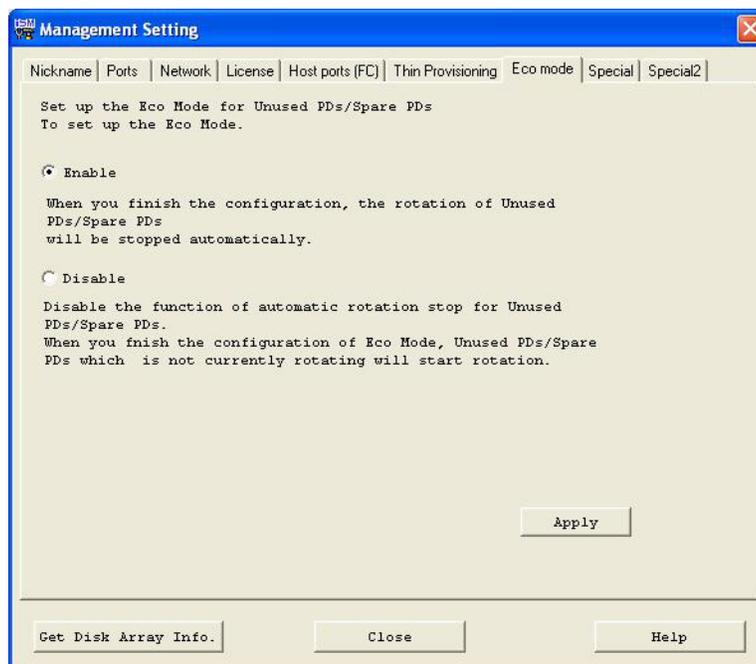


Figure 4-26: Management Setting

Set the eco mode for unused PDs/spare PDs.

Enable

When this function is enabled, the rotating unused PDs/spare PDs are automatically stopped when configuration setting is complete to save power. The following confirmation screen appears when the [Apply] button is pressed in this mode.

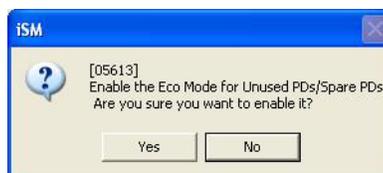


Figure 4-27: Eco Mode Changing (Enable)

Disable

The automatic stop function for unused PDs/spare PDs does not operate. Because all physical disks become in the rotation status in this mode, the currently stopped unused PDs/spare PDs start rotating immediately after this mode is changed.

The following confirmation screen appears when the [Apply] button is pressed in this mode.



Figure 4-28: Eco Mode Changing (Disable)

It takes one or two minutes to completely start the unused PDs/spare PDs.

If the eco mode is enabled for the unused PDs/spare PDs, the confirmation screen when configuration setting is complete and then the screen is displayed, automatically stopping physical disks.

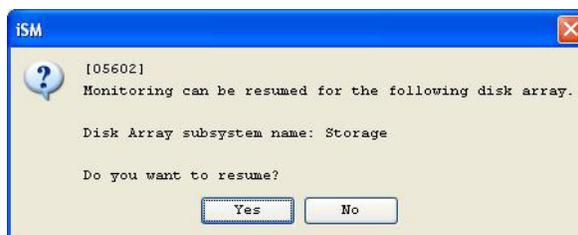


Figure 4-29: Resume Monitoring

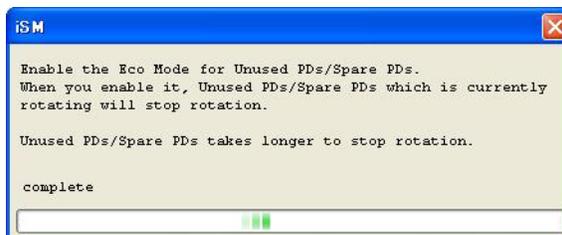
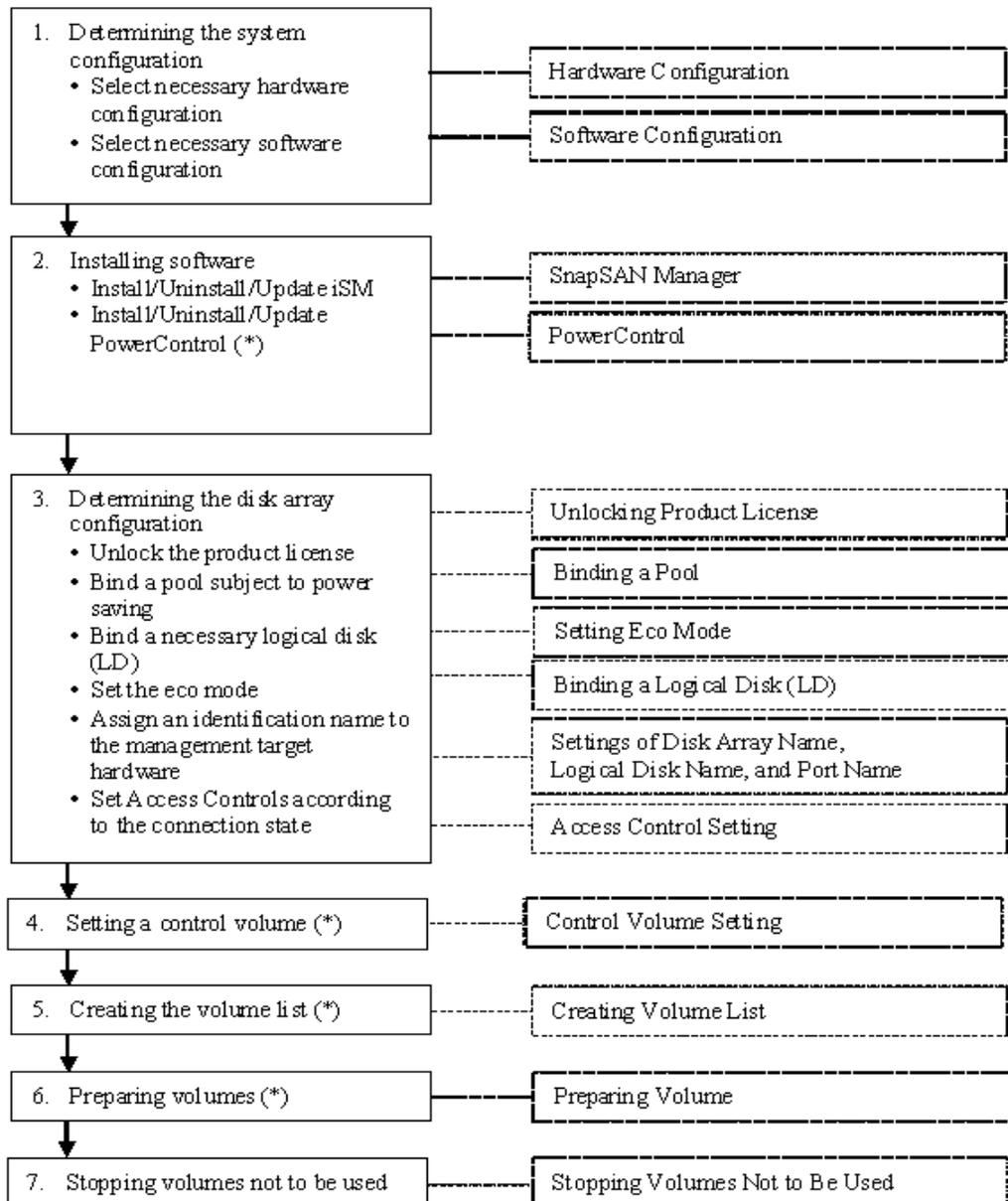


Figure 4-30: Enable

It takes one or two minutes to completely stop the unused PDs/spare PDs.

Installation - Windows

This chapter describes the system installation procedures showing an example to establish a power saving system in an existing operation system. Installation works are outlined below. Works followed by "*" mark are necessary for servers where PowerControl will be installed.



System Configuration

Hardware Configuration

Select hardware components according to the business conditions, requirements, disk capacity, etc... An example of a hardware configuration is shown.

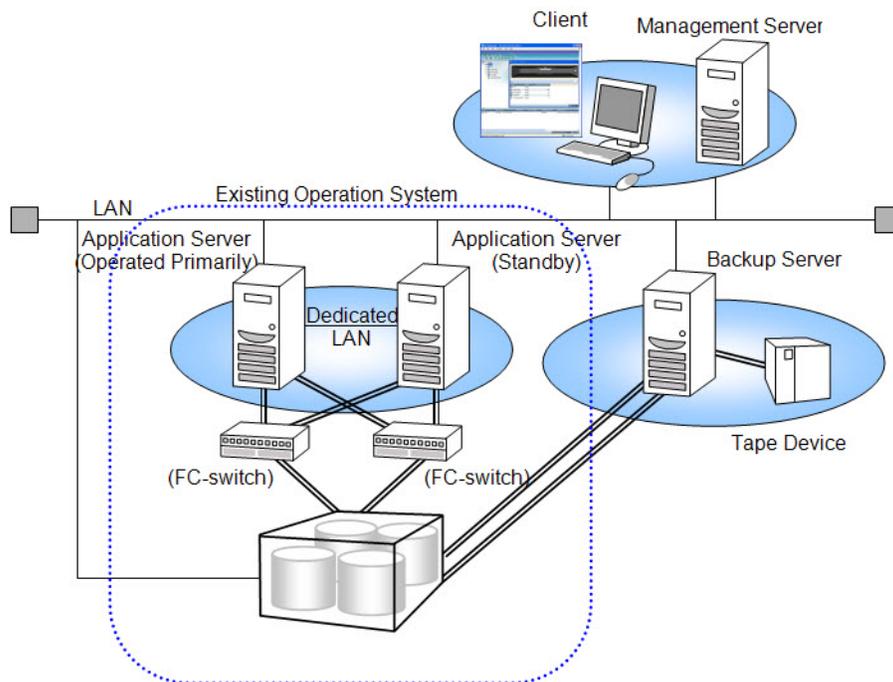


Figure 5-1: Hardware Configuration

Though a business or backup server may also be used as a management server, using a specific management server is recommended. Use of LAN connection is strongly recommended for connection with disk array.

- Connect the path of individual servers, to be connected to the disk array, to the port of different directors, limiting the servers to be accessed by Access Control.
- In the above configuration example, the application servers are installed in a cluster and mutually connected through the dedicated LAN.

Software Configuration

Select software to be used according to the hardware components, operating conditions, etc. software configuration example.

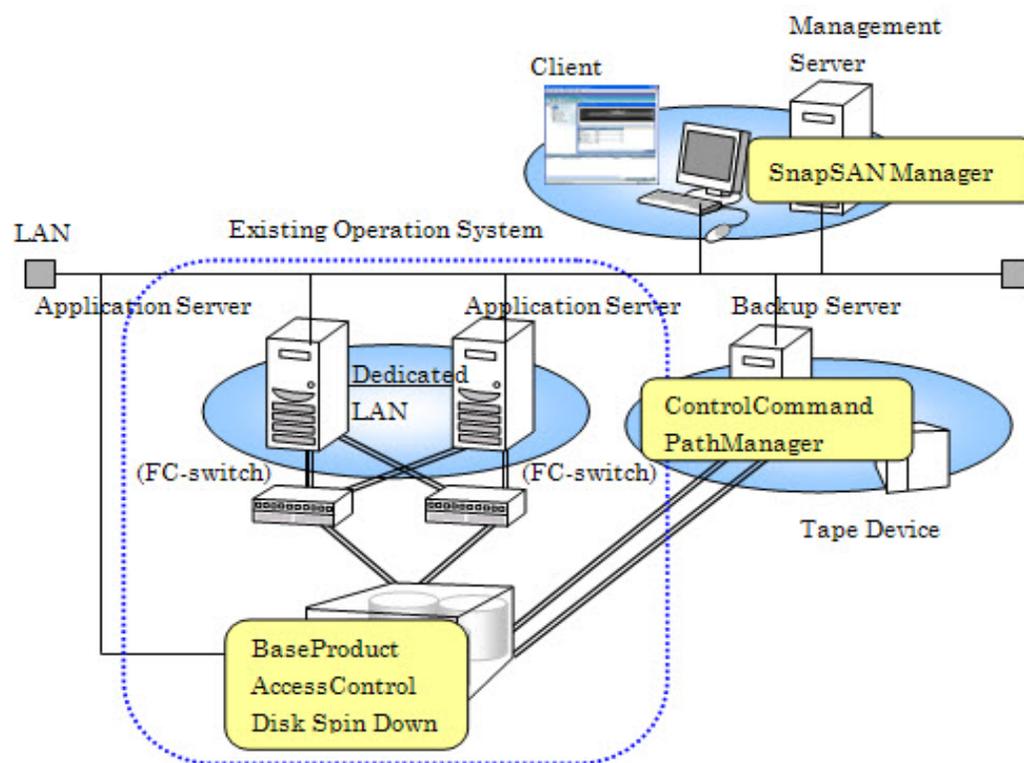


Figure 5-2: Software Configuration

- Install the backup software in the backup server.
- Install the management software in the management server. Install the SnapSAN Manager in the management server.
- Install the PowerControl in the backup server. PowerControl is included in ControlCommand.
- Disk Spin Down and AccessControl are installed in the disk array. They become available by unlocking the license.

Software Installation

SnapSAN Manager

Operating Environment

SnapSAN Manager Server

SnapSAN Manager Client (GUI)

SnapSAN Manager Server Installation

Install the SnapSAN Manager server.

SnapSAN Manager Server Setting

Create the environment.

SnapSAN Manager Client

Install the SnapSAN Manager client.

SnapSAN Manager Server Uninstallation

Uninstall the SnapSAN Manager server according to the installation guide attached to the SnapSAN Manager.

SnapSAN Manager Client Uninstallation

Uninstall the SnapSAN Manager client according to the installation guide attached to the SnapSAN Manager.

Update

SnapSAN Manager Server Update

To update the SnapSAN Manager software, uninstall the existing software, and then install the new software.

PowerControl

Operating Environment

- Operating system and linkage software
- Required disk free space
- Required memory

Installation

Install PowerControl that is included in ControlCommand.

Setting Operating Environment

When you use PowerControl, you can use the option setting file (SnapSAN Managerrpl.ini) to set various operations at command execution.

Uninstall PowerControl

Update

To update the PowerControl software, uninstall the existing software, and then install the new software.

Disk Array Configuration

For the disk array to be connected, determine the configuration for using the power saving function.

Unlocking Product License

To use the Disk Spin Down, you must unlock the product license set in the disk array. To unlock the license, you must purchase the corresponding products equal to or greater than the total capacity of the data disk.

At execution, PowerControl checks the license status of the products and check whether they are available.

If the total capacity of the data disk exceeds the product's specified capacity because physical disks are added to the disk array system, it is necessary to unlock the product licenses equal to or greater than lack of licenses.

Binding a Pool

Bind a pool for use with the power saving function.

Setting Eco Mode

Set the eco mode of a pool that is used with the power saving function to ON.

When a pool is bound, the eco mode is set to OFF by default. To enable the eco mode, click [Change Eco mode] on the LD Individual Bind/Unbind screen of configuration setting to set the eco mode to ON.

Binding a Logical Disk (LD)

Bind volumes for use with the power saving function.

The capacity and number of volumes for use with the power saving function must be determined depending on the frequency of use, size, and usage purpose of the data. Then, bind logical disks in a pool that is used with the power saving function.

The following types of volumes must not be bound in a pool that is used with the power saving function.

- Volume which rotates regularly for business use
- Volume to be used by the snapshot function
- Control volume
- System volume

Settings of Disk Array Name, Logical Disk Name, and Port Name

You can assign identification names to hardware components managed by the SnapSAN Manager. Identification names can be given to the following items:

- Disk array subsystem name
- Logical disk name (plus OS type)
- Port name

It is better to set a disk array subsystem name, port name, and logical disk name according to the operating conditions and server connection conditions.

When you use the power saving function, you do not need to note disk array names and port names. For the OS type of a logical disk, you need to note the following.

- A logical disk name must be set so as to identify data to be stored.
- The OS type of a logical disk must be appropriate for the supporting platform.

These settings are performed from an SnapSAN Manager client.

Disk Array Name Setting

Disk Array Subsystem	Disk Array Subsystem Name
Storage_array	Customer_Database

Port Names

Director Number	Port Number	Port Name	Connected Server
00h	00h	BACKUP_PRIMARY	Backup server
01h	00h	BACKUP_SECONDARY	

Setting Logical Disk Names and OS Types

LD No.	OS Type	Logical Disk Name	Remarks
0050h	WN	DB_DATA_BK	Backup of DB data file
0051h		DB_REDO1_BK	Backup of DB REDO file 1
0052h		DB_REDO2_BK	Backup of DB REDO file 2
0053h		DB_CTL_BK	Backup of DB control file
0054h		DB_ARCHIVE_BK	Backup of DB backup file

Set the OS type as WN, which is the Windows operating system default value, to use the power saving function on the Windows system. This example shows logical disk names when corresponds to the database configuration.

Access Control is necessary for a system in which the power saving function is installed.

Before performing the following operations, enable Access Control setting. In addition, Access Control setting needs to be performed for volumes that have already been used for other operations.

Access Control Setting

To prevent a wrong update to a volume or a wrong modification of the disk configuration, usually you need to set the system with power saving function so that volumes to be used by power saving function cannot be referenced by a server other than a backup server.

Therefore, to use power saving function, you need to limit logical disks that can be accessed from a server by using Access Control.

To use power saving function, also take note the following points and set Access Control.

Setting Access Control

- Assign volumes to be used by power saving function to a backup server.
- Assign a control volume to a backup server. A control volume must be bound in not a pool that is used with the power saving function but a pool that is always rotating

Before introducing servers, you must determine the server connection modes and design Access Control settings. Access Control can be set for individual ports or WWNs. Setting for Access Controls requires purchasing the AccessControl.

Control Volume Setting

A control volume is used when a server issues control I/O to the relevant disk array. Select one of logical disks connected to a backup server as the volume for issuing I/O to that disk array and register the volume in the volume list. The purpose (attribute) of logical disks built as control volumes can be identified with the SnapSAN S3000/S5000. When the logical disk information is displayed by the SnapSAN Manager client (and so on) for disk arrays on which the purpose (attribute) of a control volume can be identified, the identification information indicating the control volume as a logical disk purpose (attribute) is displayed.

Control Volume Registration

Create the volume list when the logical disk bound as a control volume is recognized as a disk by the server. The disk array identifies the logical disk having the control volume attribute from the logical disks connected to the server and automatically registers it in the volume list.

Creating Volume List

Creation of a volume list is required before using PowerControl command. To create a volume list, execute the SnapSAN Managervollist command with the -cr option specified or execute the [Create/Update Volume List] operation in the Volume List Display screen (screen operation). The user must belong to the Administrators group to create a volume list.

The following command line shows an example to create a volume list with the SnapSAN Managervollist command.

```
SnapSAN Managervollist -cr
```

Upon successful creation of volume list, the following message appears:

```
SnapSAN Manager11701: Volume list is created successfully.
```

If creation of a volume list fails, execution of PowerControl command is disabled. Troubleshoot in accordance with an error message or with operation error tracing, create a volume list again.

Create a volume list in the following states.

- The path between the disk array and the server is normally connected.
- The logical disk in the disk array is recognized as a server (OS) disk device.
- The volume (partitions) in the disk is recognized by the server (OS).

Execute the following operation before creating a volume list if you use a control volume in the disk array with which the control volume attribute cannot be identified.

- Register the logical disk to be used as a control volume in advance by executing the [Define Control Volume] operation in the Volume List Display screen.

To successfully register volume information in the volume list, create a volume list in the following states.

- Pairs are separated when the RV in the data replication function is connected to the server.
- The link-volume (LV) and snapshot-volume (SV) are linked when the LV in the snapshot function is connected to the server. The base-volume (BV) and LV are also not linked when the BV is connected to the server.
- Protected data is readable when the logical disk for which the WORM function is applied is connected to the server.
- The volume is in the "In use" state and accessible when the logical disk for which the power saving function is applied is connected to the server.
- All the volumes are mounted and every mount point to be used (drive letter or NTFS folder name) is set.
- The link path between disk arrays is normal when the Replication and Mirroring is configured for the disk array.

After successfully creating a volume list, display the information registered in the volume list to check that the items to be used such as logical disks, partitions (mount point volume names), and mount points (drive letters or NTFS folder names) are all registered.

Once the volume list is successfully created, that information is maintained for operation. It is not necessary to update the volume list during operation. However, if the disk array, server (OS) volume, or other configuration is changed, it is required to recreate the volume list to reflect the new information. Note that an error or inconsistency may occur at execution of PowerControl command unless the volume list is updated.

Preparing Volume

When starting/stopping a volume for the first time for a power saving operation, execute the steps given below for the target volume. The following is an example of the procedure for creating partitions and a file system on a volume to be used by the power saving function. The volume must be stopped after a file system is created.

Suppressing automatic volume mounting (backup server)

Suppress automatic volume mounting.

If you specify NOTREADY for the UMOUNT_RVACC parameter of the option setting file (SnapSAN Managerrpl.ini), the mount point (drive letter or NTFS folder name) is deleted automatically when the volume is unmounted. Therefore, the volume is in the state where automatic mounting is impossible. The operation suppresses automatic volume mounting by Windows. Since the default of this parameter, however, is not suppressing automatic mounting, it is recommended to specify NOTREADY for this parameter to suppress automatic volume mounting for operation.

For Windows Server 2003 or Windows Server 2008, specify NOTREADY to the UMOUNT_RVACC parameter of the option setting file (SnapSAN Managerrpl.ini) and enter "MOUNTVOL /N" on command prompt.

```
MOUNTVOL /N
```

Then, the list of volumes available on system is displayed as follows:

```
\\?\Volume{37d84cc8-2507-11d5-a0f7-00004c714491}\
  F:
\\?\Volume{37d84cc8-2507-11d5-a0f7-00004c714491}\
  G:
\\?\Volume{37d84cc8-2507-11d5-a0f7-00004c714491}\
  H:
```

A mount point volume name is required for a power saving operation. Take a memo of the mount point volume names, which are displayed in the mount point volume name list, to use in the operation.

Unmounting a volume (backup server)

Unmount the volume in preparation for the not in use state.

When the volume is unmounted, the drive letter set for the volume is automatically deleted.

```
SnapSAN Managerrc_umount -drv H: -offline
```

Stopping to use a volume (backup server)

Perform an operation to stop using the volume.

When all the volumes bound in the pool are not in use, the pool rotation also stops.

```
SnapSAN Managerec_stop -vol vol002 -volflg ld
```

Stopping Volumes Not to Be Used

As the condition to put a pool in the rotation stop state, you need to put all volumes bound in the pool in the not in use state.

If bound volumes that are not used currently and volumes that are not supposed to be used for a while exist in the pool for which the power saving function is executed, you cannot put the pool in the rotation stop state until these volumes is put in the not in use state. If these volumes exist, put the volumes in the not in use state by the power saving operation beforehand. Confirm that volumes are unmounted before you put them in the not in use state.

```
SnapSAN Managerec_stop -vol vol_unused1 -volflg ld  
SnapSAN Managerec_stop -vol vol_unused2 -volflg ld
```

This chapter describes an example of operation using the power saving function, the operation procedure for power saving function, and the trouble-shooting for faults that may occur during operations.

Operation Design

To realize an efficient power saving operation, you must consider the following items:

Concurrent use of volumes

The power saving function cannot stop the pool rotation until all volumes that belong to the pool are put in the not in use state. The longer the time during which all volumes that belong to the pool are in the not in use state becomes, the higher the effect of power saving is enhanced. Therefore, consideration is needed in order to use volumes concurrently during the same time period.

The power saving effect when volumes are used concurrently is enhanced significantly when compared to the power saving effect when volumes are not used concurrently.

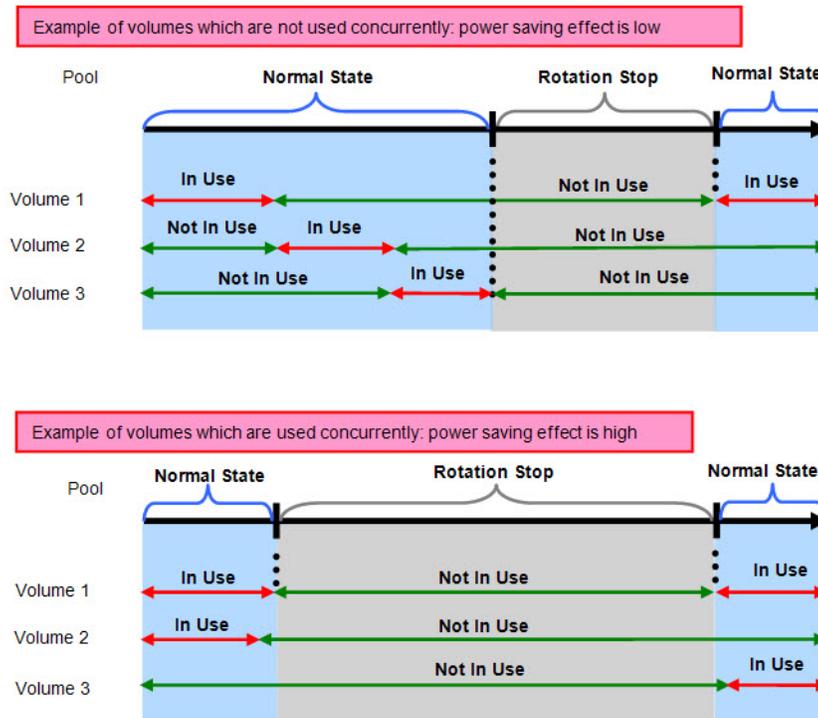


Figure 6-1: Power Saving Effect

Example of Power Saving Operation

This section describes an operation example using the power saving function on a backup volume to be used in a periodical disk backup operation.

Although the text describes the commands in input order, it is recommended to automate the command execution by job scheduling software on the system built actually.

Overview

The power saving function is applied at backup execution to each backup volume bound in the same pool (power saving disk backup). Except at backup execution, you can use a backup volume which is not in use as needed (use of a backup volume).

Power Saving Disk Backup

Before starting disk backup, instruct a backup volume to start using the volume by the start of use command. When using a backup volume is started, execute backup by backup software. After backup is completed, instruct the backup volume to stop using the volume by the not in use command.

For the specific operations, refer to (2) Operation flow (power saving disk backup) and (3) Operation procedure (power saving disk backup).

Execute the power saving operation for each of backup volumes bound in the same pool executing the same steps.

Use of backup volume

To use data in a backed up volume, start using the target backup volume and use data in the volume.

For the specific operations, refer to (4) Operation flow (use of backup volume) and (5) Operation procedure (use of backup volume).

Data recovery of business volume

When data in a business volume is corrupted due to a physical failure or an operating error, the business volume is restored from the backup volume.

For the specific operation, refer to (6) Operation flow (data recovery of business volume) and (7) Operation procedure (data recovery of business volume). It is assumed that the power saving operation environment is configured. It is also assumed that a backup volume is not in use at installation. A backup volume logical disk name in the following operation example is as follows.

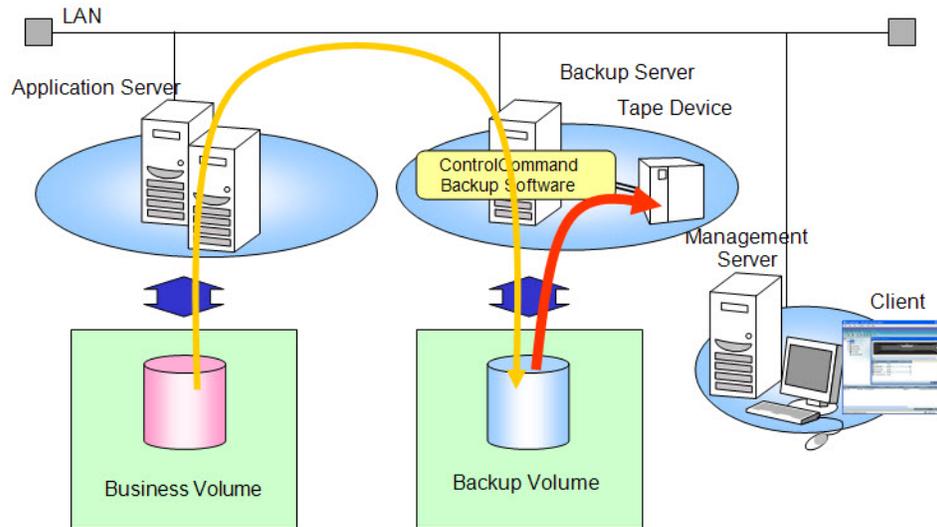
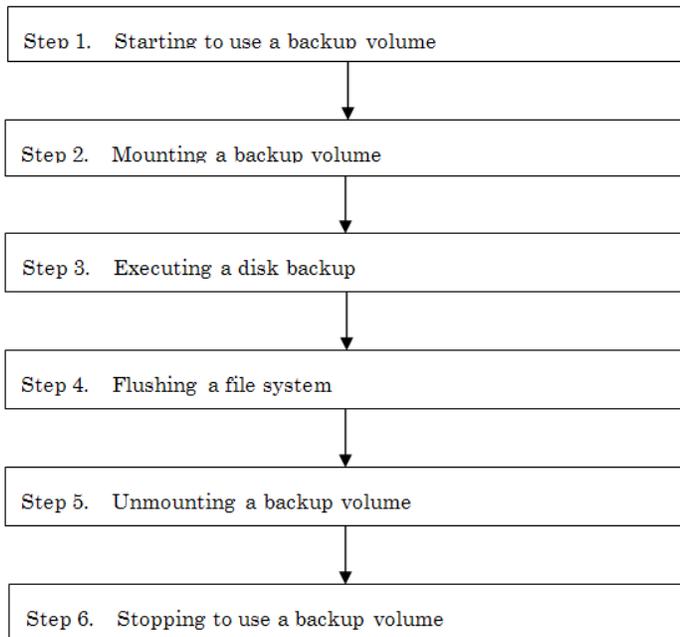


Figure 6-2: Power Saving Operation Example

Operation flow (Power Saving Disk Backup)

Work flow for power saving operation example

<<Backup Server>>



Power Saving Disk Backup Operation procedure

Starting to use a backup volume (backup server)

Perform an operation to start using the backup volume.

When rotation of a pool including the backup volume is being stopped, this operation may take time because the command waits for the pool to start rotation.

```
SnapSAN Managerec_start -vol vol1002 -volflg ld
```

Mounting a backup volume (backup server)

Mount the backup volume.

When the drive letter or NTFS folder name is also included in the mount command, the drive letter or NTFS folder name is automatically reset after the backup volume is mounted.

```
SnapSAN Managerrc_mount -mvol \\?\Volume{37d84cca-2507-11d5-a0f7-00004c714491}\ -drv H:
```

Executing a disk backup (backup server)

Back up necessary business data to the backup volume using backup software.

For the procedure to back up the data, follow that of the backup software to use.

Flushing a file system (backup server)

Exit or abort an application accessing the backup volume.

Flush the file system on the backup volume, and write to a disk the data in the file system buffer that has not been written.

```
SnapSAN Managerrc_flush -drv H:
```

Unmounting a backup volume (backup server)

Unmount the backup volume in preparation for the not in use state.

When the backup volume is unmounted, the drive letter or NFS folder name set for the volume is automatically deleted.

```
SnapSAN Managerrc_umount -drv H: -offline
```

Stopping to use a backup volume (backup server)

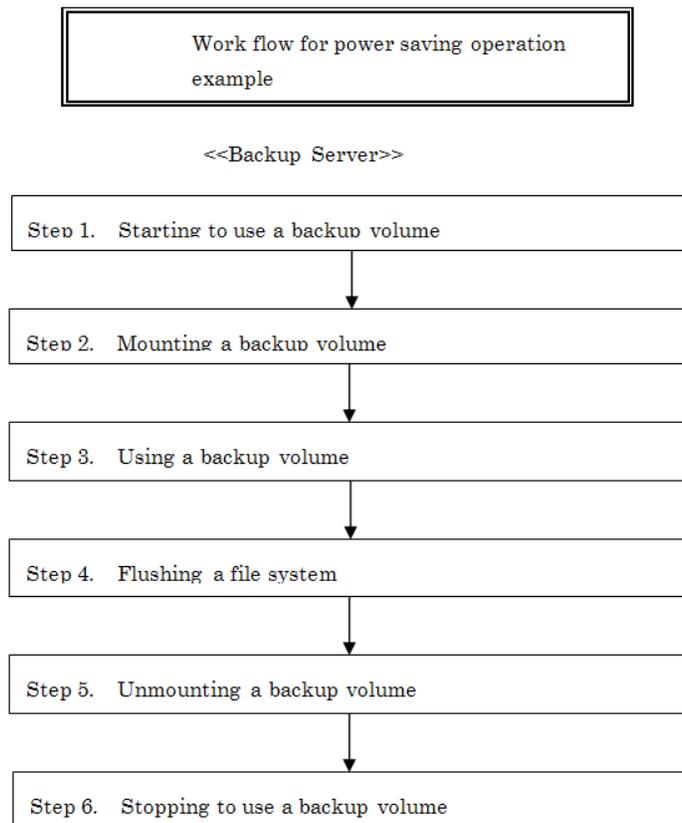
Perform an operation to stop using the backup volume.

When all the volumes bound in the pool are not in use, the pool rotation also stops.

```
SnapSAN Managerec_stop -vol vol1002 -volflg ld
```

Before you perform an operation for stopping to use a volume, the volume must already be unmounted. If the volume has not been unmounted and you execute the volume use stop command, the volume is unmounted within the volume use stop command.

Operation flow (use of backup volume)



Operation procedure (use of backup volume)

Starting to use a backup volume (backup server)

Perform an operation to start using to the backup volume.

When rotation of a pool including the backup volume is being stopped, this operation may take time because the command waits for the pool to start rotation.

```
SnapSAN Managerec_start -vol vol1002 -volflg ld
```

Mounting a backup volume (backup server)

Mount the backup volume.

When the drive letter or NTFS folder name is also included in the mount command, the drive letter or NTFS folder name is automatically reset after the backup volume is mounted.

```
SnapSAN Managerrc_mount -mvol \\?\Volume{37d84cca-2507-11d5-a0f7-00004c714491}\ -drv H:
```

Using a backup volume (backup server)

Use data in the backup volume.

Flushing a file system (backup server)

Exit or abort an application accessing the backup volume.

Flush the file system on the backup volume, and write to a disk the data in the file system buffer that has not been written.

```
SnapSAN Managerrc_flush -drv H:
```

Unmounting a backup volume (backup server)

Unmount the backup volume in preparation for the not in use state.

When the backup volume is unmounted, the drive letter or NFS folder name set for the volume is automatically deleted.

```
SnapSAN Managerrc_umount -drv H: -offline
```

Stopping to use a backup volume (backup server)

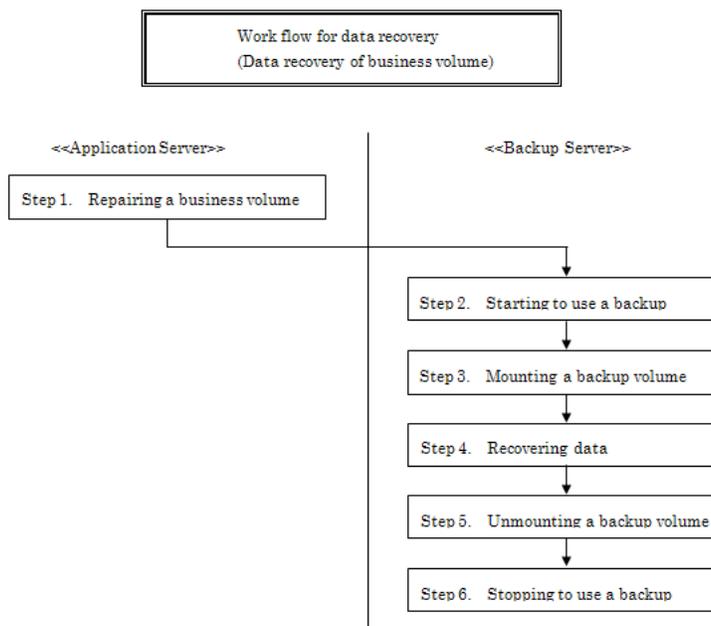
Perform an operation to stop using the backup volume.

When all the volumes bound in the pool are not in use, the pool rotation also stops.

```
SnapSAN Managerec_stop -vol vol1002 -volflg ld
```

Before you perform an operation for stopping to use a volume, the volume must already be unmounted. If the volume has not been unmounted and you execute the volume use stop command, the volume is unmounted within the use stop command.

Operation flow (data recovery of business volume)



Operation procedure (data recovery of business volume)

Repairing a backup volume (application server)

You may bind a new logical volume when, for example, a hardware fault has occurred and you repair the backup volume by rebuilding it. In such a case, use [Disk Management] (Windows) to create a disk signature.

Then set partitions, perform formatting to create a file system, and reset the drive letter. For the partitions, file system, and drive letter, make the same settings as you did before occurrence of the fault.

You must also re-create and update a volume list.

```
SnapSAN Managervollist -cr
```

Starting to use a backup volume (backup server)

Perform an operation to start using to the backup volume.

When rotation of a pool including the backup volume is being stopped, this operation may take time because the command waits for the pool to start rotation.

```
SnapSAN Managerec_start -vol vol1002 -volflg ld
```

Mounting a backup volume (backup server)

Mount the backup volume.

When the drive letter or NTFS folder name is also included in the mount command, the drive letter or NTFS folder name is automatically reset after the backup volume is mounted.

Recovering data (backup server)

Use backup software to restore the data saved in the backup volume to the business volume.

For the procedure to restore the data, follow that of the backup software to use.

Unmounting a backup volume (backup server)

Unmount the volume in preparation for the not in use state.

When the backup volume is unmounted, the drive letter or NTFS folder name set for the volume is automatically deleted.

```
SnapSAN Managerrc_umount -drv H: -offline
```

Stopping to use a backup volume (backup server)

Perform an operation to stop using the backup volume.

When all the volumes bound in the pool are not in use, the pool rotation also stops.

```
SnapSAN Managerec_stop -vol vol1002 -volflg ld
```

Before you perform an operation for stopping to use a volume, the volume must already be unmounted. If the volume has not been unmounted and you execute the volume use stop command, the volume is unmounted within the command.

Example of Concurrent Operation with Replication Function

This section describes an example of operation by concurrently using the power saving function and data replication function.

Although the text describes the commands in input order, it is recommended to automate the command execution by job scheduling software on the system built actually.

Overview

For a backup system using the data replication function, power saving function is applied to replication volumes (RV) (power saving for replication volumes). For other than performing backup, replication volumes which are not in use can be started. When data in a master volume is corrupted by physical failure or mis-operation, the master volume is restored from the backed-up replication volume (data recovery of master volume).

Power Saving of Replication Volume

Before starting backup, instruct a replication volume to start using the volume by the start of use command. When using the replication volume is started, use the data replication function to back up the data of the master volume to the replication volume. After backup is completed, instruct the replication volume to stop using the volume by the not in use command.

For the specific operations, refer to (2) Operation flow (power saving of replication volume) and (3) Operation procedure (power saving of replication volume).

Execute the power saving operation for each of backup volumes bound in the same pool executing the same steps.

Use of replication volume

To use the backed up data, start using the target replication volume and use data in the volume.

For the specific operations, refer to (4) Operation flow (use of backup volume) and (5) Operation procedure (use of backup volume).

Data recovery of master volume

When data in a master volume is corrupted by physical failure or mis-operation, the master volume is restored from the backed-up replication volume.

For the specific operations, refer to (6) Operation flow (data recovery of master volume) and (7) Operation procedure (data recovery of master volume).

It is assumed that the environment of the power saving operation concurrently using the data replication function is configured. In addition, it is assumed that pair setting has been performed for the volume and operation is started in the separated state. It is also assumed that the replication volume is in the not in use state when installed.

The logical disk names of the master volume and the replication volume are as follows:

- Master volume (MV) : Logical disk name (vol001)
- Replication volume (RV) : Logical disk name (vol002)

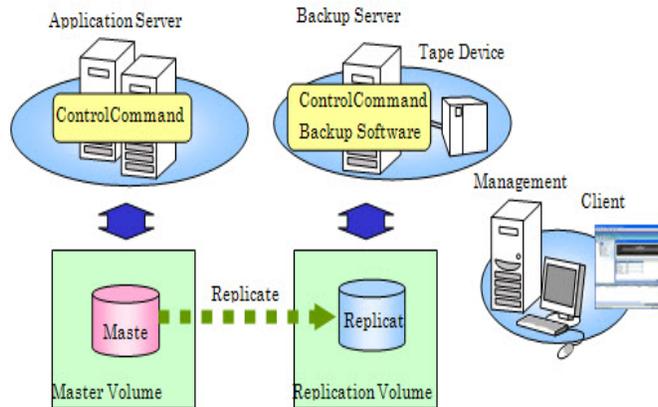
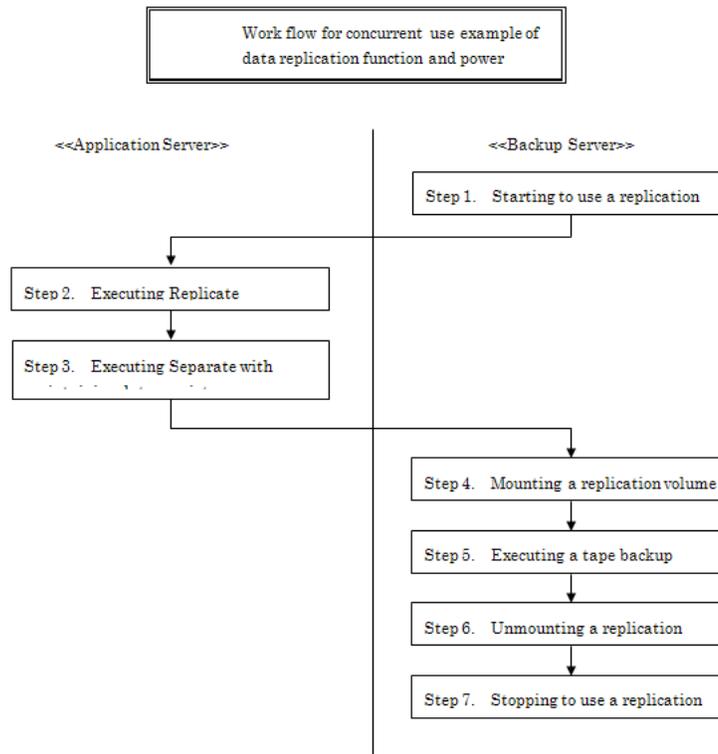


Figure 6-3: Data Replication and Power Saving

Operation flow (Power Saving of Replication Volume)



Operation procedure (power saving of replication volume)**Starting to use a replication volume (backup server)**

Perform an operation to start using to the replication volume.

When rotation of a pool including the replication volume is being stopped, this operation may take time because the command waits for the pool to start rotation.

```
SnapSAN Managerec_start -vol vol002 -volflg ld
```

Executing Replicate (application server)

Execute Replicate and copy data from a master volume to a replication volume to synchronize the data.

```
SnapSAN Managerrc_replicate -mv vol001 -mvflg ld -rv vol002 -rvflg ld
-wait
```

Executing Separate with maintaining data consistency (application server)

After maintaining data consistency of a master volume, execute Separate and establish the data of a replication volume.

Mounting a replication volume (backup server)

Mount the replication volume.

When the drive letter or NTFS folder name is also included in the mount command, the drive letter or NTFS folder name is automatically reset after the backup volume is mounted.

```
SnapSAN Managerrc_mount -mvol \\?\Volume{37d84cca-2507-11d5-a0f7-
00004c714491}\ -drv H:
```

Executing a tape backup (backup server)

Save data of the replication volume to a tape using backup software if it is necessary to secondarily back up the data copied to the replication volume for a countermeasure against physical failures or for permanent keeping.

Unmounting a replication volume (backup server)

Unmount the replication volume in preparation for the not in use state.

When the replication volume is unmounted, the drive letter or NTFS folder name set for the volume is automatically deleted.

```
SnapSAN Managerrc_umount -drv H: -offline
```

Stopping to use a replication volume (backup server)

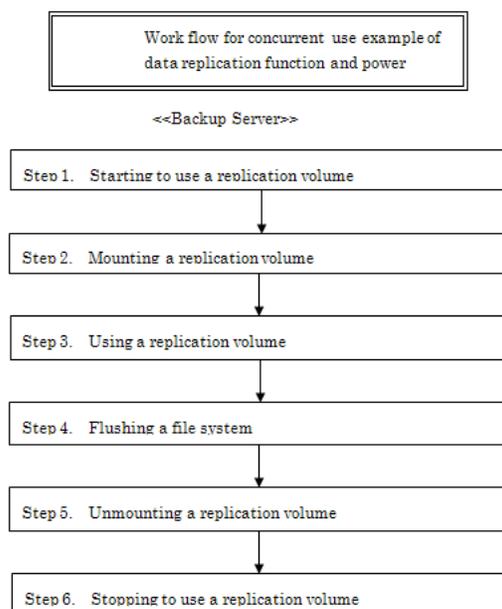
Perform an operation to stop using the replication volume.

When all the volumes bound in the pool are not in use, the pool rotation also stops.

```
SnapSAN Managerec_stop -vol vol002 -volflg ld
```

Before you perform an operation for stopping to use a volume, the volume must already be unmounted. If the volume has not been unmounted and you execute the volume use stop command, the volume is unmounted within the use stop command.

Operation flow (use of replication volume)



Operation procedure (use of replication volume)

Starting to use a replication volume (backup server)

Perform an operation to start using to the replication volume.

When rotation of a pool including the replication volume is being stopped, this operation may take time because the command waits for the pool to start rotation.

```
SnapSAN Managerec_start -vol vol002 -volflg ld
```

Mounting a replication volume (backup server)

Mount the replication volume.

When the drive letter or NTFS folder name is also included in the mount command, the drive letter or NTFS folder name is automatically reset after the backup volume is mounted.

```
SnapSAN Managerrc_mount -mvol \\?\Volume{37d84cca-2507-11d5-a0f7-00004c714491}\ -drv H:
```

Using a replication volume (backup server)

Use data in the replication volume.

Flushing a file system (backup server)

Exit or abort an application accessing the replication volume.

Flush the file system on the replication volume, and write to a disk the data in the file system buffer that has not been written.

```
SnapSAN Managerrc_flush -drv H:
```

Unmounting a replication volume (backup server)

Unmount the replication volume in preparation for the not in use state.

When the replication volume is unmounted, the drive letter or NFS folder name set for the volume is automatically deleted.

```
SnapSAN Managerrc_umount -drv H: -offline
```

Stopping to use a replication volume (backup server)

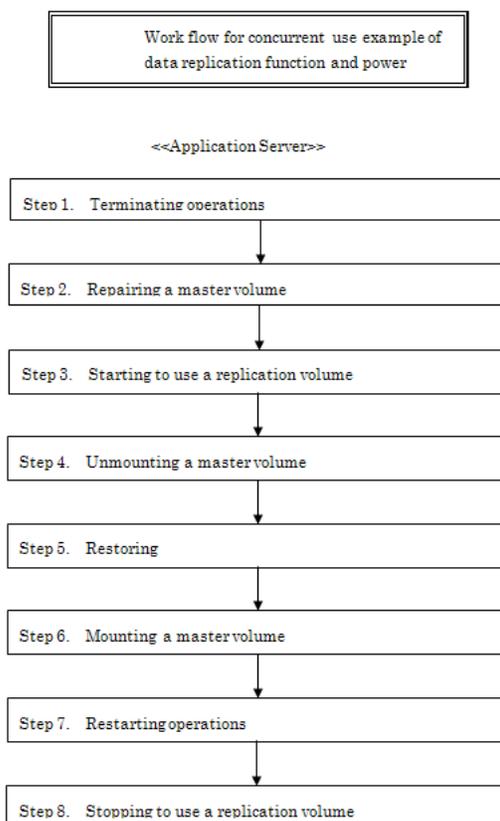
Perform an operation to stop using the replication volume.

When all the volumes bound in the pool are not in use, the pool rotation also stops.

```
SnapSAN Managerec_stop -vol vol1002 -volflg ld
```

Before you perform an operation for stopping to use a volume, the volume must already be unmounted. If the volume has not been unmounted and you execute the volume use stop command, the volume is unmounted within the use stop command.

Operation flow (data recovery of master volume)



Operation procedure (data recovery of master volume)

Terminating operations (application server)

Terminate or halt the operations that are accessing the volume where a fault has occurred.

Repairing a master volume (application server)

You may bind a new logical volume when, for example, a hardware fault has occurred and you repair the master volume by rebuilding it. In such a case, use [Disk Management] (Windows) to create a disk signature.

Then set partitions, perform formatting to create a file system, and reset the drive letter. For the partitions, file system, and drive letter, make the same settings as you did before the occurrence of fault.

You must also re-create and update a volume list.

```
SnapSAN Managervollist -cr
```

Starting to use a replication volume (application server)

Perform an operation to start using the replication volume.

When rotation of a pool including the replication volume is being stopped, this operation may take time because the command waits for the pool to start rotation.

```
SnapSAN Managerec_start -vol vol1002 -volflg ld
```

Unmounting a master volume (application server)

Unmount the master volume in preparation for restoration.

```
SnapSAN Managerrc_umount -drv G:
```

Restoring (application server)

Restore the backup data from the replication volume to the master volume.

Mounting a master volume (application server)

Mount the master volume and use it again.

```
SnapSAN Managerrc_mount -drv G:
```

Restarting operations (application server)

Restart the operations that have been terminated.

Stopping to use a replication volume (application server)

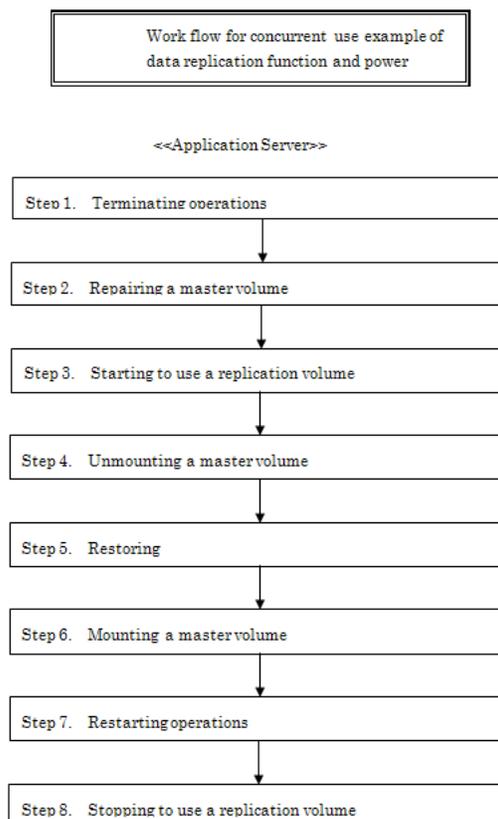
Perform an operation to stop using the replication volume.

When all the volumes bound in the pool are not in use, the pool rotation also stops.

```
SnapSAN Managerec_stop -vol vol1002 -volflg ld
```

Before you perform an operation for stopping to use a volume, the volume must already be unmounted. If the volume has not been unmounted and you execute the volume use stop command, the volume is unmounted within the use stop command.

Operation flow (data recovery of master volume)



Operation procedure (data recovery of master volume)

Terminating operations (application server)

Terminate or halt the operations that are accessing the volume where a fault has occurred.

Repairing a master volume (application server)

You may bind a new logical volume when, for example, a hardware fault has occurred and you repair the master volume by rebuilding it. In such a case, use [Disk Management] (Windows) to create a disk signature.

Then set partitions, perform formatting to create a file system, and reset the drive letter. For the partitions, file system, and drive letter, make the same settings as you did before the occurrence of fault.

You must also re-create and update a volume list.

```
SnapSAN Managervollist -cr
```

Starting to use a replication volume (application server)

Perform an operation to start using to the replication volume.

When rotation of a pool including the replication volume is being stopped, this operation may take time because the command waits for the pool to start rotation.

```
SnapSAN Managerec_start -vol vol002 -volflg ld
```

Unmounting a master volume (application server)

Unmount the master volume in preparation for restoration.

```
SnapSAN Managerrc_unmount -drv G:
```

Restoring (application server)

Restore the backup data from the replication volume to the master volume.

Mounting a master volume (application server)

Mount the master volume and use it again.

```
SnapSAN Managerrc_mount -drv G:
```

Restarting operations (application server)

Restart the operations that have been terminated.

Stopping to use a replication volume (application server)

Perform an operation to stop using the replication volume.

When all the volumes bound in the pool are not in use, the pool rotation also stops.

```
SnapSAN Managerec_stop -vol vol1002 -volflg ld
```

Measures for Errors

This section describes how to take measures against faults that occur during a power saving operation. Measures against following faults are described in this section.

- SnapSAN Manager Server or client fault
- PowerControl abnormal termination
- Invalid product

How to collect information necessary to analyze unidentified faults is also described.

SnapSAN Manager Server or Client Fault

Abnormal Termination of PowerControl

PowerControl outputs error contents and messages to the standard output, standard error output, event log, command trace, or operation trace when an error has occurred.

The standard output, standard error output, event log, or command trace records the messages described in the "Messages Handbook". Take necessary actions depending on the message.

The command trace is output in the etc folder under the folder where PowerControl has been installed as a text file beginning with "SnapSAN Manager_Log". Check the contents using a text editor.

The internal information necessary for analyzing faults is recorded in operation trace.

The following describes a PowerControl error that requires a special action.

Failure of Pool Rotation Start Processing

When you start using a volume and then the processing fails at some midpoint of start of the pool rotation, specify the pool number and the disk array name to which the volume belongs in the following command directly and execute it. You can get the pool number and the disk array name to which the volume belongs by the SnapSAN Managerec_sense command.

```
SnapSAN Managerec_start -pool poolnum -arrayname diskarray
```

If the operation start fails in spite of specifying the pool number and the disk array name, contact our engineer.

Information Gathering in the Event of a Fault

When an error whose reason is unknown has occurred and you want to request the provider to investigate the error, you must collect information required for error analysis.

PowerControl Error

Information gathering on a server where a failure occurred

Follow the steps below to execute the command and collect the operation trace and other fault information at a time.

A disk for storing fault information must have at least about 4 MB of unused space. The total size of fault information files differs depending on the system status, and it may exceed 4 MB. It is advisable to allocate an unused space of enough size.

1. Log on as a member in the Administrators group.
2. Select [Start] of Windows [All Programs] - [ControlCommand] - [SnapSAN Manager Volume List] - [Difficulty Information Gather].
3. Confirm that the SnapSAN Managervolgather directory is created under the installation directory when the storage destination directory is not changed or under the specified directory when it is changed, and obtain the files under that directory.

Information gathering on a management server

Operations when the Configuration is Changed

It is necessary to recreate the volume list to reflect the new configuration information to the volume list when you change the disk array or server (OS) configuration.

Conditions Requiring Volume List Update

Be sure to recreate and update the volume list after changing the following configurations:

Change of disk array configuration

- Change of disk array name
- Change of logical disk name
- Change of logical disk OS type
- Adding of logical disk, and change and deleting of configuration
- Change of Access Control setting
- Adding and deleting of disk array connected by Replication and Mirroring

If the disk array configures Replication and Mirroring and the above configurations are changed in the remote-side disk array, be sure to update the volume list as well.

Change of server configuration

- Adding, change and deleting of partition
- Adding, change and deleting of mount point set to the volume (drive letter or NTFS folder name)
- Adding, deleting and change of control volume definition (only when the control volume is used)
- Change of connection configuration (path) between the disk array and server

Updating Volume List

To update a volume list, execute the SnapSAN Managervollist command with the -cr option specified or execute the [Create/Update Volume List] operation in the Volume List Display screen (screen operation). The user must belong to the Administrators group to update a volume list.

When updating a volume list, note the following points so that the information to be registered in the volume list including the logical disk and volume information already registered is complete.

Update a volume list in the following states.

- The path between the disk array and the server is normally connected.
- The logical disk in the disk array is recognized as a server (OS) disk device.
- The volume (partitions) in the disk is recognized by the server (OS).

When you add, delete, or change the control volume definition in the disk array with which the control volume attribute cannot be identified, execute the following operation before updating a volume list.

- Register the logical disk to be used as a control volume in advance by executing the [Define Control Volume] operation in the Volume List Display screen.
- Define the logical disk to be used as the control volume in advance in the control volume definition file.

To successfully register volume information in the volume list, update a volume list in the following states.

- Pairs are separated when the RV is connected to the server.
- The link-volume (LV) and snapshot-volume (SV) are linked when the LV in the snapshot function is connected to the server. The base-volume (BV) and LV are not linked when the BV is connected to the server.
- Protected data is readable when the logical disk for which the WORM function is applied is connected to the server.
- The volume is in the "In use" state and accessible when the logical disk for which the power saving function is applied is connected to the server.
- All the volumes are mounted and every mount point to be used (drive letter or NTFS folder name) is set.
- The link path between disk arrays is normal when the Replication and Mirroring is configured for the disk array.

After updating the volume list, display the information registered in the volume list to check that the items to be used such as logical disks, partitions (mount point volume names), and mount points (drive letters or NTFS folder names) are all registered.

If the batch file or the like used for operation describes the logical disks, partitions (mount point volume names), mount points (drive letters or NTFS folder names), and other information to be operated, reflect the updated information in the volume list to that file.

The PowerControl command execution may abnormally end in the future operation if the information in the volume list contains an error or if the volume list information is inconsistent with the batch or other file used for operation.

Windows System Volumes and Partitions

Partitions and logical volumes of Windows can be specified as a target volume of power saving. The power saving operation is operated for individual disk array's logical disk. When multiple partitions or logical volumes exist in one logical disk, if a power saving operation is executed for a volume that contains more than one partition or logical volume or for a volume such as a dynamic disk, an unintended operation may be executed depending on operation details.

Disk Type	Volume Type	Availability
Basic disk	Primary partition (MBR format)	✓
	Primary partition (GPT format)	✓*
	Logical volume on expanded partition	✓
Dynamic disk	Simple volume	-
	Span volume	-
	Stripe volume	-
	Mirror volume	-
	RAID-5 volume	-

✓:Available

-:Operation inhibited

*:With notes

The following conditions must be met when using partition disks in GPT (GUID partition table) format.

- The OS type of the logical disk is "WG".
- The option setting file is set so as to enable to use partition disks in GPT (GUID partition table) format.

For Windows Server 2003, use the MOUNTVOL command provided by the system at system startup to disable automatic volume mounting before operation.

To disable automatic volume mounting, specify the N option and execute the MOUNTVOL command as follows:

```
MOUNTVOL /N
```

Disk Containing Multiple Partitions or Logical Volumes

Even when a certain mount point volume name is specified to execute a power saving operation for a logical disk containing multiple partitions or logical volumes, all partitions or logical volumes on the logical disk become the target for a power saving operation. This is because a power saving operation is executed for an individual logical disk.

Even when the mount point volume name for partition1 is specified and an operation to stop using is performed in order to stop using partition1 only, using partition2 is also stopped actually.

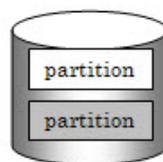


Figure 7-1: Target Volume

A power saving operation using a logical disk containing multiple partitions or logical volumes is not recommended.

When the volume to be operated is recognized from the server (operating system) and can be accessed, PowerControl obtains disk configuration information of that volume. When the volume contains multiple partitions or logical volumes, PowerControl does not allow operation (by default).

You can perform operation for a logical disk containing multiple partitions or logical volumes by changing settings in the option setting file. In this case, however, be extremely careful about operation.

Control Volume

A control volume is used when a server issues control I/O to the relevant disk array. Select one of logical disks connected to each server for each disk array as the volume for issuing I/O to that disk array and register the volume in the volume list.

Note the following points when making a control volume setting.

- Prepare one control volume for each server. It is not advisable to use the same logical disk as a control volume from different servers.
- Select a normal volume that is not used for data replication, snapshot, and WORM.
- Keep the volume assigned as a control volume as a dedicated volume, and do not assign business data to the volume.
- Since a control volume is always rotating, it cannot be assigned to a pool intended for power saving.
- For a logical disk used as a control volume, the RAID format and capacity are not limited.

- In the case of disk arrays with pool, you can build a small-capacity logical disk dedicated for a control volume.

Management and Operations of Power Saving Function

1. A volume for power saving cannot be allocated to LUN0. Allocate to LUN0 a normal volume that is not used by power saving function.
2. Care must be taken in setting and operating partitions because power saving operations are performed on a disk-by-disk basis, not on a partition-by-partition basis.
3. Care must be taken in setting and operating logical disks because rotation stop/start operations are performed on a pool-by-pool basis, not on a disk-by-disk basis.
4. In a remote desktop environment where Windows Server 2003 or later is running, volumes can be used and ControlCommand can be executed from multiple remote desktop environments. However, to handle a volume by using ControlCommand, the volume must be exclusively used. Therefore, note the following to prevent an unmount command (SnapSAN Managerrc_unmount) from terminating abnormally or automount from causing unexpected data corruption after unmounting the volume.
 - When executing a ControlCommand command, do not use a volume being used by another remote desktop.
 - When a volume is being used by a ControlCommand command executed by another terminal service, do not reference the volume by using Windows Explorer or an application.
5. On Windows Server 2003, use the MOUNTVOL command provided by the system at system startup to disable automatic volume mounting (MOUNTVOL /N) before operation.
6. In a system configuration, a target volume for power saving cannot be used as a shared disk for a cluster.
7. When you stop using RV of the data replication function, the volume must have been separated. When you perform Separate (immediate) of the replication function, the RV becomes available (available for read or write) but cannot be stopped using because the data has not been established. Wait until Separate is completed.
8. Some of the physical disks will not stop for power saving.
9. When you perform [Rescan Disks] and [Refresh] in Windows [Disk Management] after stopping using the target volume by the power saving operation on a Windows Server 2008, the following error message may be recorded in the event log. However, the operation is not affected.

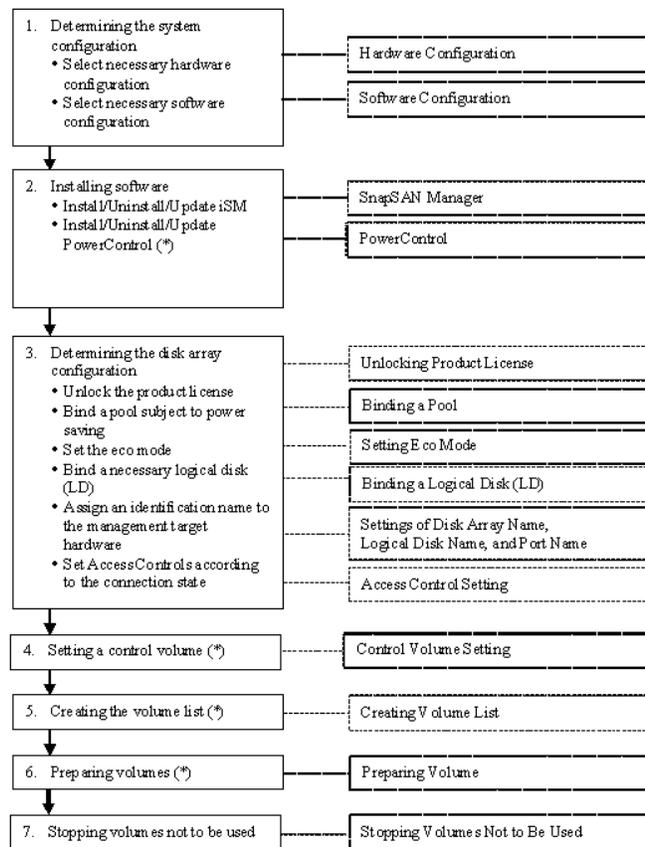
<Message example>

SourceVirtual Disk Service
Event ID1
Description: Unexpected failure.
Error code: 15@02000015

* A different value may be displayed for the error code.

This chapter describes the system installation procedures showing an example to establish a power saving system using SnapSAN S3000/S5000 in an existing operation system.

Installation works are outlined below. Works followed by "(*)" mark are necessary for servers where PowerControl will be installed.



System Configuration

Hardware Configuration

Select hardware components according to the business conditions, requirements, disk capacity, and so forth.

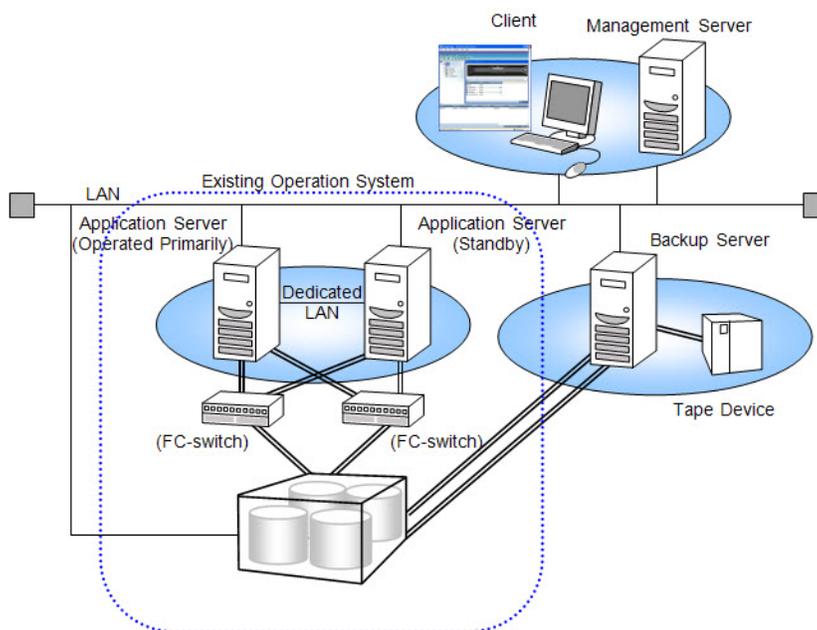


Figure 8-1: Hardware Configuration - Linux

Though a business or backup server may also be used as a management server, using a specific management server is recommended. Use of LAN connection is strongly recommended for connection with disk array.

- Connect the path of individual servers, to be connected to the disk array, to the port of different directors, limiting the servers to be accessed by Access Control.
- In the above configuration example, the application servers are installed in a cluster and mutually connected through the dedicated LAN.

Software Configuration

Select software to be used according to the hardware components, operating conditions, etc.

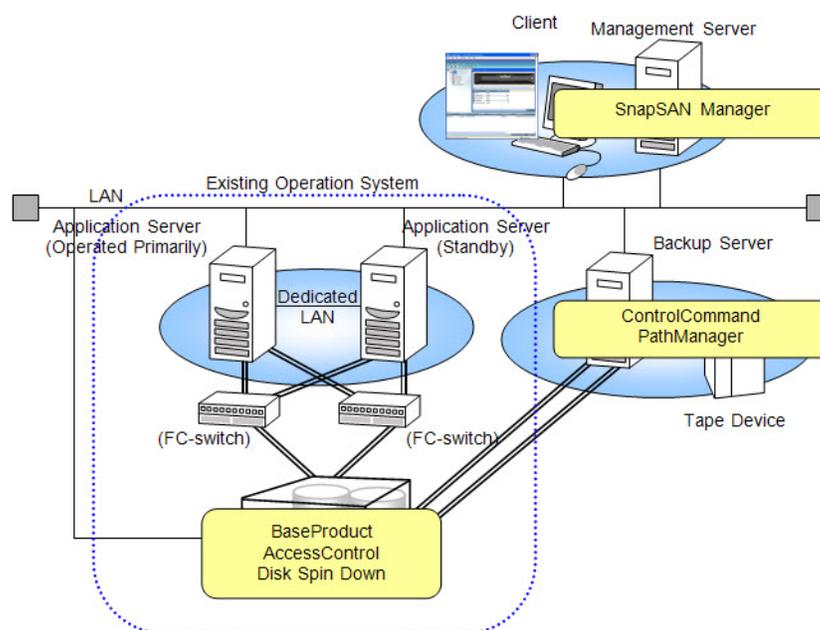


Figure 8-2: Software Configuration - Linux

- Install the backup software in the backup server.
- Install the management software in the management server. Install the SnapSAN Manager in the management server.
- Install the PowerControl in the backup server. PowerControl is included in ControlCommand.
- Disk Spin Down and AccessControl are installed in the disk array. They become available by unlocking the license.

Software Installation

SnapSAN Manager

Operating Environment

SnapSAN Manager Server

SnapSAN Manager Client (GUI)

Installation

SnapSAN Manager Server Installation

SnapSAN Manager Server Setting

SnapSAN Manager Client Installation

Uninstallation

SnapSAN Manager Server Uninstallation

SnapSAN Manager Client Uninstallation

Update

SnapSAN Manager Server Update

PowerControl

Operating Environment

Operating system and linkage software

Required disk free space

Required memory

Installation

To install PowerControl software that is included in ControlCommand, use the rpm command.

Setting Operating Environment

When you use PowerControl, you can use the environment variables to set various operations at command execution.

Uninstallation

To uninstall PowerControl software, use the rpm command.

Update

To update the PowerControl software, uninstall the existing software, and then install the new software.

Disk Array Configuration

For the disk array to be connected, determine the configuration for using the power saving function.

Unlocking Product License

To use the Disk Spin Down , you must unlock the product license set in the disk array. To unlock the license, you must purchase the corresponding products equal to or greater than the total capacity of the data disk.

At execution, PowerControl checks the license status of the products and check whether they are available.

If the total capacity of the data disk exceeds the product's specified capacity because physical disks are added to the disk array system, it is necessary to unlock the product licenses equal to or greater than lack of licenses.

Binding a Pool

Bind a pool for use with the power saving function.

Setting Eco Mode

Set the eco mode of a pool that is used with the power saving function to ON.

When a pool is bound, the eco mode is set to OFF by default. To enable the eco mode, click [Change Eco mode] on the LD Individual Bind/Unbind screen of configuration setting to set the eco mode to ON.

Binding a Logical Disk (LD)

Bind volumes for use with the power saving function.

The capacity and number of volumes for use with the power saving function must be determined depending on the frequency of use, size, and usage purpose of the data. Then, bind logical disks in a pool that is used with the power saving function.

The following types of volumes must not be bound in a pool that is used with the power saving function.

- Volume which rotates regularly for business use
- Volume to be used by the snapshot function
- Control volume
- System volume

Settings of Disk Array Name, Logical Disk Name, and Port Name

You can assign identification names to hardware components managed by the SnapSAN Manager. Identification names can be given to the following items:

- Disk array subsystem name
- Logical disk name (plus OS type)
- Port name

It is better to set a disk array subsystem name, port name, and logical disk name according to the operating conditions and server connection conditions.

When you use the power saving function, you do not need to note disk array names and port names. For the OS type of a logical disk, you need to note the following.

- A logical disk name must be set so as to identify data to be stored.
- The OS type of a logical disk must be appropriate for the supporting platform.

These settings are performed from an SnapSAN Manager client.

Disk Array Name Setting Example

Disk Array Subsystem	Disk Array Subsystem Name
Storage_array	Overland_Customer_Database

Port Names Setting Example

Director Number	Port Number	Port Name	Connected Server
00h	00h	BACKUP_PRIMARY	Backup server
01h	00h	BACKUP_SECONDARY	

Logical Disk Names and OS Types Setting Example

LD No.	OS Type	Logical Disk Name	Remarks
0050h	LX	DB_DATA_BK	Backup of DB data file
0051h		DB_REDO1_BK	Backup of DB REDO file 1
0052h		DB_REDO2_BK	Backup of DB REDO file 2
0053h		DB_CTL_BK	Backup of DB control file
0054h		DB_ARCHIVE_BK	Backup of DB backup file

Set the OS type as LX, which is the Linux operating system default value, to use the power saving function on the Linux system.

This example shows logical disk names when corresponds to the database configuration.

Access Control is necessary for a system in which the power saving function is installed.

Before performing the following operations, enable Access Control setting. In addition, Access Control setting needs to be performed for volumes that have already been used for other operations.

Access Control Setting

To prevent a wrong update to a volume or a wrong modification of the disk configuration, usually you need to set the system with power saving function so that volumes to be used by power saving function cannot be referenced by a server other than a backup server.

Therefore, to use power saving function, you need to limit logical disks that can be accessed from a server by using Access Control.

To use power saving function, also take note the following points and set Access Control.

- Assign volumes to be used by power saving function to a backup server.
- Assign a control volume to a backup server. A control volume must be bound in not a pool that is used with the power saving function but a pool that is always rotating

Before introducing servers, you must determine the server connection modes and design Access Control settings. Access Control can be set for individual ports or WWNs. Setting for Access Controls requires purchasing the AccessControl.

Control Volume Setting

A control volume is used when a server issues control I/O to the relevant disk array. Select one of logical disks connected to a backup server as the volume for issuing I/O to that disk array and register the volume in the volume list.

Select a normal volume that is not used for data replication, snapshot, and WORM functions for a control volume. Prepare a control volume as a dedicated volume and do not assign business data.

A control volume must be bound not in the pool including the volume for the power saving function but in the regularly rotating pool.

The purpose (attribute) of logical disks built as control volumes can be identified with the following SnapSAN S3000/S5000.

SnapSAN S3000/S5000

When the logical disk information is displayed by the SnapSAN Manager client for disk arrays on which the purpose (attribute) of a control volume can be identified, the identification information indicating the control volume as a logical disk purpose (attribute) is displayed.

Control Volume Registration

Create or update the volume list when the logical disk bound as a control volume is recognized as a disk by the server. The disk array identifies the logical disk having the control volume attribute from the logical disks connected to the server and automatically registers it in the volume list.

After creating or updating the volume list, display the list of control volumes with the SnapSAN Managervollist command to check that the setting information in the control volume definition file has been successfully reflected to the volume list.

```
SnapSAN Managervollist -ctl
```

Creating Volume List

Creation of a volume list is required before using PowerControl command. A volume list is created by the SnapSAN Managervollist command with the -r option specified. Create a volume list with the appropriate user privilege.

The following command line shows an example to create a volume list with the SnapSAN Managervollist command.

```
SnapSAN Managervollist -r
```

Upon successful creation of volume list, the following message appears:

```
SnapSAN Manager11100: Command has completed successfully
```

If creation of a volume list fails, execution of PowerControl command is disabled. Troubleshoot in accordance with an error message or with operation error tracing, create a volume list again.

If the SnapSAN Manager server is running on the same server, it is required to exit SnapSAN Manager before creating a volume list.

Create a volume list in the following states.

- The path between the disk array and the server is normally connected.
- The logical disk in the disk array is recognized as a server (OS) disk device.
- The volume in the disk is recognized by the server (OS).

Execute the following operation before creating a volume list if you use a control volume in the disk array with which the control volume attribute cannot be identified.

- Define the logical disk to be used as a control volume in advance in the control volume definition file.

To successfully register volume information in the volume list, create a volume list in the following states.

- Pairs are separated when the RV in the data replication function is connected to the server.
- The link-volume (LV) and snapshot-volume (SV) are linked when the LV in the snapshot function is connected to the server. The base-volume (BV) and LV are also linked when the BV is connected to the server.
- Protected data is readable when the logical disk for which the WORM function is applied is connected to the server.
- The volume is in the "In use" state and accessible when the logical disk for which the power saving function is applied is connected to the server.
- The link path between disk arrays is normal when the Replication and Mirroring is configured for the disk array.

After successfully creating a volume list, display the information registered in the volume list to check that the items to be used such as logical disks and special file names are all registered.

Once the volume list is successfully created, that information is maintained for operation. It is not necessary to update the volume list during operation. However, if the disk array, server (OS) volume, or other configuration is changed, it is required to recreate the volume list to reflect the new information. Note that an error or inconsistency may occur at execution of PowerControl command unless the volume list is updated..

Preparing Volume

When using a volume for the first time for a power saving operation, execute the steps given below for the target volume.

LVM Disk Application Example

This section describes a volume group usage example where you create a file system on a volume to be used by the power saving function.

Stop using the volume after creating the file system.

LVM Configuration

LVM logical volume is configured.

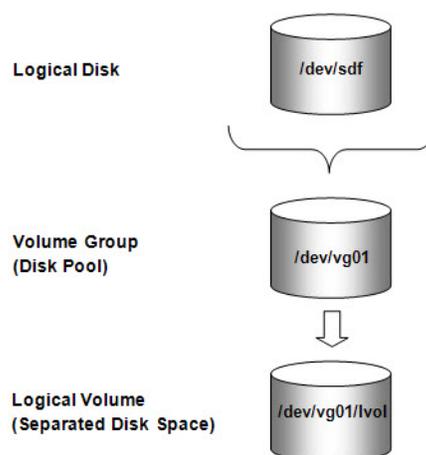


Figure 8-3: LVM Configuration

Creating a File System (Backup Server)

You have to create a file system to be used in the power saving operation if necessary.

Bind a file system by entering the following.

In this example, “ext3” is used as a file system.

```
mkfs -t ext3 /dev/vg01/lvol
```

Deactivating the volume group (backup server)

Deactivate the volume group of the volume in preparation of not in use.

```
vgchange -a n /dev/vg01
```

Stopping To Use A Volume (Backup Server)

Perform an operation to stop using the volume.

When all the volumes bound in the pool are not in use, the pool rotation also stops.

```
SnapSAN Managerec_stop -vol vol1002 -volflg ld
```

Now the volume preparation is finished.

VxVM Disk Application Example

This section describes a disk group usage example where you create a file system on a volume to be used by the power saving function.

Stop using the volume after creating the file system.

VxVM Configuration

VxVM logical volume is configured.

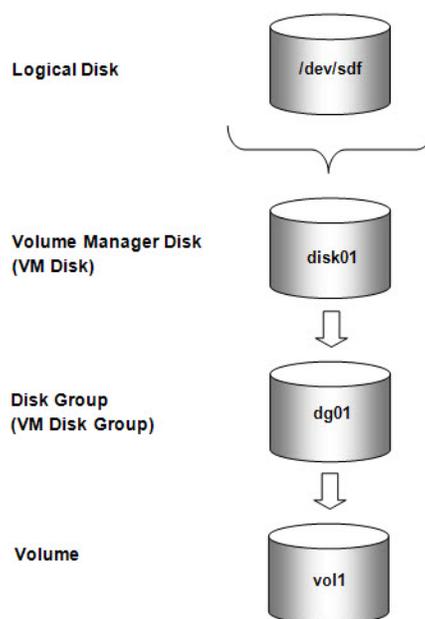


Figure 8-4: VxVM Configuration

Creating a File System (Backup Server)

You have to create a file system to be used in the power saving operation if necessary.

Bind a file system by entering the following.

In this example, "VxFS" is used as a file system.

```
mkfs -t vxfs /dev/vx/dsk/dg01/vol1
```

Deactivating the Volume Group (Backup Server)

Deport the disk group of the volume and make the disk offline in preparation of not in use.

```
vxvg deport dg01
vxdisk offline sdf
```

Stopping to Use a Volume (Backup Server)

Perform an operation to stop using the volume.

When all the volumes bound in the pool are not in use, the pool rotation also stops.

```
SnapSAN Managerec_stop -vol vol1002 -volflg ld
```

Now the volume preparation is finished.

Not Managing Volumes Example

This section describes how to create a file system on a volume to be used by the power saving function as an example of not using the volume management software such as LVM and VxVM, thus not managing the volume.

Stop using the volume after creating the file system.

Creating a File System (Backup Server)

You have to create a file system to be used in the power saving operation if necessary.

Bind a file system by entering the following.

In this example, "ext3" is used as a file system.

```
mkfs -t ext3 /dev/ddf
```

Stopping to Use a Volume (Backup Server)

Perform an operation to stop using the volume.

When all the volumes bound in the pool are not in use, the pool rotation also stops.

```
SnapSAN Managerec_stop -vol vol002 -volflg ld
```

Now the volume preparation is finished.

Stopping Volumes Not Used

As the condition to put a pool in the rotation stop state, you need to put all volumes bound in the pool in the not in use state.

If bound volumes that are not used currently and volumes that are not supposed to be used for a while exist in the pool for which the power saving function is executed, you cannot put the pool in the rotation stop state until these volumes is put in the not in use state. If these volumes exist, put the volumes in the not in use state by the power saving operation beforehand. Confirm that volumes are unmounted before you put them in the not in use state.

```
SnapSAN Managerec_stop -vol vol_unused1 -volflg ld
```

```
SnapSAN Managerec_stop -vol vol_unused2 -volflg ld
```

This chapter describes an example of operation using the power saving function, the operation procedure for power saving function, and the trouble-shooting for faults that may occur during operations.

To realize an efficient power saving operation, you must consider the following items:

Concurrent Use Of Volumes

The power saving function cannot stop the pool rotation until all volumes that belong to the pool are put in the not in use state. The longer the time during which all volumes that belong to the pool are in the not in use state becomes, the higher the effect of power saving is enhanced. Therefore, consideration is needed in order to use volumes concurrently during the same time period. The power saving effect when volumes are used concurrently is enhanced significantly when compared to the power saving effect when volumes are not used concurrently.

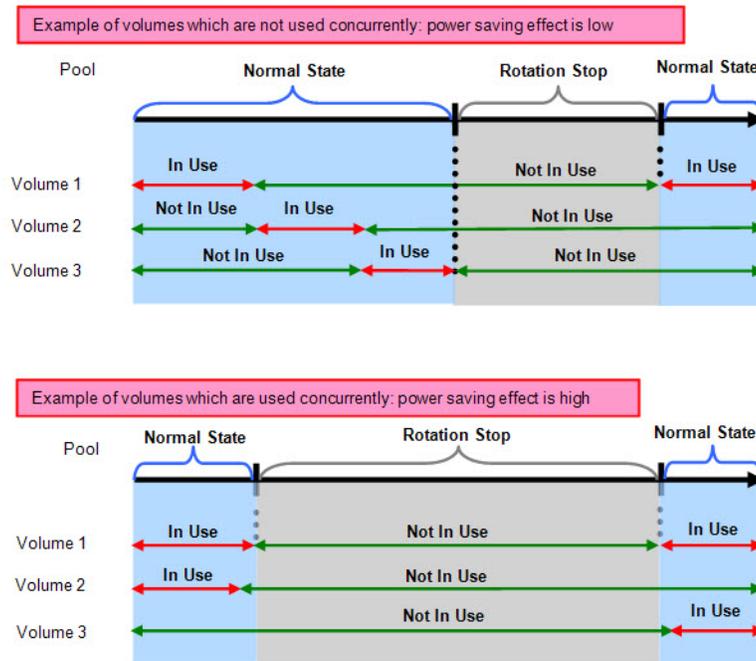


Figure 9-1: Power Saving Effect

Power Saving Operation Example

The power saving function is applied at backup execution to each backup volume bound in the same pool (power saving disk backup). Except at backup execution, you can use a backup volume which is not in use as needed (use of a backup volume). This section describes an operation example using the power saving function on a backup volume to be used in a periodical disk backup operation. Although the text describes the commands in input order, it is recommended to automate the command execution by job scheduling software on the system built actually.

Power Saving Disk Backup

Before starting disk backup, instruct a backup volume to start using the volume by the start of use command. When using a backup volume is started, execute backup by backup software. After backup is completed, instruct the backup volume to stop using the volume by the not in use command.

For the specific operations, refer to (2) Operation flow (power saving disk backup) and (3) Operation procedure (power saving disk backup).

Execute the power saving operation for each of backup volumes bound in the same pool executing the same steps.

Use of Backup Volume

To use data in a backed up volume, start using the target backup volume and use data in the volume.

For the specific operations, refer to (4) Operation flow (use of backup volume) and (5) Operation procedure (use of backup volume).

Data Recovery of Business Volume

When data in a business volume is corrupted due to a physical failure or an operating error, the business volume is restored from the backup volume.

For the specific operation, refer to (6) Operation flow (data recovery of business volume) and (7) Operation procedure (data recovery of business volume).

It is assumed that the power saving operation environment is configured. It is also assumed that a backup volume is not in use at installation.

A backup volume logical disk name in the following operation example is as follows.

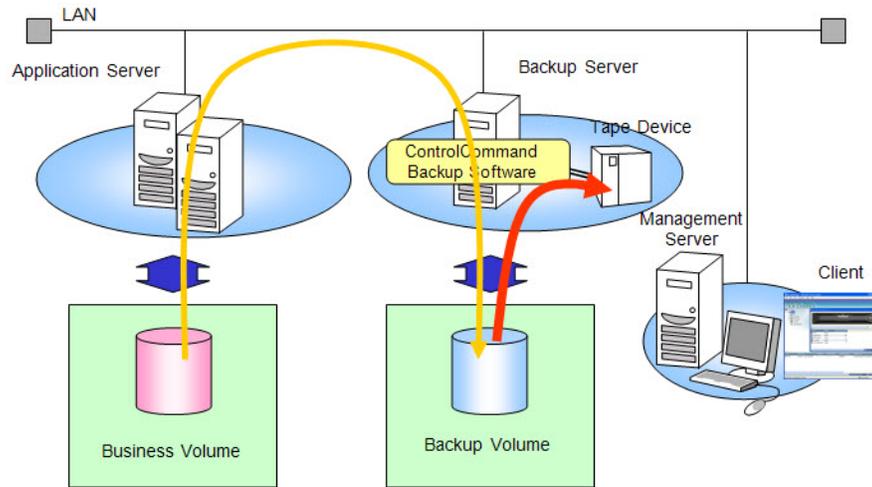
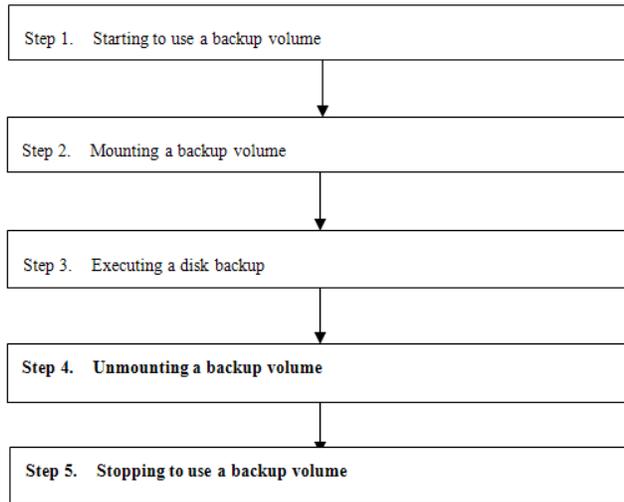


Figure 9-2: Power Saving Operation

Operation Flow (Power Saving Disk Backup)

Work flow for power saving operation example

<<Backup Server>>



Operation Procedure (Power Saving Disk Backup)**Perform an Operation to Start Using the Backup Volume.**

When rotation of a pool including the backup volume is being stopped, this operation may take time because the command waits for the pool to start rotation.

```
SnapSAN Managerec_start -vol vol1002 -volflg ld
```

Mounting a Backup Volume (Backup Server)**Activating the Volume Group or Importing the Disk Group**

If you use LVM, activate the volume group of the backup volume.

```
vgchange -a y /dev/vg01
```

If you use VxVM, import the disk group after making the backup volume disk online.

```
vxdisk online sdf
vxdg import dg01
vxvol -g dg01 startall
Mounting the backup volume
```

Mount the Backup Volume

If you use LVM, mount the LVM logical volume.

In this example, "ext3" is used as a file system.

```
mount -t ext3 /dev/vg01/lvol /bkfs1
```

If you use VxVM, mount the VxVM logical volume.

In this example, "VxFS" is used as a file system.

```
mount -t vxfs /dev/vx/dsk/dg01/vol1 /bkfs1
```

Executing a Disk Backup (Backup Server)

Back up necessary business data to the backup volume using backup software.

For the procedure to back up the data, follow that of the backup software to use.

Unmounting a backup volume (backup server)

Unmount the backup volume.

```
umount /bkfs1
```

Deactivate the Volume Group or Deport The Disk Group

If you use LVM, deactivate the volume group of the backup volume.

```
vgchange -a n /dev/vg01
```

If you use VxVM, deport the disk group of the backup volume, and make the disk offline.

```
vxdg deport dg01
vxdisk offline sdf
```

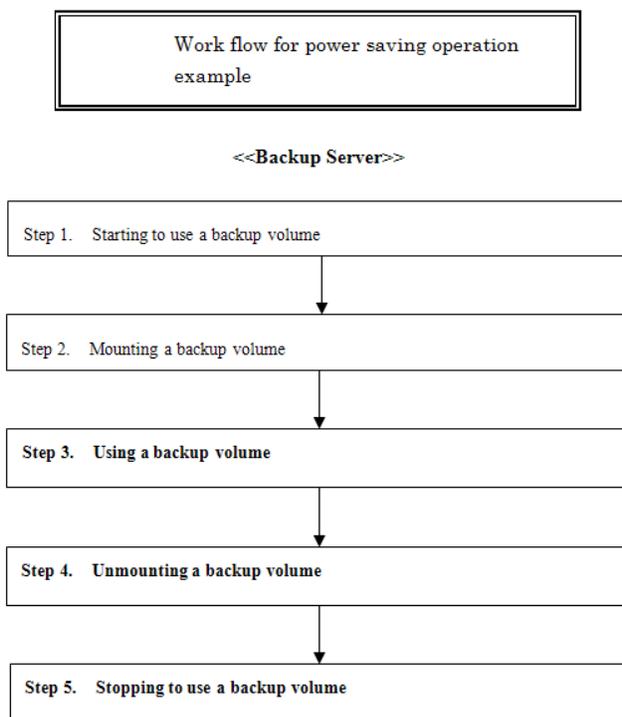
Perform an operation to stop using the backup volume.

When all the volumes bound in the pool are not in use, the pool rotation also stops.

```
SnapSAN Managerec_stop -vol vol1002 -volflg ld
```

Before you perform an operation for stopping to use a volume, the volume must already be unmounted. If the volume has not been unmounted and you execute the volume use stop command, the use stop command checks the mount state of the volume and discontinues operation before stopping to use the volume.

Operation flow (Use of Backup Volume)



Operation procedure (use of backup volume)

Starting to use a backup volume (backup server)

Perform an operation to start using to the backup volume.

When rotation of a pool including the backup volume is being stopped, this operation may take time because the command waits for the pool to start rotation.

```
SnapSAN Managerec_start -vol vol002 -volflg ld
```

Mounting a backup volume (backup server)

Activating the volume group or importing the disk group

If you use LVM, activate the volume group of the backup volume.

```
vgchange -a y /dev/vg01
```

If you use VxVM, import the disk group after making the backup volume disk online.

```
vxdisk online sdf
vxdg import dg01
vxvol -g dg01 startall
```

Mount the backup volume.

If you use LVM, mount the LVM logical volume.

In this example, "ext3" is used as a file system.

```
mount -t ext3 /dev/vg01/lvol1 /bkfs1
```

If you use VxVM, mount the VxVM logical volume.

In this example, "VxFS" is used as a file system.

```
mount -t vxfs /dev/vx/dsk/dg01/vol1 /bkfs1
```

Using a backup volume (backup server)

Use data in the backup volume.

Unmount a backup volume (backup server)

```
umount /bkfs1
```

Deactivate the volume group or deport the disk group.

If you use LVM, deactivate the volume group of the backup volume.

```
vgchange -a n /dev/vg01
```

If you use VxVM, deport the disk group of the backup volume, and make the disk offline.

```
vxdg deport dg01
vxdisk offline sdf
```

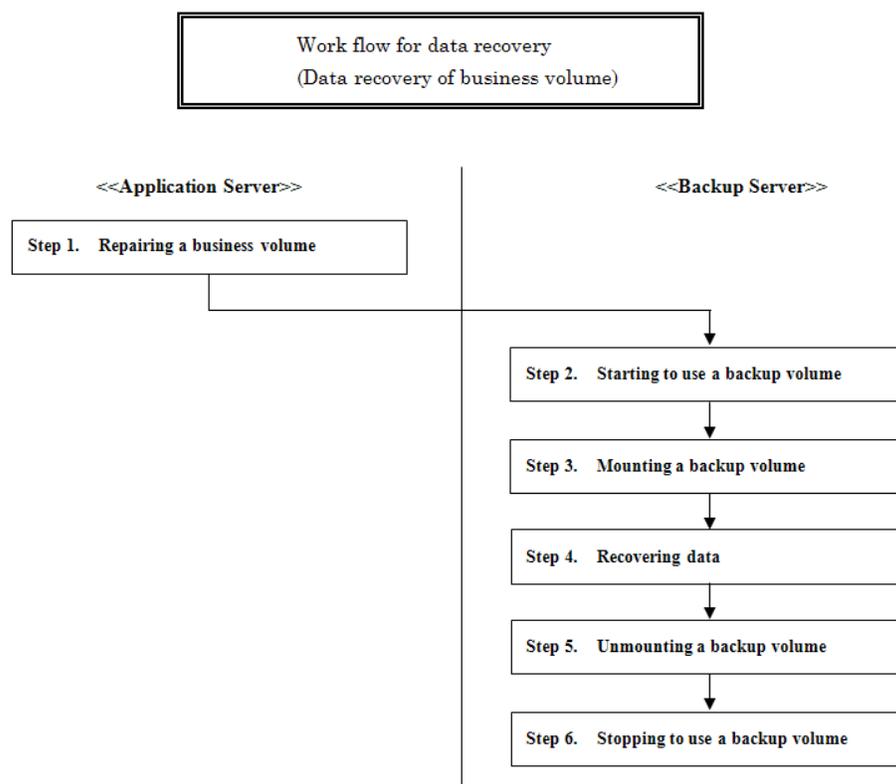
Stopping to use a backup volume (backup server)

Perform an operation to stop using to the backup volume.

When all the volumes bound in the pool are not in use, the pool rotation also stops.

```
SnapSAN Managerec_stop -vol vol002 -volflg ld
```

Before you perform an operation for stopping to use a volume, the volume must already be unmounted. If the volume has not been unmounted and you execute the volume use stop command, the use stop command checks the mount state of the volume and discontinues operation before stopping to use the volume.



Operation procedure (data recovery of business volume)

Repairing a backup volume (application server)

You may bind a new logical volume when, for example, a hardware fault has occurred and you repair the backup volume by rebuilding it. In such a case, re-create a file system with the same settings as you did before the occurrence of fault.

You must also re-create and update a volume list.

```
SnapSAN Managervollist -r
```

Perform an operation to start using to the backup volume.

When rotation of a pool including the backup volume is being stopped, this operation may take time because the command waits for the pool to start rotation.

```
SnapSAN Managerec_start -vol vol002 -volflg ld
```

Mount a backup volume (backup server)

Activating the volume group or importing the disk group

If you use LVM, activate the volume group of the backup volume.

```
vgchange -a y /dev/vg01
```

If you use VxVM, import the disk group after making the backup volume disk online.

```
vxdisk online sdf
vxdg import dg01
vxvol -g dg01 startall
```

Mount the backup volume.

If you use LVM, mount the LVM logical volume.

In this example, "ext3" is used as a file system.

```
mount -t ext3 /dev/vg01/lvol1 /bkfs1
```

If you use VxVM, mount the VxVM logical volume.

In this example, "VxFS" is used as a file system.

```
mount -t vxfs /dev/vx/dsk/dg01/vol1 /bkfs1
```

Recovering data (backup server)

Use backup software to restore the data saved in the backup volume to the business volume.

For the procedure to restore the data, follow that of the backup software to use.

Unmount the backup volume.

```
umount /bkfs1
```

Deactivate the volume group or deport the disk group.

If you use LVM, deactivate the volume group of the backup volume.

```
vgchange -a n /dev/vg01
```

If you use VxVM, deport the disk group of the backup volume, and make the disk offline.

```
vxvg  deport  dg01
vxdisk offline sdf
```

Stopping to use a backup volume (backup server)

Perform an operation to stop using to the backup volume.

When all the volumes bound in the pool are not in use, the pool rotation also stops.

```
SnapSAN Managerec_stop -vol vol002 -volflg ld
```

Before you perform an operation for stopping to use a volume, the volume must already be unmounted. If the volume has not been unmounted and you execute the volume use stop command, the use stop command checks the mount state of the volume and discontinues operation before stopping to use the volume.

Concurrent Operation with Replication Function Example

This section describes an example of operation by concurrently using the power saving function and data replication function.

Although the text describes the commands in input order, it is recommended to automate the command execution by job scheduling software on the system built actually.

For a backup system using the data replication function, power saving function is applied to replication volumes (RV) (power saving for replication volumes). For other than performing backup, replication volumes which are not in use can be started. When data in a master volume is corrupted by physical failure or mis-operation, the master volume is restored from the backed-up replication volume (data recovery of master volume).

Power saving of replication volume

Before starting backup, instruct a replication volume to start using the volume by the start of use command. When using the replication volume is started, use the data replication function to back up the data of the master volume to the replication volume. After backup is completed, instruct the replication volume to stop using the volume by the not in use command.

For the specific operations, refer to (2) Operation flow (power saving of replication volume) and (3) Operation procedure (power saving of replication volume).

Execute the power saving operation for each of backup volumes bound in the same pool executing the same steps.

Use of Replication Volume

To use the backed up data, start using the target replication volume and use data in the volume.

For the specific operations, refer to (4) Operation flow (use of backup volume) and (5) Operation procedure (use of backup volume).

Data recovery of master volume

When data in a master volume is corrupted by physical failure or mis-operation, the master volume is restored from the backed-up replication volume.

For the specific operations, refer to (6) Operation flow (data recovery of master volume) and (7) Operation procedure (data recovery of master volume).

It is assumed that the environment of the power saving operation concurrently using the data replication function is configured. In addition, it is assumed that pair setting has been performed for the volume and operation is started in the separated state. It is also assumed that the replication volume is in the not in use state when installed.

The logical disk names of the master volume and the replication volume are as follows:

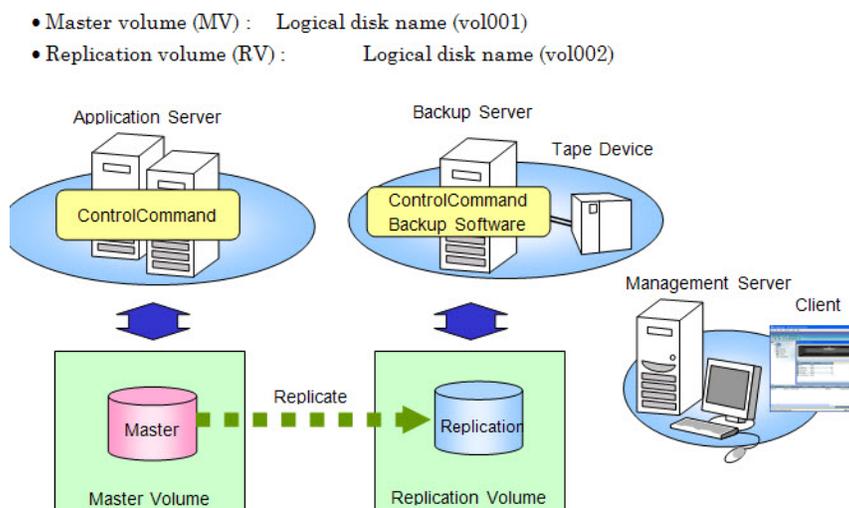
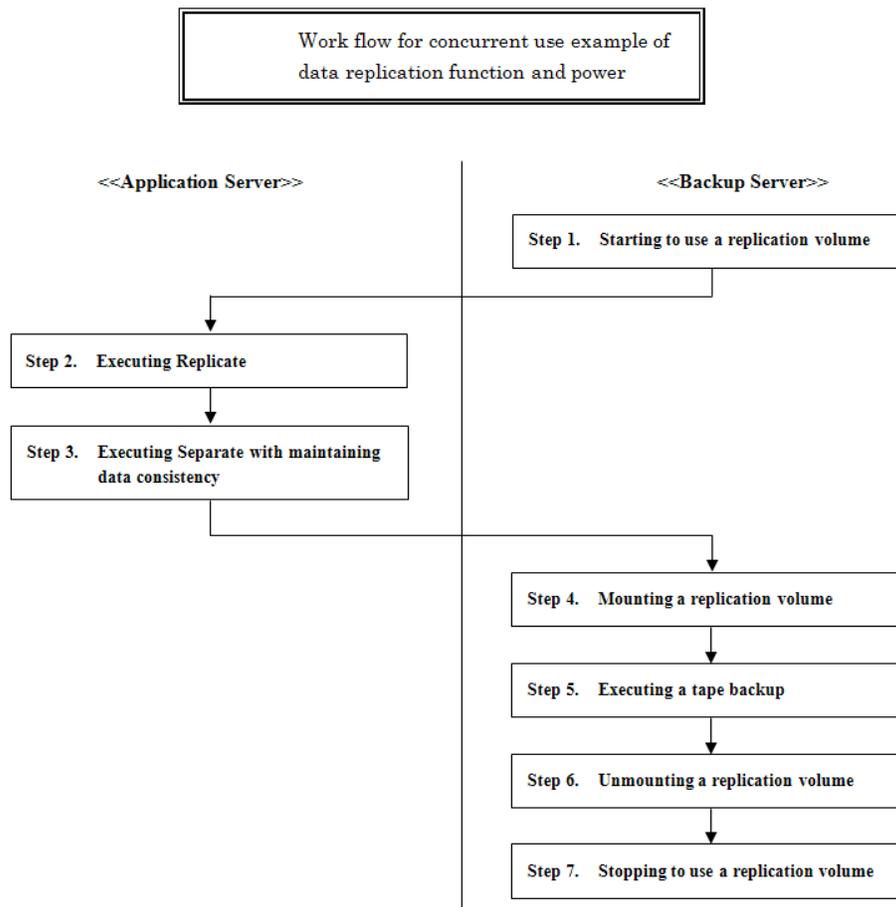


Figure 9-3: Data Replication and Power Saving

Operation flow (power saving of replication volume)



Operation procedure (power saving of replication volume)

Starting to use a replication volume (backup server)

Perform an operation to start using to the replication volume.

When rotation of a pool including the replication volume is being stopped, this operation may take time because the command waits for the pool to start rotation.

```
SnapSAN Managerec_start -vol vol002 -volflg ld
```

Executing Replicate (application server)

Execute Replicate and copy data from a master volume to a replication volume to synchronize the data.

```
SnapSAN Managerrc_replicate -mv vol001 -mvflg ld -rv vol002 -rvflg ld
-wait
```

Executing Separate with maintaining data consistency (application server)

After maintaining data consistency of a master volume, execute Separate and establish the data of a replication volume.

Mounting a replication volume (backup server)

Activating the volume group or importing the disk group

If you use LVM, activate the volume group of the replication volume.

```
vgchange -a y /dev/vg01
```

If you use VxVM, import the disk group after making the replication volume disk online.

```
vxdisk online sdf
vxdg import dg01
vxvol -g dg01 startall
```

Mounting the replication volume

Mount the replication volume.

If you use LVM, mount the LVM logical volume.

In this example, "ext3" is used as a file system.

```
mount -t ext3 /dev/vg01/lvol /rvfs1
```

If you use VxVM, mount the VxVM logical volume.

In this example, "VxFS" is used as a file system.

```
mount -t vxfs /dev/vx/dsk/dg01/vol1 /rvfs1
```

Executing a tape backup (backup server)

Save data of the replication volume to a tape using backup software if it is necessary to secondarily back up the data copied to the replication volume for a countermeasure against physical failures or for permanent keeping.

Unmounting a replication volume (backup server)

```
umount /rvfs1
```

Deactivating the volume group or deporting the disk group

Deactivate the volume group or deport the disk group.

If you use LVM, deactivate the volume group of the replication volume.

```
vgchange -a n /dev/vg01
```

If you use VxVM, deport the disk group of the replication volume, and make the disk offline.

```
vxdg deport dg01
vxdisk offline sdf
```

Stopping to use a replication volume (backup server)

Perform an operation to stop using to the replication volume.

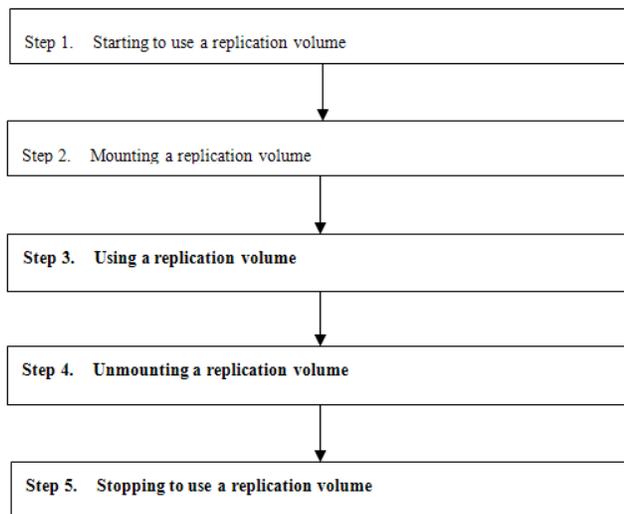
When all the volumes bound in the pool are not in use, the pool rotation also stops.

```
SnapSAN Managerec_stop -vol vol002 -volflg ld
```

Before you perform an operation for stopping to use a volume, the volume must already be unmounted. If the volume has not been unmounted and you execute the volume use stop command, the use stop command checks the mount state of the volume and discontinues operation before stopping to use the volume.

Work flow for concurrent use example of
data replication function and power

<<Backup Server>>



Operation procedure (use of replication volume)

Starting to use a replication volume (backup server)

Perform an operation to start using to the replication volume.

When rotation of a pool including the replication volume is being stopped, this operation may take time because the command waits for the pool to start rotation.

```
SnapSAN Managerec_start -vol vol002 -volflg ld
```

Mounting a replication volume (backup server)

Activating the volume group or importing the disk group

If you use LVM, activate the volume group of the replication volume.

```
vgchange -a y /dev/vg01
```

If you use VxVM, import the disk group after making the replication volume disk online.

```
vxdisk online sdf
vxdg import dg01
vxvol -g dg01 startall
```

Mount the replication volume.

If you use LVM, mount the LVM logical volume.

In this example, "ext3" is used as a file system.

```
mount -t ext3 /dev/vg01/lvol /rvfs1
```

If you use VxVM, mount the VxVM logical volume.

In this example, "VxFS" is used as a file system.

```
mount -t vxfs /dev/vx/dsk/dg01/vol1 /rvfs1
```

Use data in the replication volume.

Unmount the replication volume.

```
umount /rvfs1
```

Deactivate the volume group or deport the disk group.

If you use LVM, deactivate the volume group of the replication volume.

```
vgchange -a n /dev/vg01
```

If you use VxVM, deport the disk group of the replication volume, and make the disk offline.

```
vxdg deport dg01  
vxdisk offline sdf
```

Stopping to use a replication volume (backup server)

Perform an operation to stop using to the replication volume.

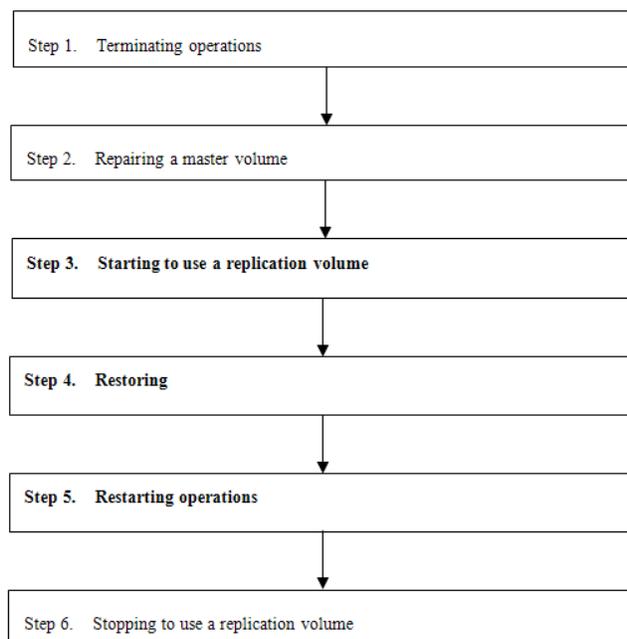
When all the volumes bound in the pool are not in use, the pool rotation also stops.

```
SnapSAN Managerec_stop -vol vol1002 -volflg ld
```

Before you perform an operation for stopping to use a volume, the volume must already be unmounted. If the volume has not been unmounted and you execute the volume use stop command, the use stop command checks the mount state of the volume and discontinues operation before stopping to use the volume.

Work flow for concurrent use example of
data replication function and power

<<Application Server>>



Operation procedure (data recovery of master volume)

Terminating operations (application server)

Terminate or halt the operations that are accessing the volume where a fault has occurred.

Repairing a master volume (application server)

You may bind a new logical volume when, for example, a hardware fault has occurred and you repair the master volume by rebuilding it. In such a case, re-create a file system with the same settings as you did before the occurrence of fault.

Then set partitions, perform formatting to create a file system, and reset the drive letter. For the partitions, file system, and drive letter, make the same settings as you did before the occurrence of fault.

You must also re-create and update a volume list.

```
SnapSAN Managervollist -cr
```

Starting to use a replication volume (application server)

Perform an operation to start using to the replication volume.

When rotation of a pool including the replication volume is being stopped, this operation may take time because the command waits for the pool to start rotation.

```
SnapSAN Managerec_start -vol vol1002 -volflg ld
```

Restoring (application server)

Restore the backup data from the replication volume to the master volume.

Restarting operations (application server)

Restart the operations that have been terminated.

Stopping to use a replication volume (application server)

Perform an operation to stop using the replication volume.

When all the volumes bound in the pool are not in use, the pool rotation also stops.

```
SnapSAN Managerec_stop -vol vol1002 -volflg ld
```

Measures for Errors

This section describes how to take measures against faults that occur during a power saving operation. Measures against following faults are described in this section.

- SnapSAN Manager Server or client fault
- PowerControl abnormal termination
- Invalid product

How to collect information necessary to analyze unidentified faults is also described.

SnapSAN Manager Server or Client Fault

Abnormal Termination of PowerControl

PowerControl outputs error contents and messages to the standard output, standard error output, syslog, command trace, or operation trace when an error has occurred.

The standard output, standard error output, syslog, or command trace records the messages described in the "Messages Handbook". Take necessary actions depending on the message.

The command trace is output in the etc folder under the folder where PowerControl has been installed as a text file beginning with "SnapSAN Manager_Log". Check the contents using a text editor.

The internal information necessary for analyzing faults is recorded in operation trace.

The following describes a PowerControl error that requires a special action.

Failure of Pool Rotation Start Processing

When you start using a volume and then the processing fails at some midpoint of start of the pool rotation, specify the pool number and the disk array name to which the volume belongs in the following command directly and execute it. You can get the pool number and the disk array name to which the volume belongs by the SnapSAN Managerec_sense command.

```
SnapSAN Managerec_start -pool poolnum -arrayname diskarray
```

If the operation start fails in spite of specifying the pool number and the disk array name, contact our engineer.

Invalid Product

If the product for power saving function has not been purchased, the protection setting for a volume through the power saving operation abnormally terminates.

Information Gathering in the Event of a Fault

When an error whose reason is unknown has occurred and you want to request the provider to investigate the error, you must collect information required for error analysis.

For PowerControl error

Information gathering on a server where a failure occurred

Follow the steps below to execute the command and collect the operation trace and other fault information at a time.

A disk for storing fault information must have at least about 4 MB of unused space. The total size of fault information files differs depending on the system status, and it may exceed 4 MB. It is advisable to allocate an unused space of enough size.

1. Log in as root.
2. Execute the SnapSAN Managervolgather command.
 - # SnapSAN Managervolgather[Directory name]
 - * Be sure to specify the directory name with the absolute path name.

The SnapSAN Managervolgather directory is created under the /opt/SnapSAN Managervol/ directory if you do not specify any directory name. If you specify a directory, the SnapSAN Managervolgather directory is created under the specified directory. Check that the SnapSAN Managervolgather.tar.Z or SnapSAN Managervolgather.tar.gz file is created under the directory and obtain the file.

Information gathering on a management server

Operations when the Configuration is Changed

It is necessary to recreate the volume list to reflect the new configuration information to the volume list when you change the disk array or server (OS) configuration.

Conditions Requiring Volume List Update

Be sure to recreate and update the volume list after changing the following configurations:

Change of disk array configuration

- Change of disk array name
- Change of logical disk name
- Change of logical disk OS type
- Adding of logical disk, and change and deleting of configuration
- Change of Access Control setting
- Adding and deleting of disk array connected by Replication and Mirroring

If the disk array configures Replication and Mirroring and the above configurations are changed in the remote-side disk array, be sure to update the volume list as well.

Change of server configuration

- Adding, deleting and change of control volume definition
- Change of connection configuration (path) between the disk array and server

Updating Volume List

To update a volume list, execute the SnapSAN Managervollist command with the -r option specified. Update a volume list with the appropriate user privilege. When updating a volume list, note the following points so that the information to be registered in the volume list including the logical disk and volume information already registered is complete.

Update a volume list in the following states.

- The path between the disk array and the server is normally connected.
- The logical disk in the disk array is recognized as a server (OS) disk device.
- The volume in the disk is recognized by the server (OS).

When you add, delete, or change the control volume definition in the disk array with which the control volume attribute cannot be identified, execute the following operation before updating a volume list.

- Define the logical disk to be used as the control volume in advance in the control volume definition file.

To successfully register volume information in the volume list, update a volume list in the following states.

- Pairs are separated when the RV in the data replication function is connected to the server.
- The link-volume (LV) and snapshot-volume (SV) are linked when the LV in the snapshot function is connected to the server. The base-volume (BV) and LV are not linked when the BV is connected to the server.
- Protected data is readable when the logical disk for which the WORM function is applied is connected to the server.
- The volume is in the "In use" state and accessible when the logical disk for which the power saving function is applied is connected to the server.
- The link path between disk arrays is normal when the Replication and Mirroring is configured for the disk array.

After updating the volume list, display the information registered in the volume list to check that the items to be used such as logical disks and special file names are all registered.

If the script or the like used for operation describes the logical disks, special file names, and other information to be operated, reflect the updated information in the volume list to the script or the like.

Note that the PowerControl command execution may abnormally end in the future operation if the information in the volume list contains an error or if the volume list information is inconsistent with the script or others used for operation.

Restarting the Server

This chapter describes some notes regarding management and operations of the power saving function.

When you restart the server connected to the volume in not in use state, the volume may not be used from the OS. This event occurs because the OS cannot recognize the volume partition information when the volume cannot be read and written due to the not in use state.

For the above case, the volume partition information needs to be recognized again by performing the following procedures.

Starting to use the volume (backup server)

Start using the volume.

Restarting the server (backup server)

Restart the server and make the OS recognize the volume partition information.

Control Volume

A control volume is used when a server issues control I/O to the relevant disk array. Select one of logical disks connected to each server for each disk array as the volume for issuing I/O to that disk array and register the volume in the volume list.

Note the following points when making a control volume setting.

- Prepare one control volume for each server. It is not advisable to use the same logical disk as a control volume from different servers.
- Select a normal volume that is not used for data replication, snapshot, and WORM.
- Keep the volume assigned as a control volume as a dedicated volume, and do not assign business data to the volume.
- Since a control volume is always rotating, it cannot be assigned to a pool intended for power saving.
- For a logical disk used as a control volume, the RAID format and capacity are not limited.
- In the case of disk arrays with pool, you can build a small-capacity logical disk dedicated for a control volume.

Management and Operations of Power Saving Function

1. A volume for power saving cannot be allocated to LUN0. Allocate to LUN0 a normal volume that is not used by power saving function.

2. Care must be taken in setting and operating partitions because power saving operations are performed on a disk-by-disk basis, not on a partition-by-partition basis.
3. Care must be taken in setting and operating logical disks because rotation stop/start operations are performed on a pool-by-pool basis, not on a disk-by-disk basis.
4. To register in a volume list a logical disk to be used, a special file in the /dev/sd# format for the logical disk must already be created. Before creating or updating a volume list, you must use the /dev/MAKEDEV or mknod command to create all special files for logical disks you want to use.
5. When you specify the value of a special file name in a command option, the value must be in the /dev/sd# format. The special file name is displayed in the /dev/sd# format.
6. The LUN settings assigned to logical disks must be sequential values starting at 0. The system can recognize only a range of logical disks with sequential LUN values starting at 0; the first logical disk to have a non-sequential LUN value and subsequent logical disks are not recognized.
7. To add or delete disk arrays, the system must be restarted.
8. A volume for power saving operations cannot be used as a share disk for the cluster.
9. If an attempt is made to access a volume in the not in use state, a message indicating an SCSI error (refer to <Message example> below) may be recorded in syslog. If you execute a command, such as fsck, that tries to access all volumes in a server, a message similar to the example below may be recorded for every volume in the server in the not in use state.

<Message example>

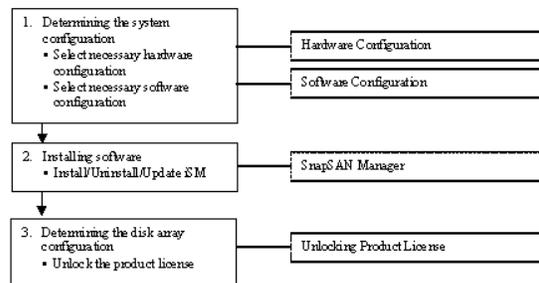
```
Dec 10 14:48:14 sv001 kernel: sd 4:0:1:1: SCSI error : return code =
0x8000002
Dec 10 14:48:14 sv001 kernel: sde: Current sde: sense key:Data Protect
Dec 10 14:48:14 sv001 kernel: <<vendor>> ASC=0xf4 ASCQ=0xc ASC=0xf4
ASCQ=0xc
Dec 10 14:48:14 sv001 kernel: Info fld=0x0
Dec 10 14:48:14 sv001 kernel: end_request:I/O error, dev sde, sector 0
```

In an environment that has PathManager installed, if such a message is recorded, the PathManager path to the volume may be broken, preventing the volume from being accessed.

Start using the volume to make the volume read/write-enabled, and then recover the broken path using the recoverpath command of PathManager. In an environment that does not have PathManager installed, there is no operational problem even if a message similar to the above example is recorded.

10. When you stop using RV of the data replication function, the volume must have been separated. When you perform Separate (immediate) of the replication function, the RV becomes available (available for read or write) but cannot be stopped using because the data has not been established. Wait until Separate is completed.
11. Some of the physical disks will not stop for power saving.

This chapter describes how to install and use the power saving function for physical disks.
 Installation Procedure Flow:



System Configuration

Hardware Configuration

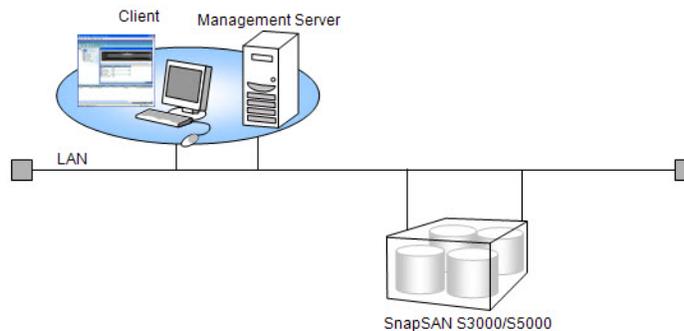


Figure 11-1: Hardware Configuration - Eco Mode

Though a business or backup server may also be used as a management server, using a specific management server is recommended. Use of LAN connection is strongly recommended for connection with disk array.

Software Configuration

Select software to be used according to the hardware components, operating conditions,

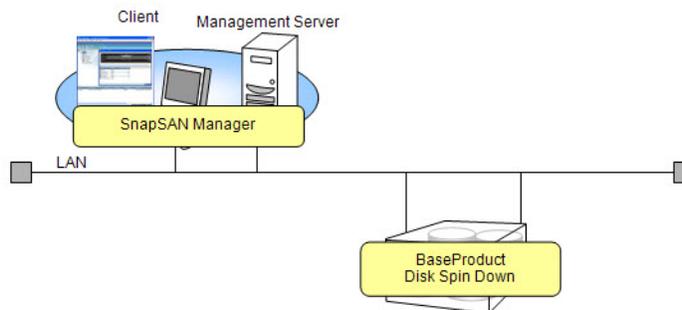


Figure 11-2: Software Configuration

- Install the management software in the management server. Install the SnapSAN Manager in the management server.
- Disk Spin Down is installed in the disk array. This becomes available by unlocking the license.

Operation Design

Since it takes some time to start rotating a stopped physical disk, disable the eco mode for unused PDs/spare PDs in the disk array to put priority to disk responsiveness. If the eco mode is disabled for these devices, they do not stop rotation and enter into the power saving status.

To put priority to disk power saving, enable the power saving function for unused PDs/spare PDs. If the eco mode is enabled for these disks, they stop rotation and enter into the power saving status when the configuration setting function is used.

Take the following points into consideration to realize efficient power saving operation.

Stopping Physical Disks

If you stop all the physical disks not used by the pool, a lot of power can be saved. Therefore, when the eco mode is enabled for unused PDs, these disks are automatically stopped when the configuration setting function is used.

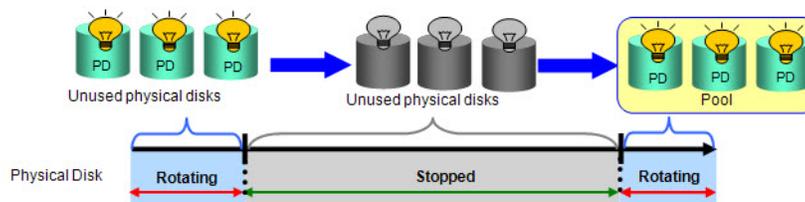


Figure 11-3: Power Saving Effect

Software Installation

SnapSAN Manager

Operating Environment

SnapSAN Manager Server

SnapSAN Manager Client (GUI)

Installation

SnapSAN Manager Server Installation

SnapSAN Manager Server Setting

SnapSAN Manager Client Installation

Uninstallation

SnapSAN Manager Server Uninstallation

SnapSAN Manager Client Uninstallation

Update

SnapSAN Manager Server Update

Disk Array Configuration

For the disk array to be connected, determine the configuration for using the power saving function.

Unlocking Product License

To use the Disk Spin Down , you must unlock the product license set in the disk array. To unlock the license, you must purchase the corresponding products equal to or greater than the total capacity of the data disk.

If the total capacity of the data disk exceeds the product's specified capacity because physical disks are added to the disk array system, it is necessary to unlock the product licenses equal to or greater than lack of licenses.

Operations

Operation Design

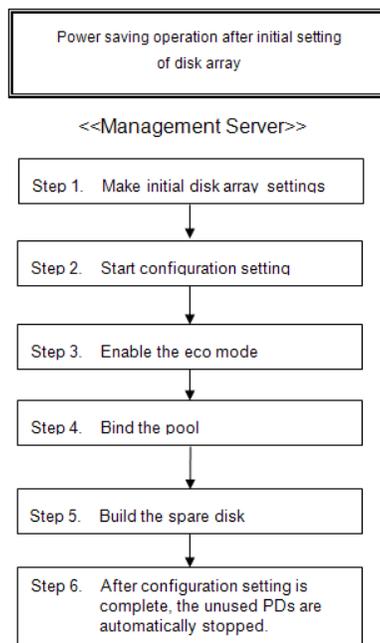
Since it takes some time to start rotating a stopped physical disk, disable the eco mode for unused PDs/spare PDs in the disk array to put priority to disk responsiveness. If the eco mode is disabled for these devices, they do not stop rotation and enter into the power saving status.

To put priority to disk power saving, enable the power saving function for unused PDs/spare PDs. If the eco mode is enabled for these disks, they stop rotation and enter into the power saving status when the configuration setting function is used.

Take the following points into consideration to realize efficient power saving operation.

Stopping Physical Disks

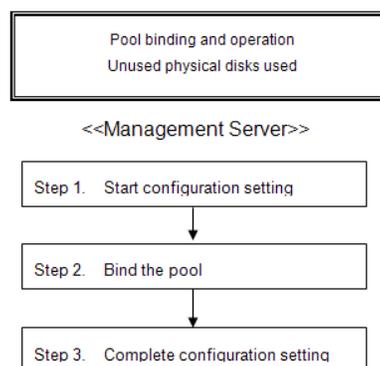
If you stop all the physical disks not used by the pool, a lot of power can be saved. Therefore, when the eco mode is enabled for unused PDs, these disks are automatically stopped when the configuration setting function is used.



Power Saving Operation when Binding the Pool Example

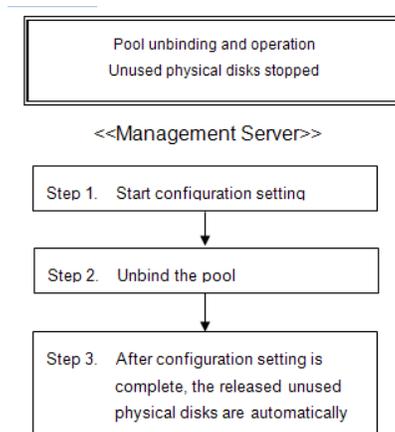
When binding a new pool using unused physical disks, you do not have to pay attention to the rotation state of unused physical disks. During pool binding, the stopped physical disk are automatically started and used for binding. However, the pool is bound after all the physical disks to be used completely start, it may take some time to bind the pool depending on the number of stopped physical disks.

Operation flow



Power Saving Operation when Unbinding the Pool Example

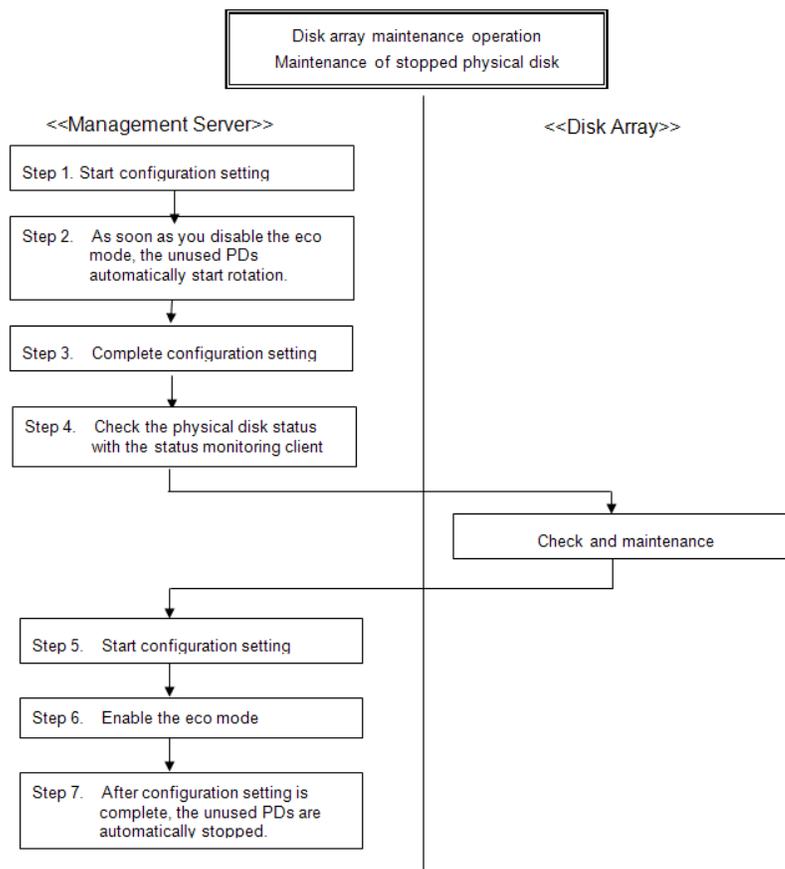
When the pool is no longer used, unbind the pool, automatically stop the physical disks that make up the pool and start the power saving status.



Disk Array Maintenance Operation in the Eco Mode

If a physical disk is stopped for a long time, you can disable the eco mode for such unused PDs/spare PDs so that they automatically start rotation to see their status. After checking the status, enable the eco mode so that unused PDs enter into the power saving status again.

Operation flow



Operation procedure

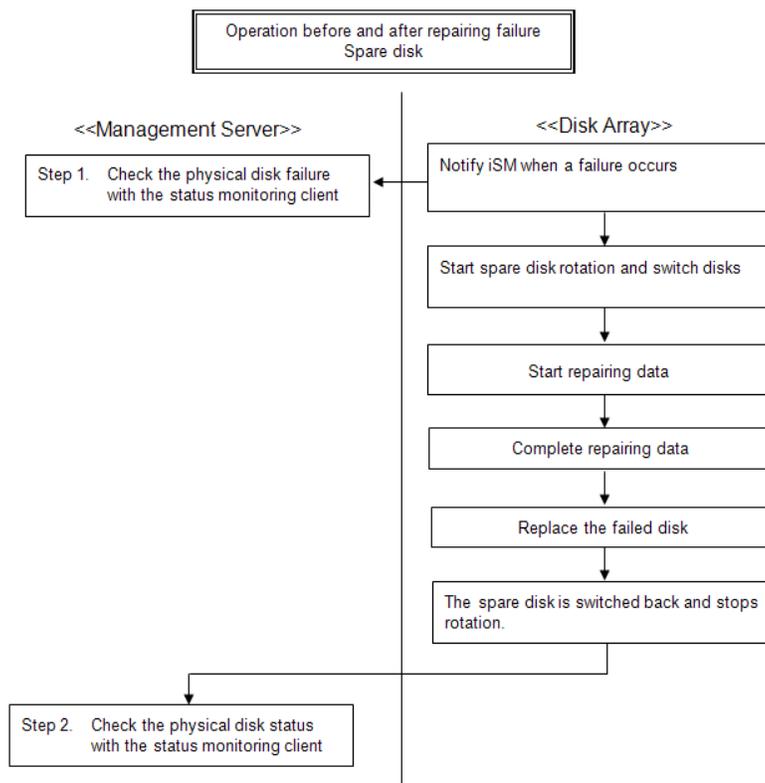
Operation example before and after repairing a failed disk in the eco mode

If a physical disk fails in the pool, the stopped spare disk automatically starts rotation, replace the failed physical disk in the pool, and start repairing data.

After completing repairing data, replacing the failed physical disk, and switching the disk back to the spare disk, the spare disk automatically stops rotation and enters into the power saving status.

These rotation start and stop operations of spare disk are automatically performed.

Operation flow



Notes

The time required to stop rotation or to start rotation varies depending on the number of physical disks of which rotation is to be stopped or started. When a lot of stopped physical disks are used to bind a pool, binding a pool takes some time because the processing starts after all the disks completely start.

The power saving function does not stop rotation of certain physical disks that save disk array configuration information.

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