FUJITSU Storage
ETERNUS SF Express V16.9

Operation Guide

Windows/Linux

Preface

Purpose of This Manual

This manual gives an overview of FUJITSU Storage ETERNUS SF Express (hereafter abbreviated as "Express").

Express is the software that enables you to easily install and operate a storage system.

Intended Readers

This manual is intended for users who are considering installing Express or who want an overall understanding of the product.

Readers gain an understanding of the Express functions from this manual.

Structure of This Manual

The structure of this manual is as follows.

Chapter 1 Flow to Operation

This chapter explains the workflow from installing to operating a storage system.

Chapter 2 Configuration

This chapter explains how to configure the operating environment of a storage system using Express.

Chapter 3 Operation

This chapter explains how to operate a storage system using Express.

Chapter 4 Maintenance

This chapter explains the maintenance of Express.

Appendix A Advanced Copy Function

This appendix explains Advanced Copy function.

Appendix B Command References

This appendix explains commands.

Conventions

- This manual abides by the conventions listed in "Conventions" in the *FUJITSU Storage ETERNUS SF Express / Storage Cruiser / AdvancedCopy Manager Documentation Road Map*.

- In this manual, unless there is a special disclaimer, "Deduplication/Compression" indicates either Deduplication or Compression.

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Notes

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Update History

Content of Update	Updated Section	Revision
Information related to displaying data access state of the RAID group during redundancy loss has been added.	3.1.3	10.1
The product overview article has been deleted from this manual because it was moved to the *Overview*.	General	10
In [See], the manual to be referred has been modified.	3.4.1	
[Point] has been added in "Basic System Configuration".	1.3	9.2
Information related to the ETERNUS DX200 S5 and ETERNUS AF250 S3 whose firmware version is V11L40 or later has been added.	4.1.5, 4.2.1.1, 4.5.1	
The explanation has been added.	4.2.2.2	
The explanation has been modified or deleted.	4.2.2.8	
In "Threshold Values and Threshold Monitoring Status", the meaning of the displayed icons has been described.	4.5.1	
[Note] has been deleted.	Appendix C	
Information related to the role group configuration file has been added.	5.1.1, 5.1.2	9.1
Information related to the following storage devices and software has been added. - ETERNUS DX60 S5/DX100 S5/DX200 S5 - ETERNUS AF150 S3, AF250 S3 - Red Hat Enterprise Linux 8 (for Intel64) Information related to the following storage device and software has been deleted. - ETERNUS DX60 - Microsoft Windows Server 2008 R2 - Microsoft Windows Server 2008	General	9
The description for Conventions has been changed so that the *FUJITSU Storage ETERNUS SF Express / Storage Cruiser / AdvancedCopy Manager Documentation Road Map* is referenced.	"Conventions" in Preface	
The "Manual Organization and Reading Suggestions" section has been deleted from Preface.	Preface	
The description about the maximum number of SnapOPC+ copy sessions that can be executed in a storage device has been modified.	1.2, 4.4, A.3.1	
In [Note], the explanation has been modified.	4.2.2.5.6	
[Note] has been added.	Appendix C	
Information related to Microsoft Windows Server 2019 has been added.	"Notation" and "Others" in Preface	8.1
In [Note], the explanation has been added.	4.1.7	
Information related to Solaris 9 has been deleted.	"Notation" in Preface	7
Information related to the ETERNUS AF250 S2 has been added.	"Notation" in Preface, 1.2, 1.3, 3.1, 4.1.5, 4.1.7, 4.1.8, 4.2.1.1, 4.6, 5.1.3.4, A.2.1, A.2.2, A.3.1	
In [Note], the explanation has been added.	4.1.3, 4.1.4	

Content of Update	Updated Section	Revision
A note for CM Port has been added.	4.2.1.1	
The explanation has been added.	4.5.2	
In [Information], the explanation has been modified.	4.5.2	
Information related to Microsoft Windows Server 2016 has been added.	"Notation" and "Others" in Preface	6
Information related to Windows Vista has been deleted.	"Notation" in Preface	
Information related to the ETERNUS DX60 S4/DX100 S4/DX200 S4 has been added.	"Notation" in Preface, 1.2, 1.3, 3.1, 4.1.5, 4.2.1.1, 4.4, A.2.1, A.2.2, A.3.1, A.4	
The description about Deduplication/Compression has been modified or added.	"Others" in Preface, 4.1.5	
In [Note], the explanation has been modified.	4.1.4, 4.1.5	
[Point] has been added.	4.1.5	
In step 2 of "Changing Port Numbers Used in Web Console", an unnecessary file to edit has been deleted.	5.1.3.1, 5.2.3.1	
The description has been modified so that Microsoft Windows Server 2016 is listed.	5.1.3.3	
A new section has been added.	5.1.3.4	
In steps 2 and 3 of "Changing Port Numbers Used in Web Console", the description related to the "/etc/services" file has been added.	5.2.3.1	
Information related to HP-UX 11i v1/v2 has been deleted.	"Notation" in Preface	5
Information related to VMware vSphere 4 has been deleted.	"Notation" in Preface	
Information related to the ETERNUS DX80/DX90 has been deleted.	"Notation" in Preface, 1.2, 1.3, 4.2.1.1, 4.4, A.1.1, A.2.1, A.3.1, A.3.2	
Information related to the ETERNUS AF250 has been added.	"Notation" and "Others" in Preface, 1.2, 1.3, 3.1, 4.1.5, 4.1.7, 4.1.8, 4.2.1.1, 4.4, 4.6, A.2.1, A.2.2, A.3.1	
The description of the antivirus function has been deleted.	"Software Products" in Preface, 4.6	
The explanation related to the automatic update of device component status has been added.	4.1.1, 4.3.1.1, 4.3.1.2, 4.5.1	
The term "Deduplication" has been changed to "Deduplication/Compression".	4.1.5	
Note has been deleted.	4.4.6	
The explanation related to the snapshot copy has been modified.	A.2.2, A.3.1, A.3.3	
In [Point], information has been added	4.6.1.1.1	4.3
The explanation related to home directory has been added.	4.6.1.1.3, 4.6.1.5.1, 4.6.4.1 - 4.6.4.3, 4.6.4.28	
In [Information], the explanation has been modified.	4.6.1.2.1	
The unit that can set quota has been described.	4.6.1.4.1, 4.6.4.16	
The explanation about a local user/local group for connecting to NAS has been added.	4.6.2.1, 4.6.2.2, 4.6.3.3	
The description of the following items has been added:	4.6.3.1	

Content of Update	Updated Section	Revision
- Usage - Access Configurations of Shared Folder - Host Access Configurations of Shared Folder		
"Hosts Allowed Access with root privilege" has been added to the item that can change the setting.	4.6.4.3	
Information related to the encryption mode AES-256 has been added.	4.1.8	4.2
Information related to the quota settings has been modified or added.	4.6.1.1.2, 4.6.1.4.1, 4.6.3.1, 4.6.4.16 - 4.6.4.21	4.1
The explanation related to the NAS file system has been modified.	4.6.1.1.3	
Information related to the snapshots has been modified or added.	4.6.1.3, 4.6.4.10, 4.6.4.13, 4.6.4.14	
Point has been added to "Creating RAID Groups".	4.6.2.5	
Information related to the shared folders has been modified or added.	4.6.3.1, 4.6.4.2, 4.6.4.3	
Information related to Microsoft Windows Server 2003 has been deleted.	"Notation" in Preface	4
Information related to Windows 10 has been added.	"Notation" in Preface	
The description related to SNMP communication has been modified or added.	3.1, 3.3, 3.5.1, 4.1, 5.1.3.1, 5.1.3.3, 5.2.3.3, Appendix C	
Information related to the Thin Provisioning has been added.	4.1.5	
An explanation of the Dashboard has been added.	4.3.1.1, 4.3.1.2, 4.5.2.1	
Figure "Backup/Restoration of NAS Volume" has been modified.	4.6.1.2.1	
The explanation related to the shared folders has been modified.	4.6.1.2.2, 4.6.3.1	
Information related to the NAS backup has been modified or added.	4.6.4.9, 4.6.4.23, 4.6.4.24	
The term "VMware Virtual Volumes" has been changed to "VMware vSphere Virtual Volumes" according to the terms used by VMware, Inc.	Throughout this manual	3.1
Information related to VMware vSphere(R) 6 has been added.	"Notation" in Preface	
Antivirus server has been added.	"Software Products" in Preface	3
Information related to the ETERNUS DX200F has been modified or added.	"Others" in Preface, 1.2, 1.3, 3.1, 4.2.1.1, 4.4, 4.4.6, A.2.1, A.2.2, A.3.1	
Information related to ETERNUS DX60 S3 has been added.	"Organization" in Preface, 1.3, 3.1, 4.2.1.1, A.4	
The error in writing of "Copy Command via LAN" has been corrected about the ETERNUS DX90 in the table of "System Configuration Using Advanced Copy Function".	1.3	
Performance management has been added to NAS volume and NAS system.	4.2.1.1, 4.2.2.5, 4.6.1.1.2, 4.6.4.18, B.1	
Antivirus countermeasures have been added to the NAS environment.	4.6.1.1.2, 4.6.1.5, 4.6.1.6, 4.6.2.4, 4.6.4.18, 4.6.4.19, 4.6.4.20, 4.6.4.24	
"Copy Table Size Settings" has been added.	4.6.2.5	

Content of Update	Updated Section	Revision
The SMB encryption of the data access and the enumeration based on the access permission setting has been added.	4.6.3.1, 4.6.4.2	
"Access Using NFS Protocol" has been changed.	4.6.4.1	
Note on the "Deleting Shared Folder" has been added.	4.6.4.24	
Note has been added.	4.6	2.1
The number of NAS volumes and NAS backup volumes creatable on one ETERNUS Disk storage system has been changed.	4.6.1.2.1	
Note has been added when data inconsistency is found in a snapshot.	4.6.1.3.1, 4.6.4.12	
Point has been added to "NAS Environment Quota Management".	4.6.1.4.1	
Point has been added to "Events Notified by Quota Management".	4.6.1.4.2	
Note has been added to "Registration of User/Group".	4.6.2.2	
Note when using quota management function and snapshot function has been added.	4.6.2.4, 4.6.3.1, 4.6.4.10, 4.6.4.15	
"NAS Volume Number to Which to Create Shared Folder" has been added. Method for specifying time to collect snapshots has been added.	4.6.3.1	
Suffix of volume name has been changed. The limit to the number of volume name characters has been deleted.	4.6.3.1, 4.6.4.9	
Mode number has been added. Point has been added to "Port Bonding". Note has been added to "NAS Interface (Network)". Note has been added to "VLAN ID".	4.6.3.2	
Point has been added to "Removing Authentication Server".	4.6.4.21	
Modified screen names in the ETERNUS GUI.	3.1	2
Added Wizard startup method description.	3.6	
Added Notes for ETERNUS Disk storage systems.	4.1.1	
Notes have been added and changed.	4.1.4, 4.1.5, 4.1.7	
Added the ETERNUS DX200F information.	4.2.1, A.4	
Updated the Web Console graphics.	4.3.1	
Function has been added to the NAS management.	4.6	
Removed SymfoWARE description.	5.1.3.1, 5.1.3.2	
Port numbers used in Express has been deleted.	5.1.3.1, 5.2.3.1	
Updated the Eco-mode description.	A.4	
Information related to the ETERNUS DX200F has been added.	"Others" in Preface, 4.1.7, 4.1.8, 4.2.1.1, 4.6, 4.6.1.3	1.2
Notes when creating a NAS interface have been added.	4.6.3.2	1.1
Notes when setting up an authentication server have been added.	4.6.3.3	
The access method by CIFS protocol has been changed.	4.6.4	

Contents

Chapter 1   Flow to Operation

The "Figure 1.1 Flow from Installing to Operating Storage System" shows a flow from installation of a storage system to its operation in Express.

Refer to the following manual for installation and setting up Express.

- For installing Express

  Installation and Setup Guide

- For upgrading from previous version to latest version

  Migration Guide

Figure 1.1 Flow from Installing to Operating Storage System

	System Administrator	Business Administrator	Hardware Administrator

Installation

- Installing Express
- Setting up Express's manager
  - Registering user information
  - Setting up environment for network
  - Setting SNMP Trap
  - Checking the connection from Web Console
  - Registering the license for Express
  - Setting the PATH environment variable

Configuration

- Configuring disk storage systems
- Registering disk storage systems
- Registering servers
- Executing SNMP Trap reception test
- Executing e-mail send test
- Configuring environment using wizard

Operation

Disk storage system resource management

- RAID group management
- Volume management
- Thin Provisioning management
- Disk management
- Connection management
- Disk storage system management
- Advanced Copy management
- Advanced Copy operation

Performance management of a storage system

- Starting the performance information collection
- Stopping the performance information collection
- Displaying the performance information

If detected a trouble

- Identifying the trouble condition
- Trouble analysis
- Trouble response

Executing of Advanced Copy

- Setting of Advanced Copy
- Operation of Advanced Copy

Maintenance

- Backing up Express's manager environment
- Restoring Express's manager environment
- Changing Express's manager environment

☐ : Task scope for each administrator

Express defines the role of each administrator for installing and operating a storage system as follows.

Table 1.1 Roles of Administrators

Administrator	Task
System administrator	Manages design through operation of storage systems. Handles all the tasks required to operate storage systems.
Business administrator	Manages business operations performed on servers. Performs backup and restore of business data and handles failures affecting managed business operations.
Hardware administrator	Manages storage system hardware. Handles hardware failures.

Information

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To use Express, it is necessary to register Administrator user information on the server on which to install Express.
System administrator must be registered. Register Business administrator and Hardware administrator as required.
Refer to "Registering User Account for Using Express" in the *Installation and Setup Guide* for privileges given to each administrator.

· ·

Point

· ·

In system environments where this product shares storage devices with other products that use the RESTful API of the storage device, the operation must be designed so that each product does not perform a simultaneous configuration change operation of the shared storage device.
If a configuration change operation of the storage device is simultaneously performed from each product, one of the operations may terminate with an error. If the operation terminates with an error, after the operation is completed on the other side, try again.

· ·

Chapter 2　　Configuration

This chapter describes the configuration procedures of storage system operating environment by using Express.

2.1　Setup Required in Advance

In order to manage ETERNUS Disk storage system using Express, it is necessary to configure ETERNUS Disk storage system in advance.

Set up the following item by using ETERNUS Web GUI.
Refer to the ETERNUS Web GUI manuals for more information.

- Check the IP address of the Management Server.
  When the Management Server exists in a different subnet from where ETERNUS Disk storage system belongs, make sure that the IP address of the Management Server is registered in "Access permission list for outside of the subnet" on "Setup environment for network" screen. If it is not registered, register it.

- On the following screens of ETERNUS Web GUI, enable the SNMP function of MNT port.

Target Device	Screen Name
ETERNUS DX60 S5/S4/S3 ETERNUS DX100 S5/S4/S3 ETERNUS DX200 S5/S4/S3 ETERNUS AF150 S3 ETERNUS AF250 S3/S2 ETERNUS AF250 ETERNUS DX200F	Setup SNMP Agent User
ETERNUS DX60 S2 ETERNUS DX80 S2 ETERNUS DX90 S2	Setup SNMP Agent

- Check the ETERNUS Disk storage system name displayed in the **Name** column on the "Modify Storage System Name" screen.
  When using Advanced Copy functions, specify 16 or less alphanumeric characters for ETERNUS Disk storage system name.

- When you connect iSCSI, specify "Enable" the use of iSNS server in the target port.

If the target storage device is other than the ETERNUS DX60 S2, in addition to the above, execute the following settings:

- Create a new SSH server key.
  Create an SSH server key on the following screens of ETERNUS Web GUI. The number of bits for SSH server key is optional.

Target Device	Screen Name
ETERNUS DX60 S5/S4/S3 ETERNUS DX100 S5/S4/S3 ETERNUS DX200 S5/S4/S3 ETERNUS AF150 S3 ETERNUS AF250 S3/S2 ETERNUS AF250 ETERNUS DX200F	Setup SSH Server Key
ETERNUS DX80 S2 ETERNUS DX90 S2	Create SSH Server Key

- On the Setup User Account screen of ETERNUS Web GUI, create a Software Role Account.
  In later procedures, specify the account information you created here.

- When managing devices using SNMPv1, you must set the SNMP community name on the ETERNUS Disk storage system. Set the SNMP community name on the Setup SNMP Agent Community screen of ETERNUS Web GUI.

- When managing devices using SNMPv3, you must set the SNMP user name on the ETERNUS Disk storage system. Set the SNMP user name from the Setup SNMP Agent User screen of ETERNUS Web GUI.

📒 Note
....
Make sure to logout from ETERNUS Web GUI if the setting up is completed.
....

2.2 Checking Connection from Web Console

From the next section on, the described tasks are supposed to be performed from Web Console.
Launch Web Console and login, and then check that the initial screen is displayed.

📚 See
....
Refer to the *Web Console Guide* for the version level of the supported web browsers and methods for launching and logging into Web Console.
....

2.3 Registering Disk Storage Systems

In order to manage disk storage systems, first of all it is necessary to register disk storage systems to be managed.

Disk storage systems can be registered by using Web Console. Refer to "Register ETERNUS Disk Storage System" in the *Web Console Guide* for details on the operation procedures.

🅿 Point
....
If you use SNMPv3 to manage a disk storage system, register the SNMP user information beforehand. For details, refer to "Display/Add/Change/Delete SNMPv3 User Configuration" in the *Web Console Guide*.
....

2.4 Registering Servers

In order to assign volume to a server using Express, it is necessary to register the target server in advance.

With Web Console, register a server to be managed by Express. Refer to "Register Server" in the *Web Console Guide* for details on the operation procedures.

Then, add HBA to the registered server. Refer to "Add HBA" in the *Web Console Guide* for details on the operation procedures.

🅿 Point
....
Registration of a server and the addition of HBA can be performed using the Storage configuration wizard. Refer to "2.6 Environment Configuration Using Wizard" for details about the Storage configuration wizard.
....

2.5 Event Notification Test

Express performs the fault monitoring by processing events that are asynchronously reported by SNMP Trap from ETERNUS Disk storage system. Therefore, check that the SNMP Trap settings are correctly done.

By sending E-mail to the destination address configured in advance when an abnormality occurs in the device, it is possible to notify its abnormality to the system administrator and business administrator immediately.

This section describes the procedure for SNMP Trap reception test and E-mail send test.

2.5.1   Procedure for SNMP Trap Reception Test

To check that the Management Server can receive SNMP Trap, perform the following procedure to execute a SNMP Trap reception test:

1. Launch ETERNUS Web GUI.

2. On ETERNUS Web GUI, check that SNMP Trap destination from ETERNUS Disk storage systems is an IP address of the Management Server.
    If you select SNMPv1 to register a device, set a SNMP Trap destination to automatic setting when registering the disk storage system or set it using ETERNUS Web GUI. If you select SNMPv3 to register a device, set an SNMP Trap destination using ETERNUS Web GUI.

3. On ETERNUS Web GUI, send the SNMP Trap.
    Refer to the ETERNUS Web GUI manuals for more information.

4. On Web Console, check that the message has been displayed in the event log.
    SNMP Trap Test has been completed successfully if the message including the character string of "SNMP Trap Test" is displayed in the body of the message.

If the message has not been displayed, check the SNMP Trap settings in the ETERNUS Disk storage system settings. In addition, check that the network settings (e.g. firewall setting) is correct. Then, send the SNMP Trap on ETERNUS Web GUI again.

2.5.2   Procedure for E-mail Send Test

Check whether E-mail can be received at the specified E-mail address or SMTP server IP address.

With Web Console, check that the E-mail destination address is set up and then send test E-mail. Refer to "Send Test E-mail" in the *Web Console Guide* for details on the operation procedures.

🛈 Note
. . . .
If an event notification E-mail destination address has been set, a test E-mail is sent to the E-mail destination address whether or not an event notification E-mail has been set to send.
The test E-mail is sent only to the business administrator and system administrator.
. . . .

2.6   Environment Configuration Using Wizard

Even without prior experience of ETERNUS Disk storage systems configuration and setup, the volume created in ETERNUS Disk storage system can be assigned to the server with a wizard.

Express provides the following wizards:

-   Storage Configuration Wizard

    This wizard can register new server and assign volumes created in ETERNUS Disk storage system to new server. In addition, volumes to be assigned can be created in this wizard.
    From **Main** or **Storage** of the Global Navigation tab, execute **Configure Storage** under **Wizard** on the Action pane.

-   Volume Allocation Wizard

    This wizard can assign volumes created in ETERNUS Disk storage system to the registered server.
    From **Main** or **Storage** of the Global Navigation tab, execute **Assign Volume** under **Wizard** on the Action pane.

-   Advanced Copy Configuration Wizard

    This wizard can configure the copy table size and Snap Data Pool policy required for Advanced Copy operation.
    Select ETERNUS Disk storage system from **Storage** of the Global Navigation tab and select **Advanced Copy** on the Category pane.
    Then, from **Configuration** of **Advanced Copy** on the Category pane, execute **Advanced Copy** under **Wizard** on the Action pane.

Wizard Name	Flow of Operation
Storage configuration wizard	1. Register the server and add HBA
	2. Select ETERNUS Disk storage system to connect with the server

Wizard Name	Flow of Operation
	3. Create RAID group (optional)
	4. Create volume (optional)
	5. Assign volume to the server

	5-1. Register host
	    5-2. Create Affinity group
	    5-3. Add Host Affinity

Volume allocation wizard	1. Select the server
	2. Select HBA and port
	3. Assign volume to the server

	3-1. Register host
	    3-2. Create Affinity group
	    3-3. Add Host Affinity

Advanced Copy configuration wizard	1. Configure the copy table size
	2. Configure Snap Data Pool policy (optional)

Without using these wizards, each operation can be executed. Refer to "3.1 Resource Management" for the executable operations.

Chapter 3   Operation

This chapter describes the procedure to operate the disk storage system using Express.

3.1   Resource Management

Various functions can be used on Web Console to the disk storage system registered into Express.

See
....
Refer to the *Web Console Guide* for details on the operation procedures using Web Console.
....

3.1.1   Operations for ETERNUS Disk Storage System

Express can execute operations related to ETERNUS Disk storage system.

With Web Console, select the disk storage system, and then select the process on the Action pane.

The executable operations are as follows:

  - Display ETERNUS Disk storage system

  - Delete ETERNUS Disk storage system

  - Change ETERNUS Disk storage system information

  - Set/change the information of the account that can access ETERNUS Disk storage system

  - Change the storage system name or Box ID for ETERNUS Disk storage system

  - Configure ETERNUS Disk storage system

  - Assign ETERNUS Disk storage system volumes to a server

  - Reload ETERNUS Disk storage system configuration information

The following operation can be executed from **SNMP Configuration** in **System** on the global navigation tab through Web Console:

  - Display/change Manager Engine ID

  - Change SNMP communication settings

  - Display/add/change/delete SNMPv3 user settings

Note
....
In the following cases, since the ETERNUS Disk storage system has been modified beyond management of Express manager, the configuration information must be reloaded:

  - An error event or warning event has been received (*1)

  - The ETERNUS Disk storage system has recovered from a problem (*1)

  - Performance is managed and monitored status is not up-to-date

  - Management Server or Express manager has stopped its functions before operations specified from Web Console are completed

  - When the ETERNUS Disk storage system is being managed by multiple Express managers

  - ETERNUS Disk storage system is operated by another manager (not Express)

  - If the ETERNUS Disk storage system was upgraded with new hardware option e.g. Unified Kit

  - The firmware of the ETERNUS storage system was updated

*1: For devices that support automatic updates of the device component status, this product acquires the device configuration status automatically from the device. For this reason, you do not need to perform the **Reload Conf.** operation for the device. For devices that support automatic updates of the device component status, refer to "Monitoring Device Component Status" in the *Storage Cruiser Operation Guide*.

3.1.2 Operations Related to Server

Express can execute operations related to servers.

With Web Console, select the server, and then select the process on the Action pane.

The executable operations are as follows:

- Display the server

- Delete the server

- Change the server information

- Reload the server configuration information

- Add the HBA

- Delete the HBA

3.1.3 Operations Related to RAID Group

Express can execute operations related to RAID groups in the disk storage system.

With Web Console, select the disk storage system, and then select the process on the Action pane.

The executable operations are as follows:

- Display the RAID group status

- Create and delete the RAID group

- Configure the RAID group Eco-mode

Note

- When the RAID group corresponds to either following conditions, the disk drive cannot be stopped from Web Console. Stop the disk drive by the "storageadm spindle stop" command:

    - The volume whose volume type is WSV exists in the target RAID group.

    - The volumes in the target RAID group are concatenated with other RAID groups by the LUN Concatenation.

    Refer to "Command References" in the *Storage Cruiser Operation Guide* for information on the "storageadm spindle stop" command.

- In this product, the External RAID Groups that are used for the Non-disruptive Storage Migration cannot be operated or displayed. Perform these operations with ETERNUS Web GUI.

Point

In the "Display the RAID group status" operation, the following information is also displayed.

- Whether there is data access failure in the RAID group during redundancy loss

- Whether there is access failure to the disks that configure the RAID group

Note that the above information can be displayed for the following storage devices and firmware versions.

Storage Device	Required Firmware Version
ETERNUS DX60 S5/DX100 S5/DX200 S5 ETERNUS AF150 S3/AF250 S3	V11L50-1000 or later
ETERNUS DX60 S4/DX100 S4/DX200 S4 ETERNUS DX60 S3/DX100 S3/DX200 S3 ETERNUS AF250 S2/AF250 ETERNUS DX200F	V10L90-1000 or later

3.1.4 Operations Related to Volume

Express can execute operations related to volumes in the disk storage system.

With Web Console, select the disk storage system, and then select the process on the Action pane.

The executable operations are as follows:

- Display the volume

- Create and delete the volume

- Forcible delete the volume

- Format the volume

- Expand the Thin Provisioning Volume capacity

- Start and stop the Thin Provisioning Volume restriping

📖 Note

- The number of maximum volumes that can be made with this product at a time is 128. Make them by dividing into two or more times when you make volumes that exceed 128.

- On Web Console, the following operations cannot be performed:

  - Delete the reservation of Snap Data Pool Volume

  - Create and format volumes of LUN concatenation

  - Create, delete and format Wide Striping Volume

  The above operations can be performed using ETERNUS Web GUI.

- In this product, the volumes that are used for the Non-disruptive Storage Migration cannot be created. Create the volumes with ETERNUS Web GUI.

3.1.5 Operations Related to Thin Provisioning

Express can execute operations related to Thin Provisioning in the disk storage system.

With Web Console, select the disk storage system, and then select the process on the Action pane.

The executable operations are as follows:

- Display the Thin Provisioning Pool

- Display the Thin Provisioning Pool status

- Create and delete the Thin Provisioning Pool

- Change the Thin Provisioning Pool threshold value

- Display the Thin Provisioning Pool capacity graph

- Expand the Thin Provisioning Pool capacity

- Format the Thin Provisioning Pool

- Enabling/Disabling the Thin Provisioning Pool Deduplication/Compression

- Display the Thin Provisioning Pool Deduplication/Compression status

- Display the data reduction rate, data size before reduction, data size after reduction, and GC remaining size of Thin Provisioning Pool Deduplication/Compression

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- The data size before reduction, data size after reduction, and GC remaining size can be displayed only if the target device is an ETERNUS DX200 S5 or an ETERNUS AF250 S3. Note that to display the GC remaining size, the firmware version of the target device must be V11L40 or later.

- The displayed content for the Data reduction rate, Data size before reduction, Data size after reduction, and GC remaining size is as follows.

Displayed Item	Displayed Content
Data reduction rate	Reduction rate of the data due to Deduplication or Compression
Data size before reduction	Total data size before compressing a volume enabled with Compression
Data size after reduction	Total data size after compressing a volume enabled with Compression
GC remaining size	Size of a Thin Provisioning Pool enabled with Deduplication or Compression temporarily used by the storage device for Deduplication or Compression

When you create a Thin Provisioning Pool, Deduplication or Compression of Thin Provisioning Pool can be enabled.
When you enable Deduplication or Compression of a Thin Provisioning Pool in the ETERNUS DX200 S5 or the ETERNUS AF250 S3, a Container Volume is automatically created. When you enable Deduplication or Compression of a Thin Provisioning Pool in a storage device other than the ETERNUS DX200 S5 and the ETERNUS AF250 S3, a Container Volume and a Block Map Volume are automatically created.
In addition, information related to the Thin Provisioning is updated every hour.

- Updated Thin Provisioning Pool information

  As shown in the following table, updated information differs according to the storage device and firmware version.

Storage Devices	Firmware Version	Updated Information				
		Used Capacity	Data Reduction Rate	Data Size Before Reduction	Data Size After Reduction	GC Remaining Size
ETERNUS DX200 S5 ETERNUS AF250 S3	V11L40 or later	Y	Y	Y	Y	Y
	Earlier than V11L40	Y	Y	Y	Y	N
Others	-	N	Y	N	N	N

  Y: Updated, N: Not Updated

- Updated Thin Provisioning volume information

  The used capacity and original data size are updated only if the firmware version of the ETERNUS DX200 S5 and ETERNUS AF250 S3 is V11L40 or later.

If you delete the Thin Provisioning Pool for which Deduplication or Compression is enabled, after disabling Deduplication and Compression, delete the Thin Provisioning Pool.

Refer to the following storage device manuals for information on the Deduplication/Compression of Thin Provisioning Pool.

Used Storage Device Name	Manual Name
ETERNUS DX200 S5/S4/S3 ETERNUS AF250 S3/S2 ETERNUS AF250 ETERNUS DX200F	ETERNUS Web GUI User's Guide (Settings)

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The methods for creating Thin Provisioning Pools are automatic creation (recommended) and manual creation. For automatic creation, select "Automatic" in the **Create Mode** field on the **Create Thin Provisioning Pool** screen. For manual creation, select "Manual".

- For the ETERNUS DX200 S5, ETERNUS AF250 S3

  When you create a Thin Provisioning Pool automatically or manually, Compression can be set to "Enable".
  For automatic creation, a configuration suitable to Compression is automatically created based on the specified disk type, reliability, and Thin Provisioning Pool total capacity.
  For manual creation, a RAID group configuration can be selected.

- For storage devices other than above

  When you create a Thin Provisioning Pool automatically, Deduplication/Compression can be set to "Enable". For automatic creation, a configuration suitable to Deduplication/Compression is automatically created based on the specified disk type, reliability, and Thin Provisioning Pool total capacity. Therefore, before the automatic creation, check that the required number of assigned disks in which two or more RAID groups can be created exist. For the required number of disks to create RAID groups, refer to the manuals of the target ETERNUS Disk storage system.

  Deduplication/Compression can be used even if a Thin Provisioning Pool is created manually, but advanced knowledge is required. For manual creation, a RAID group configuration can be selected. To enable Deduplication/Compression for manual creation, after creating a Thin Provisioning Pool by setting the chunk size to 21 MB, enable Deduplication/Compression. To set the chunk size to 21 MB, check the **Deduplication/Compression Ready** checkbox of the **Chunk Size** field on the **Create Thin Provisioning Pool** screen.

In the **Create Thin Provisioning Pool** screen, if you select "Automatic" in the **Create Mode** field, the maximum capacity that can be created for the Thin Provisioning Pool is displayed in the format "(MAX: *maximumCapacityToBeCreated*)" in the **Thin Provisioning Pool Total Capacity** field.
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- If the firmware version number of the ETERNUS DX80 S2/DX90 S2 is less than V10L20, a total capacity of Thin Provisioning Pool exceeding 2 TB cannot properly be displayed. When using a Thin Provisioning Pool exceeding 2 TB, the firmware version number must be V10L20 or later.

- For automatic creation of the Thin Provisioning Pool with Deduplication or Compression enabled, even if a Thin Provisioning Pool is successfully created, Deduplication or Compression may fail to be enabled. If it fails to be enabled, take action according to the corresponding message.

- If the status of Deduplication/Compression is "Error", a hyphen (-) is displayed in the **Data Reduction Rate**, **Data Size Before Reduction**, and **Data Size After Reduction** fields. If an automatic update occurs after recovering from the "Error" state, the hyphens (-) change to a numeric value. If you want to update the display manually before the automatic update, perform the **Reload Conf.** operation for the target ETERNUS Disk storage system.
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3.1.6 Operations Related to Component Information for Storage Device

Express can execute operations related to component information for the disk storage system.

With Web Console, select the disk storage system, and then select the process on the Action pane.

The executable operations are as follows:

- Display the entire device information

- Display the Controller Enclosure information

- Display the Drive Enclosure Information

- Display the port information

- Display the disk information

- Register the Global Hot Spare disk

- Register the Dedicated Hot Spare disk

- Release the Hot Spare disk

3.1.7　Operations Related to Connectivity for Storage Device

Express can execute operations related to connectivity for the disk storage system.

With Web Console, select the disk storage system, and then select the process on the Action pane.

The executable operations are as follows:

- Display the storage port list

- Display the FC port information, iSCSI port information, SAS port information and FCoE port information

- Change the FC port settings, iSCSI port settings and SAS port settings

- Display the number of hosts for port type

- Add the FC host, iSCSI host and SAS host

- Display the Affinity/LUN group list

- Create, delete and change the affinity/LUN group

- Display the Host Affinity list

- Create and delete the Host Affinity

📌 Note
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- For the ETERNUS AF150 S3, AF250 S3/AF250 S2/AF250 and the ETERNUS DX200F, SAS port configuration cannot be changed and SAS host cannot be added.

- On Web Console, the transfer rate of iSCSI-RA port cannot be changed.
  Change the transfer rate on ETERNUS Web GUI.

- Multiple VLAN functions of iSCSI port are not supported.
  On Web Console, a basic IP address (#0) can be set and viewed. However, expanded virtual IP addresses (#1 through #15) cannot be set and viewed. Set and view the configuration information for expanded virtual IP addresses on ETERNUS Web GUI.

- To delete all the volumes from an affinity group used for Veeam, use ETERNUS Web GUI.

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3.1.8　Operations for System Management

Express can execute operations related to the disk storage system management.

With Web Console, select the disk storage system, and then select the process on the Action pane.

The executable operations are as follows:

- Display the license

- Register and delete the license

- Display the Eco-mode

- Configure the Eco-mode

- Enable, change, and disable the encryption mode

🅿 Point
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When the disk storage system supports the encryption mode AES-256, you can select the following encryption modes when operating to enable or change the encryption:

- Fujitsu Original Encryption

- AES-128

- AES-256

When the disk storage system does not support the encryption mode AES-256, Fujitsu Original Encryption is set when operating to enable the encryption. You cannot change to other encryption mode than Fujitsu Original Encryption.
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📝 Note
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Eco-mode is not configurable for the ETERNUS AF150 S3, AF250 S3/AF250 S2/AF250 and the ETERNUS DX200F.
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3.1.9 Operations Related to Advanced Copy

Express can execute operations related to the Advanced Copy for the disk storage system.

With Web Console, select the disk storage system, and then select the process on the Action pane.

The executable operations are as follows:

- Configure the copy table size for Advanced Copy

- Configure the connection type for ETERNUS Disk storage system

- Display the copy group

- Create and delete the copy group

- Display the copy pair

- Create, add and delete the copy pair

- Perform the Advanced Copy

- Display the copy session

- Display the Snap Data Pool information

- Change the Snap Data Pool policy

3.2 Performance Management

3.2.1 Overview

This software supports performance management for ETERNUS Disk storage systems. The performance management enables users to get details about the operation and load statuses of devices.

Additionally, by knowing the number of active disks, it is possible to verify the Eco-mode status of the ETERNUS Disk storage system.

📝 Note
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- Do not execute performance monitoring for one ETERNUS Disk storage system from more than one server (*1) at the same time.

  *1: Any of Management Servers of ETERNUS SF Express, Softek Storage Cruiser, ETERNUS SF Storage Cruiser and Systemwalker Resource Coordinator.

- The performance management always starts up when the Management Server starts up. For devices in which performance management settings have been configured, performance information collection starts in the background. Accordingly, performance information is collected regardless of whether Web Console is started or not. To stop performance information collection, execute performance management stop processing.

3.2.1.1   Performance Information Types

The following information can be managed.

	Performance Information	Unit
Logical Volume	Read/Write count	IOPS
RAID Group	Read/Write data transfer rate	MB/s
	Read/Write response time	msec
	Read/Pre-fetch/Write cache hit rate	%
NAS Volume (*1)	Read/Write throughput	MB/s
Disk drive	Disk busy rate	%
CM	Load (CPU usage) rate	%
	Copy remaining amount	GB
NAS System (*1)	CPU usage rate	%
	Number of CIFS/NFS processes	ops/s
CM Port (*2)	Read/Write count	IOPS
	Read/Write data transfer rate	MB/s
Device	Number of active disks	Disk
	Power consumption	W
	Temperature	C
Deduplication/Compression Volume (*3)	Data Compression Rate	%
	Unaligned I/O Rate (*4)	%

*1: For the ETERNUS DX100 S3/DX200 S3, this information can be displayed only if the NAS option is applied and the firmware version is V10L21-0000 or later. For all other models, this information can be displayed only if the NAS option is applied.
*2: The performance information of the FC-Initiator ports can be displayed only for the ETERNUS DX60 S5/DX100 S5/DX200 S5 or the ETERNUS AF150 S3/AF250 S3, or for an ETERNUS DX60 S4/DX100 S4/DX200 S4, an ETERNUS DX60 S3/DX100 S3/DX200 S3, an ETERNUS AF250 S2/AF250, or an ETERNUS DX200F that has a firmware version of V10L80 or later.
*3: This information can be displayed only for an ETERNUS DX200 S5 or an ETERNUS AF250 S3 that has Deduplication/Compression enabled.
*4: If the firmware version is V11L40 or later, the performance information for Read and Write is displayed. If the firmware version is earlier than V11L40, the performance information for Write is displayed.

🛈 Note

- If there is a difference between the internal clocks of the Management Server and the target device, a time lag may occur in the performance graph.
  To prevent this phenomenon, it is recommended to setup NTP to stay in sync with the Management Server and the target device.

- If restarting a target device during performance management, the device may fail to acquire the correct performance information after the restart.
  We recommend to stop the performance management before restarting a target device.

- Support for Logical Volume and RAID Group performance information varies according to the volume type and the ETERNUS Disk storage system model. However, we cannot guarantee the values for the RAID Group performance information including SDV.

Storage Devices	Logical Volume, RAID Group		
	Standard Volume	Thin Provisioning Volume, Thin Provisioning Pool	Snap Data Volume, Snap Data Pool Volume
ETERNUS DX60 S5/S4/S3 ETERNUS DX100 S5/S4/S3 ETERNUS DX200 S5/S4/S3	A	A	N/A
ETERNUS DX60 S2	A	N/A	N/A
ETERNUS DX80 S2 ETERNUS DX90 S2	A	A	N/A
ETERNUS AF150 S3 ETERNUS AF250 S3/S2 ETERNUS AF250 ETERNUS DX200F	A	A	N/A

(A=supported, N/A=not supported)

- Performance information of SAS ports and NAS ports, which are ETERNUS Disk storage system host interfaces, is not supported.

- Performance management cannot be done for ETERNUS Disk storage systems which do not have Logical Volume (LUN).

- RDB performance information cannot be displayed in environments that use the REC Disk Buffered Consistency function.

3.2.1.2   Performance Graph Window Types

It is possible to display the following graph.

One-day Graph window

Based on the mean values for 10-minute periods, a line graph for a one-day period is displayed.

Information

- Following performance values are displayed as they are obtained from the device (not their mean values):

    - CM Copy remaining amount

    - Number of active disks

    - Power consumption

    - Temperature

- If the summer time functionality of the operating system is enabled, a part of the graph that is supposed to show the data around the switch to summer time may not be displayed correctly.

- Each performance graph may not be able to be displayed at every 10 minutes depending on the LAN traffic condition or network environment (for example, the Management Server and target device of the performance monitoring exist in the different subnets).

3.2.2   Flow of Performance Management

When a user gives an instruction for performance management of a target device using Web Console, the performance management unit for this product saves the device performance data for each device, and stores them as performance data to the Management Server. This performance data is displayed on a graph.

3.2.2.1 Checking Disk Space on Management Server

To conduct performance management, sufficient disk space is required on the Management Server for performance data storage. Make sure that sufficient disk space is ensured referring to the *Installation and Setup Guide*.

3.2.2.2 Instruction for Performance Management

When performing performance management, configure and start the performance management by using Web Console.
Enter the range of target Logical Volume (LUN_V) that is obtained for performance information in Web Console.
Specifying the range of Logical Volume (LUN_V) reduces the effects on the disk area stored performance data and the loads resulting from obtaining performance information. Refer to "Start/Change Settings of/Stop Performance Monitoring" in the *Web Console Guide* for details on the operation procedures.

Operation varies with the specification of the scope of monitoring volumes. Refer to "Instruction for Performance Management" in the *Storage Cruiser Operation Guide* for details.

📖 Information
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Since performance information is obtained internally in units of 64 for Logical Volume, performance information in the neighboring area of the Logical Volume setting is also obtained.
For example, if a range of 70 to 80 is set for Logical Volume (LUN_V) on the screen, the information of Logical Volume between 64 and 127 is obtained internally.
At this time, after instructing it to start the performance management, the monitoring range which is displayed on Web Console is not the value specified at the start time but the value converted to units of 64.

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When starting performance management, "Monitoring" is displayed on the "Performance Monitoring Status".

Refer to "Display Performance Monitoring Status" in the *Web Console Guide* for details on the operation procedures.

The following table shows the value of "Performance Monitoring Status", the corresponding status, and the appropriate actions.

Value of "Performance Monitoring Status"	Status	Appropriate Action
Monitoring	Performance is being monitored. (Normal)	The action is no required.
Recovering	Performance monitoring is being recovered (e.g. device time-out).	The Express's manager cannot communicate with a disk storage system. Check the network status and the disk storage status. Log off, when ETERNUS Web GUI is in a login state.
Error	Performance monitoring error (e.g. device time-out, writing to the performance information file failed.)	The Express's manager cannot communicate with a disk storage system. Check the network status and the disk storage system status. Log off, when ETERNUS Web GUI is in a login state. In addition, check the write permission to the file and the capacity of the file system. Then, stop performance monitoring and restart it.
Stop	Performance monitoring has stopped. (Normal)	The action is no required.

However, the value of "Performance Monitoring Status" may differ in present value. Reload the setting for ETERNUS Disk storage system and make sure the system is up-to-date.

Refer to "Reload ETERNUS Disk Storage System Configuration Information" in the *Web Console Guide* for details on the operation procedures.

3.2.2.3 Setting Monitoring Intervals

The performance information is acquired from ETERNUS Disk storage system at 60 second (fixed) intervals.

Information

In LAN traffic or cross-subnet (where there is a gateway between the performance monitoring target device and the Management Server) situations, it may not be possible to obtain the performance information inside the monitoring interval that was set. Change the monitoring interval when you cannot acquire performance information on each monitoring interval.

Since the performance management unit is started as a daemon of the Management Server, the unit continues obtaining performance information while the Management Server is active, without starting Web Console.

The logical configuration of the storage device is recognized, and the obtaining of performance information starts. At the start of obtaining performance information of the selected storage system, an amount of time (tens of seconds to several minutes) is spent to obtain the logical configuration before any performance information is actually obtained.

3.2.2.4 Displaying Performance Information of Selected Device

Confirm by displaying the graph on Web Console. In addition, the performance information can be output to the CSV format file by using the "storageadm perfdata" command.

Refer to "Display Performance Information Graph" and "Export Performance Information" in the *Web Console Guide* for details on the operation procedures for Web Console.

3.2.2.5 Displaying Storage Performance Information

3.2.2.5.1 Displaying Logical Volume and RAID Group Performance Information

Select the number of Logical Volume or RAID Group whose performance information you want to display in graph.

Note

The ETERNUS Disk storage system performance information for SDVs is not supported. The value for the performance information about the RAID Group containing a SDV also cannot be guaranteed.

3.2.2.5.2 Displaying Disk (Physical Drive) Performance Information

Select the number of the disk whose performance information you want to display in graph.

3.2.2.5.3 Displaying CM Performance Information

Select the CM or CM CPU whose performance information you want to display in graph.

3.2.2.5.4 Displaying CM Port Performance Information

Select the CM Port from a list of ports whose performance information you want to display in graph.

3.2.2.5.5 Displaying Number of Active Disks, Power Consumption, and Temperature Performance Information

Select the performance information you want to display in graph.

3.2.2.5.6 Displaying Performance Information of NAS Volume and NAS System

Select the performance information you want to display and display the graph.

Note

If the ETERNUS Disk storage system does not support NAS functionality, performance information of NAS volumes and NAS systems is not displayed. If NAS functionality is supported, it is necessary to perform "Required Setup Configuration" in advance. For the ETERNUS DX100 S3/DX200 S3, it is also necessary to update to supported firmware (V10L21-0000 or later). In order to display performance

information, after performing pre-configuration, it is necessary to update configuration information and restart performance monitoring.

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3.2.2.6   Examples of Use of Performance Management

If an I/O delay from the server node to a storage system occurs, the user can check for the cause in the storage system by using the methods described below. These are only examples, so all causes of I/O delays cannot be determined by use of these methods.

1. Identify the time when the I/O processing delay occurred and the access path where the delay occurred.

2. Use this software to check the Affinity Group number and Logical Volume number of the ETERNUS Disk storage system defined in the target access path.

3. Using performance management, display and check the target Logical Volume performance values.

4. If a response of the Logical Volume unit takes a long time, check RAID Group performance. If a response of RAID Group also takes a long time, find another Logical Volume belonging to RAID Group, and find the LUNs to which the Logical Volume is allocated. Check the I/O statuses of these Logical Volumes, and check for a heavy load on RAID Group. If there is a heavy load, move the appropriate Logical Volume to another RAID Group, or take other appropriate action.

3.2.2.7   Instruction for Stopping Performance Management

Execute performance management processing on Web Console.

Refer to "Start/Change Settings of/Stop Performance Monitoring" in the *Web Console Guide* for details on the operation procedures.

3.2.2.8   Updating Configuration Information

Device configuration information is independently maintained in the performance management.
If you change the device configuration or if the configuration for a device that has executed performance management has been changed, refer to "Updating Configuration Information" in the *Storage Cruiser Operation Guide* and update the device configuration information.

3.3 Detecting Trouble

The following is a description of the procedure to be taken if trouble should occur during Disk storage system operations.

Trouble occurrence is detected in the following way:

- An E-mail of error or warning level trouble occurrence is sent from Express.

- Trouble occurrence reported from a user.

The following is a flow from trouble detection to its response.

Figure 3.1 Flow from Trouble Detection to Its Response
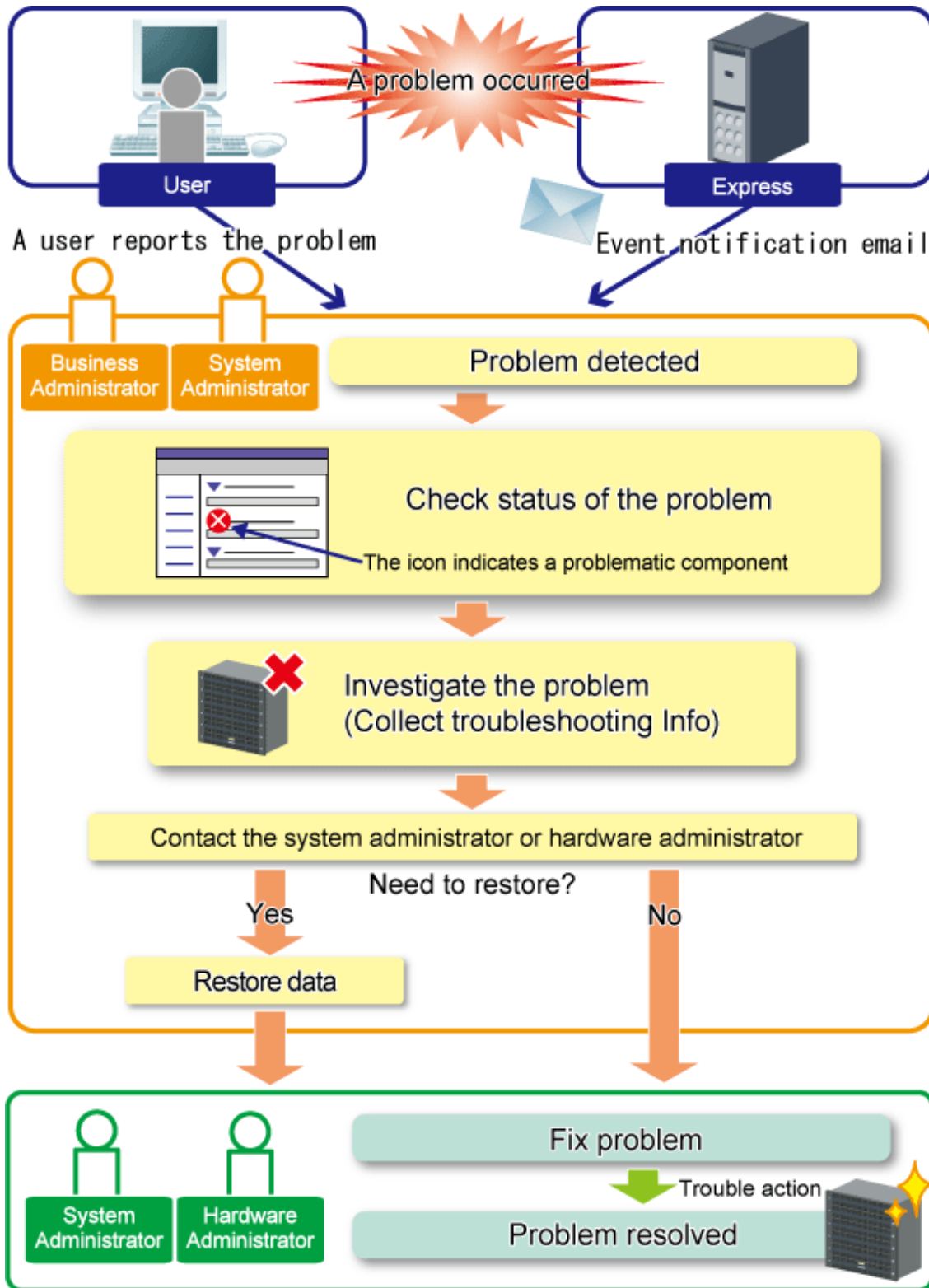
3.3.1   Identifying Trouble Condition

Web Console can identify the trouble condition.
Since Web Console displays the status of each device with icons or messages, it is easy to identify the trouble condition.

3.3.1.1 Using Dashboard

Dashboard provides an at-a-glance view of the status of the managed devices and the status of all the logs related to the ETERNUS SF system. By clicking a link in the panel, detailed information can be shown such as a list of components that are in an error state and a list of related servers.

Figure 3.2 Dashboard
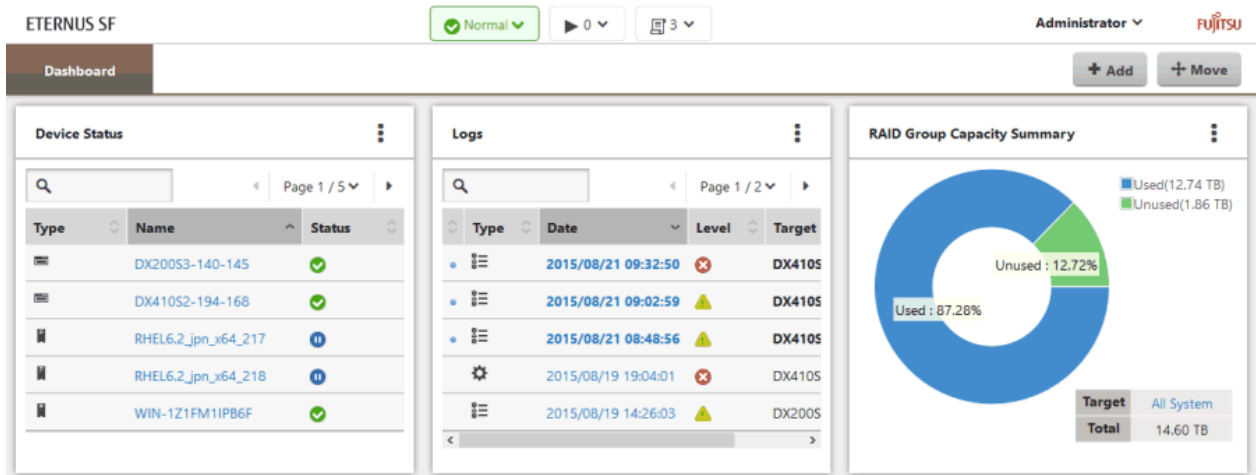
If trouble occurred, the total status in the Menu area becomes "Error" or "Warning". Since this status may affect the operation, check the cause and troubleshoot the trouble.

To check the cause of the trouble, use the Device Status panel or the Log panel.
To add the Device Status panel and the Log panel, refer to "Display Device Status" and "Display Log List" in the *Web Console Guide*.

If trouble occurs, the "Error" (❌) or "Warning" (⚠️) icon is displayed on each panel for the target device.

Clicking the target device name on the panel displays the detail dialog box.

Figure 3.3 Detail Dialog Box
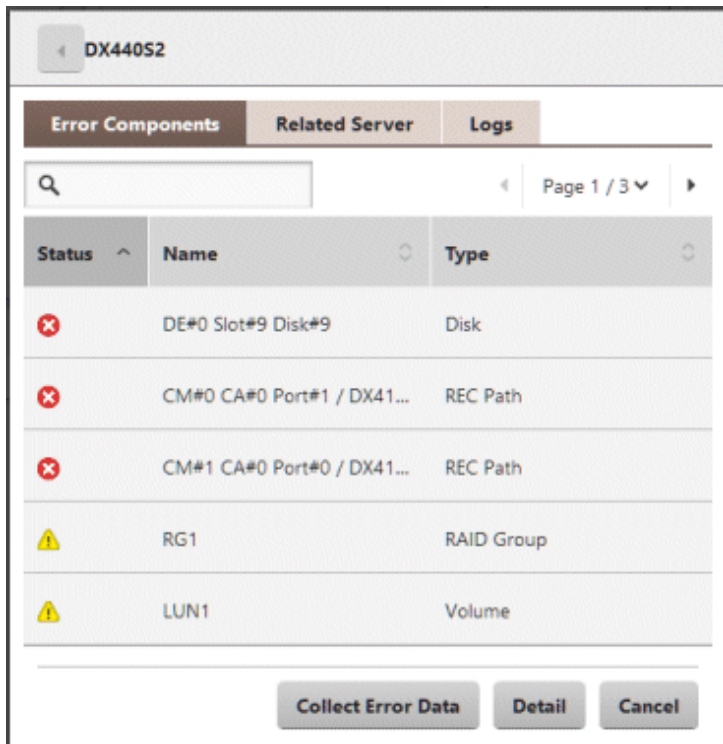
The detail dialog box can be referenced to gather information such as the trouble and the related event logs.

By clicking a date from the **Logs** tab on the detail dialog box, you can refer to the details about the various logs.

![Note icon] **Note**
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For devices that do not support automatic updates of the device component status, this product does not acquire the device component status automatically from the device. For this reason, if you receive an Error or Warning level event, click **Collect Error Data** in the detail dialog box to update the component status manually.
For devices that support automatic updates of the device component status, you do not need to update the component status manually. For devices that support automatic updates of the device component status, refer to "Monitoring Device Component Status" in the *Storage Cruiser Operation Guide*.

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3.3.1.2 Using Detail View

Confirm the following items:

- Overview screen on the **Main** Tab

    On this screen, you can grasp the overall status of the managed hardware components and the event log status at a glance.

Figure 3.4 Overview Screen on Main Tab

When trouble occurs, number of trouble-occurred devices or events is counted up in the field which "Error (![Error icon])" or "Warning (![Warning icon])" icon is displayed.
If the value in the field is counted up, it is highly possible that business operations are affected. Therefore, identify the cause of the trouble to determine how to correct it.

By clicking the value in the field, the management screen is displayed. It is possible to check the detailed status in the management screen.

- Event log

  When trouble occurs in the disk storage system, the Management Server receives an event notification by SNMP Trap.
  The notified event can be verified in the event log.
  Refer to "Display Events" in the *Web Console Guide* for details on displaying the event log.

📝 Note

For devices that support automatic updates of the device component status, this product acquires the device component status automatically from the device. For this reason, the device information is displayed automatically. For devices that support automatic updates of the device component status, refer to "Monitoring Device Component Status" in the *Storage Cruiser Operation Guide*.

For a device that does not support automatic update of device component status, this product does not acquire device component status automatically from the device. For this reason, when an Error or Warning level event is reported or when the status of the storage system is recovered, update the corresponding storage system element status manually.
The device status of the device in which a trouble is occurred is updated automatically.
Refer to "Reload ETERNUS Disk Storage System Configuration Information" in the *Web Console Guide* for details on the operation procedures.

🅿 Point

In the following cases, the status icon is updated.

- When there is a higher error event notification from the disk storage system.

- When the configuration information is reloaded using Web Console.

3.3.2 Collecting Troubleshooting Information

There are other methods to analyze the effects of the trouble besides "3.3.1 Identifying Trouble Condition". Use those methods as required.
In addition, for hardware troubles, contact the hardware administrator when needed.

- Trouble information collection

  The trouble information can be collect using either the "esfsnap" command or Web Console.
  Refer to "Collecting Troubleshooting Information" in the *Web Console Guide* for using Web Console.

- Displaying operation history

  The Web Console operation (contents, execution status and results) history can be displayed.
  Refer to "Display Operation History" in the *Web Console Guide* for details.

- Displaying login/logout history

  The Web Console user login and logout history can be displayed.
  Refer to "Display Login/Logout History" in the *Web Console Guide* for details.

3.3.3 Trouble Response

After identifying the trouble condition as shown in "3.3.1 Identifying Trouble Condition" or "Collecting the Troubleshooting Information", contact a system administrator or a hardware administrator, referring to the message and trouble information.

After resolving the trouble, reload the configuration information to update information. Refer to "Reload ETERNUS Disk Storage System Configuration Information" in the *Web Console Guide* for details on the operation procedures.

3.4 Executing Advanced Copy

This section describes the procedures for executing Advanced Copy.

Express can execute snapshot copy (SnapOPC+). For information on the maximum number of copy sessions that can be executed, refer to "Data Copy" in "Express Features" of the *Overview*.

3.4.1 Connection Type Settings

Set up the type of the connection with ETERNUS Disk storage system used by Copy command via SAN or Copy command via LAN.

See

Refer to "Agent-less Operating Model" in "Overview of AdvancedCopy Manager" of the *Overview* for details about Copy command via SAN and Copy command via LAN.

There are two connection types.

Connection Type	Explanation
Access through volumes	If this type is selected the copy command is issued through the SAN interface.
Access through network	If this type of selected the copy command is issued though the LAN interface.

Refer to "Configure Connection Type for ETERNUS Disk Storage System" in the *Web Console Guide* for details on the operation procedures.

3.4.2 Access Volume Settings

In Express, the Management Server sends a command to ETERNUS Disk storage system to perform an Advanced Copy function. When using the Copy command via SAN method, a logical volume that can be accessed from the Management Server is needed in ETERNUS Disk storage system. In this manual, this logical volume is called "access volume".

One logical volume of ETERNUS Disk storage system must be assigned to Management Server as the access volume.

Point

When registering ETERNUS Disk storage system to be used the Copy command via LAN method, no access volume is needed.

For Windows

Perform the following procedure to set an access volume on the Management Server:

1. Allocate the logical volume from ETERNUS Disk storage system that is to be used as the access volume.
   The allocated volume is recognized as a disk.

2. Initialize the disk as MBR disk format (DOS format) or GPT disk format.

3. Create a partition and assign the drive letter.

For Linux

Perform the following procedure to set an access volume on the Management Server:

1. Allocate the logical volume from ETERNUS Disk storage system that is to be used as the access volume.
   The allocated volume is recognized as a disk.

2. Initialize the disk as MBR disk format (DOS format) or GPT disk format.

3.4.3 Copy Table Size Settings

Configure the copy table size and resolution required to use Advanced Copy. It is necessary to calculate the value of these parameters on the basis of the copy capacity and the number of sessions (volumes) that are performed simultaneously. Refer to the ETERNUS Disk storage system manuals for about the calculation method.

- Copy table size

    Set the size of the copy table assigned in ETERNUS Disk storage system. The copy table is the dedicated memory area required to manage Advanced Copy.

- Resolution

    Set the resolution of the copy table (data size represented each bit). Specify the value as small as possible.

Refer to "Configure Copy Table Size for Advanced Copy" in the *Web Console Guide* for details on the operation procedures.

3.4.4   Creating Copy Group

Create copy groups. A copy group is a group of copy pairs, consisting of a copy source logical volume and a copy destination logical volume.

When creating copy groups, specify which type of Advanced Copy and which ETERNUS Disk storage system to use.

Refer to "Create/Display/Delete Copy Group" in the *Web Console Guide* for details on the operation procedures.

3.4.5   Creating Copy Pair

Before executing Advanced Copy, create a pair consisting of a copy source volume and a copy destination volume.

Refer to "Create Copy Pair" in the *Web Console Guide* for details on the operation procedures.

3.4.6   Executing Snapshot Copy

This is a copy method to execute ETERNUS Disk storage system SnapOPC+.

SnapOPC+ uses the Copy-On-Write method to create a pre-update copy source volume.

Refer to "Perform Advanced Copy" in the *Web Console Guide* for details on the operation procedures.

SnapOPC+ can save pre-update data on the copy source volume on a per snap generation (unit of volume replication) basis.

SnapOPC+ is designed in view of its mechanism and features to be used as backups for recovery from software failures such as an operational error or a software error.
If a copy source volume becomes inaccessible due to any hardware failure, SnapOPC+ session(s) fail making it impossible to read the data on the copy destination volume.

The snapshot copy (SnapOPC+) is effectively available for:

- Backups of temporary files used for cascade copy to alternate media such as tape.

- Backups of file servers and other data less frequently updated.

Figure 3.5 Snapshot Copy (SnapOPC+) Diagram
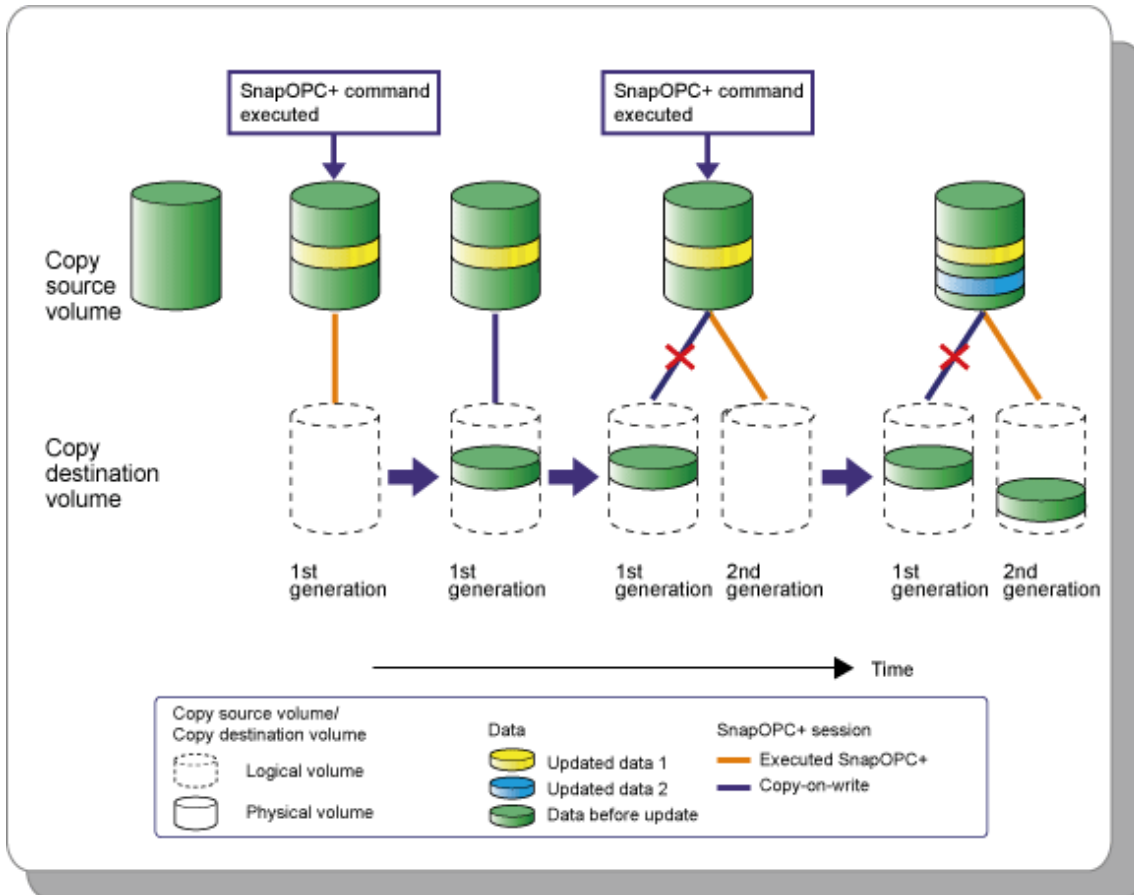
3.4.7   Checking Copy Status

This section describes how to check the status of Advanced Copy.

Refer to "Display/Forcible Suspend/Forcible Cancel Copy Session" in the *Web Console Guide* for details on the operation procedures.

📝 Note

If the copy status is "???" or "Unknown", an access volume may be wrong. Check the access volume with "acarray detail (ETERNUS Disk Storage System Detail Information Display Command)" in the *AdvancedCopy Manager Operation Guide for Copy Control Module*.

If the access volume is wrong, refer to "3.4.2 Access Volume Settings" to set a correct access volume.

3.4.8   Command Line Operation

This section describes how to execute Advanced Copy functions with command line interface.

📚 See

Refer to "Command References" in the *AdvancedCopy Manager Operation Guide for Copy Control Module* for details on the commands.

Registering ETERNUS Disk Storage System

Execute the "acarray add" command to register an ETERNUS Disk storage system.

Set up the type of the connection with ETERNUS Disk storage system at the same time.

 Note

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For ETERNUS Disk storage system name specified with the -a option of the "acarray add" command, specify an ETERNUS Disk storage system name registered to Express.
If a different name is registered, Advance Copy using Web Console is not available.

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Creating Copy Groups

Execute the "acgroup create" command to create a copy group.

Adding Copy Pairs

Execute the "acpair add" command to add a copy pair to a copy group.

Executing Copy

Execute the copy start command provided for snapshot copy (SnapOPC+) to initiate the copy operation.

 Note

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If the copy status or SID is "???" or "Unknown", an access volume may be wrong. Check the access volume with the "acarray detail" command.
If the access volume is wrong, refer to "3.4.2 Access Volume Settings" to set a correct access volume.

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3.5 Thin Provisioning Management

This product can manage storage capacity virtualization operations that use the Thin Provisioning function of the ETERNUS Disk storage system. The functions below are provided.

Threshold Monitoring

This function monitors the threshold values for the Thin Provisioning Pool capacity used. It can also change the threshold values.

Capacity Management

This function displays the changes in capacity used for the Thin Provisioning Pool graphically.

3.5.1 Threshold Monitoring

This function monitors the threshold values for the Thin Provisioning Pool capacity used.

Threshold Values and Threshold Monitoring Status

The values of the "Caution threshold value" and the "Warning threshold value" set for each Thin Provisioning Pool and the Threshold monitoring status are displayed. The "Caution threshold value" and the "Warning threshold value" are prepared at the storage device, and are the threshold values for Thin Provisioning Pool capacity used.

The threshold monitoring status is displayed with the following icons and character strings.

Threshold Monitoring Status	Meaning
Normal	The usage rate of the Thin Provisioning Pool is below the Caution threshold value.
Caution	The usage rate of the Thin Provisioning Pool has reached or exceeded the Caution threshold value but is below the Warning threshold value.
Warning	The usage rate of the Thin Provisioning Pool has reached or exceeded the Warning threshold value.

Threshold Value Settings

The initial values for the "Caution threshold value" and the "Warning threshold value" are set by the storage device when a Thin Provisioning Pool is created. If required, change the settings for the capacity threshold values.

Procedure for Setting Threshold Values

Set the threshold values with Web Console.

Action to Take When Threshold Values Are Exceeded

If threshold values are exceeded, then follow the procedures below:

- Detection of status change

  When a threshold value is exceeded, the product displays an SNMP Trap in the event log, which notifies the change in Thin Provisioning Pool status at the storage device.

- Updating to the latest status

  For devices that do not support automatic updates of the device component status, after checking the displayed event, perform the **Reload Conf.** operation for the target storage device.
  For devices that support automatic updates of the device component status, you do not need to perform the **Reload Conf.** operation. For devices that support automatic updates of the device component status, refer to "Monitoring Device Component Status" in the *Storage Cruiser Operation Guide*.

- Checking the status of the Thin Provisioning Pool

  Start the Thin Provisioning Pool monitor window and check the Thin Provisioning Pool status. Extend disks or take other action in accordance with the exceeded threshold values.

 See
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If the SNMP Trap that notifies of changes in the Thin Provisioning Pool status is not received due to packet loss or other reason, then the product detects the change by polling the Thin Provisioning Pool information of the storage device. Since the polling interval is one hour, the time from status change to detection is within one hour. The polling intervals can be customized. Refer to "Polling Service Setting File" in the *Storage Cruiser Operation Guide* for details.
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Even if capacity reaches "Caution threshold value" which is set for each LogicalVolume, SNMP Trap is not sent. "Caution threshold value" for LogicalVolume is a threshold value for unallocated capacity of LogicalVolume which is at the storage device.
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Capacity Depletion Monitoring of Container Volumes

If the capacity of the Container Volumes in Thin Provisioning Pools enabled with Deduplication or Compression is depleted in the ETERNUS DX200 S5 and ETERNUS AF250 S3 with a firmware version V11L40 or later, this product displays "Caution" for the threshold monitoring status of the Thin Provisioning Pool and the threshold monitoring status of the Container Volume.

3.5.2 Capacity Management

This function displays the Thin Provisioning Pool Capacity and its changes in the capacity used graphically to grasp the changes in the capacity used for the Thin Provisioning Pool. This enables users to grasp the period to expand the size of the physical disk for the Thin Provisioning Pool, or to review the threshold setting according to the situation.

The following information can also be displayed in a graph using the Dashboard. Refer to "Operations for Capacity" in the *Web Console Guide* for details.

- Thin Provisioning Pool capacity

- TPV capacity

- NAS file system capacity

Information of the capacity and used capacity for Thin Provisioning Pool, TPV, and NAS file system that are shown in the graph are collected everyday at 1:00:00.
You can change the time to obtain the information by using a polling service setting file. Refer to "Polling Service Setting File" in the *Storage Cruiser Operation Guide* for details.
. . . .

3.5.2.1 Capacity Graph Window Types

The following graph can be displayed.

Items that can be checked with Dashboard

Capacity ranking (List format)	Displays a table of the used capacity or free space of a specified resource in descending order. In addition, displays a mini graph within the table of the capacity changes for the latest month.
Capacity ranking (Chart format)	Displays a chart of the changes of the used capacity or free space at the same time with a five line graph in descending order.
Capacity summary display	Displays a circle graph of the total used capacity and total free space of the whole system.

Items that can be checked with Detail View

One month Graph	Displays a line graph of the data that was collected one month prior to the current day (or 31 days worth). A plot point is displayed (for each day | by the day).

For the Dashboard operation procedure, refer to "Operations for Capacity" in the *Web Console Guide*, and for the Detail View operation procedure, refer to "Display Capacity Graph of Thin Provisioning Pool" in the same manual.

3.6 NAS Management

This section explains the following items necessary in order to perform NAS operation of the ETERNUS Disk storage system with this product.

- Overview of Functions

- Required Setup Configuration

- Installation Steps

- Operation Method

 Note
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- This function cannot be used for the ETERNUS AF150 S3, AF250 S3/AF250 S2/AF250, and the ETERNUS DX200F.

- Web Console cannot be used to operate the ETERNUS DX100 S5/DX200 S5 shared folders or NAS interfaces. Use ETERNUS Web GUI of each device instead.

- Refer to the ETERNUS Disk storage system manuals for notes of NAS operation.

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3.6.1 Overview of Functions

3.6.1.1 About NAS Management

3.6.1.1.1 Basic System Configuration

For a basic system configuration to perform NAS operation of the ETERNUS Disk storage system, refer to "NAS Management" in "Function Overview of Express" of the *Overview*.

3.6.1.1.2 Support Features

In order to perform NAS operation of the ETERNUS Disk storage system, this product is provided with the following features:

- Easy Installation of NAS File System Using Wizard
- Display of Configuration Information and Fault Monitoring
- Block Level Capacity Monitoring
- Performance Management
- Backup/Restoration of NAS Volume
- Automatic Snapshot Collection of NAS Volume
- Quantity Consumed Upper Limit Management and Monitoring (Quota Management)

Easy Installation of NAS File System Using Wizard

The "creating of a shared folder" and the "creating of a NAS interface" which are necessary when installing a NAS file system can be configured easily by using a wizard.

Display of Configuration Information and Fault Monitoring

The configuration information resources being used for ETERNUS Disk Storage system NAS can be confirmed with Web Console. In addition, when a failure occurs, the details about the failure are displayed in the event log of Web Console.

Block Level Capacity Monitoring

Capacity monitoring of NAS file system in ETERNUS Disk storage system is implemented at a level similar to that for block volumes.

Performance Management

This enables performance monitoring of resources with the ETERNUS Disk storage system below.

- NAS volume
- NAS system

Information
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- The performance monitoring and threshold monitoring functions cannot be used for NAS port.
- The threshold monitoring function cannot be used for NAS volume and NAS system.
. . . .

Backup/Restoration of NAS Volume

Backup and restoration of a NAS volume utilizes QuickOPC and a NAS backup volume. The use of the NAS backup volume provides protection against loss or corruption of the active NAS volume. In addition, the NAS backup volume can be accessed Read-Only for file level recovery.

Automatic Snapshot Collection of NAS Volume

This is a function that follows the specified schedule and automatically collects snapshots. The capture of the NAS volume snapshot is achieved using SnapOPC+. The NAS volume snapshot for the specified generation can be stored, and files and folders from the snapshot can be recovered without administrators.

Quantity Consumed Upper Limit Management and Monitoring (Quota Management)

This is a function for managing the upper limit of the quantity consumed by user/group or shared folder. This prevents in advance the depletion of total resources due to large disk volume consumption by certain users/groups or shared folders.

3.6.1.1.3 Configuration Items of NAS File System

Configure the following with Web Console in order to perform NAS operation of the ETERNUS Disk storage system.

- Shared Folder

- NAS Interface

- NAS File System Environment

Shared Folder

The shared folder refers to a folder made public on the network as a NAS file system. With this product, by creating a shared folder and setting access controls, it is possible to capture a backup and snapshot.

When creating a shared folder from Web Console, the following resources are also created simultaneously.

Resources	Explanation
NAS volume	A volume where the shared folder is created. Multiple shared folders can be configured to a single NAS volume.
NAS backup volume	A volume for backup of the NAS volume. When configuring NAS backup is done by a new NAS backup volume, one is created for each NAS volume. Configuring NAS backup volume is optional.
NAS snapshot volume	This is a volume for the NAS volume snapshot. When using NAS snapshot, one is created for each generation. Configuring NAS snapshot is optional.
NAS system volume	System volumes are used to control NAS volumes. They are created when a new NAS volume is created. It is created in the same Thin Provisioning Pool as NAS volume.
Copy group	Copy group used to back up NAS volume. This is created only when a NAS backup volume is configured.
Copy pair	A copy pair of a NAS volume and a NAS backup volume. This is created only when a NAS backup volume is configured.
Quota settings	Quota settings for shared folder. This is created only when a quota settings are configured.

The shared folder that is created with this product can be accessed using the following protocols. As it is possible to use the following protocols simultaneously, it is possible to access a single shared folder from both UNIX and Windows clients.

- CIFS
  This protocol is a developed version of SMB which is used in Windows file sharing.

- NFS
  This protocol is a protocol used between UNIX based OSs.

In an environment that a shared folder for home directory has been created, a shared folder (home directory) exclusively for a user is automatically created when accessing the shared folder from a client on business LAN with CIFS protocol.
To access the home directory, enter the following format to the address bar or to the network drive mapping window.

```
\\nasInterfaceIpAddress\userName
```

NAS Interface

A NAS interface refers to the definition information of a network interface that manages, over a business LAN, a public IP address for access to the shared folder and information of the port to which this IP address is assigned. When using the VLAN function, it is possible to configure multiple IP addresses for one port.

Information

There is no relation between the shared folder and the NAS interface. It is possible to reference the same shared folder from any NAS interface.

The NAS interface maybe assigned to a single port or 2 ports. The type of connections that can be configured are as follows:

- Active-Active connection

    A method where 2 ports are used, and an IP address is configured to each. Both ports are enabled, and it is possible to access the shared folder from either port. In addition, 2 IP addresses can be publicized for clients, and it is possible to distribute the bandwidth load. In the event that one port is down, as the IP address configuration can be passed on to the other port automatically, operation with the same IP address can be continued even after recovering from the down time.

Information

During the time one port is down, operation is limited to a single port. It is not possible to distribute the bandwidth load across 2 ports.

- Active-Standby connection

    A method where 2 ports are used, and a single IP address is configured. Of the 2, only one port is enabled (Active port), and the other port is disabled (Standby port). When the Active port is down, the IP address configuration can be passed on to the Standby port which is automatically enabled, making it possible to continue operation with the same IP address even after recovering from the down time.

- Single connection

    A method where 1 port is used, and a single IP address is configured. When the port goes down, it is not possible to access the shared folder.

Information

In order to continue business when a port is down, it is recommended to configure either Active-Active or Active-Standby connection for redundancy.

Further, with the aim of increasing communication speed and becoming more fault-resilient, multiple physical ports can be bundled and handled as one logical port. Further, a NAS interface can be allocated for that logical port (bonding port). The method of determining communication ports of bonding port is to select an operating mode and hash policy.

- Increase Communication Speed

    Networks are bundled to increase communication speed.

    "Figure 3.6 Increase Communication Speed" is when three 100 Mbps networks are bundled to communicate at maximum of 300 Mbps.

Figure 3.6 Increase Communication Speed
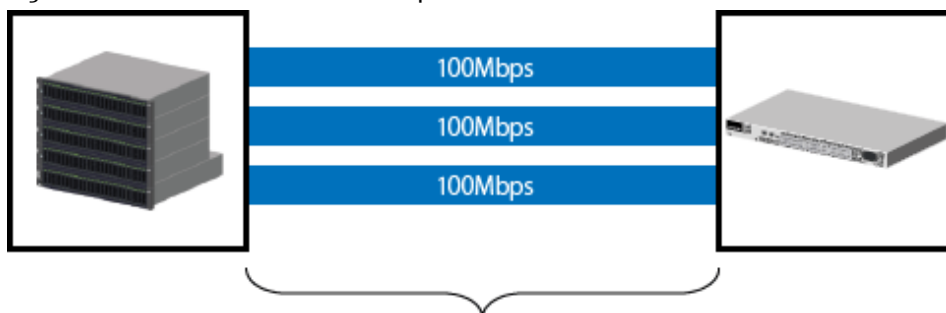
- Improved Fault-Resilience

When a communication fault occurs in any one of the bundled networks, the remaining networks can continue communication.

"Figure 3.7 Improved Fault-Resilience" is when one of 3 networks has a fault so the remaining 2 networks continue at a maximum speed of 200 Mbps.

Figure 3.7 Improved Fault-Resilience
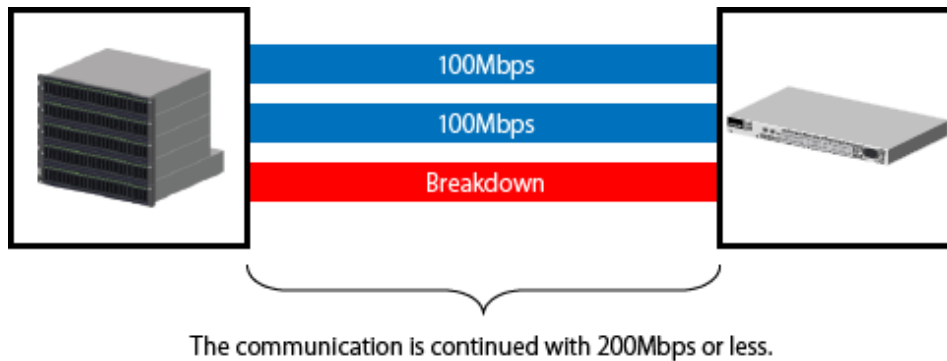
NAS File System Environment

- NAS server name

NAS server name is a unique name set within the ETERNUS Disk storage system.

By registering the NAS server name set within the ETERNUS Disk storage system and the DNS server, it is possible to set the NAS server name and access the CIFS protocol shared folder.

- DNS server

Sets the DNS server to use when operating NAS.

- Authentication System

With this product, as access to the shared folder is controlled, an authentication system using a domain controller is provided. The domain controller centrally manages the account information of individual clients on the network, and conducts authentication in relation to each of these clients or permits access.

In case an authentication server goes down, it is possible to register a maximum of 3 authentication servers for each authentication method.

The authentication methods supported by this product are as follows:

  - Kerberos Authentication Method with Active Directory

  Kerberos is a network authentication protocol designed to provide strong authentication for client/server applications. A password received from a client is authenticated, and a ticket is issued. By utilizing the ticket, the client that has been authenticated is able to utilize the network service.
  When accessing the shared folder with a CIFS protocol, and when managing access to directories and files, in order to perform authentication and access control using this authentication method, register an Active Directory domain controller.
  When accessing the shared folder from multiple domain users/groups, set up an explicit confidential relationship of an authentication server. This makes it possible for other domain users/groups for which an explicit confidential relationship is set up with the registered authentication server to access the shared folder.

  - Authentication Method using LDAP

  LDAP is a protocol for accessing the directory service. With the directory service, it is possible to easily use features such as the search function by centrally managing the account information of network equipment and clients.
  When accessing the shared folder with the NFS protocol, and when performing access management to directories and files, in order to perform authentication and access control using this authentication method, register an LDAP server.

3.6.1.2   Backup of NAS Environment

This section explains an overview of backup of the NAS environment in the ETERNUS Disk storage system.

3.6.1.2.1　Backup/Restoration of NAS Volume

It is possible to back up the entire NAS volume configured with Web Console to a NAS backup volume. In addition, it is possible to restore the entire NAS volume from the NAS backup volume.

Figure 3.8 Backup/Restoration of NAS Volume
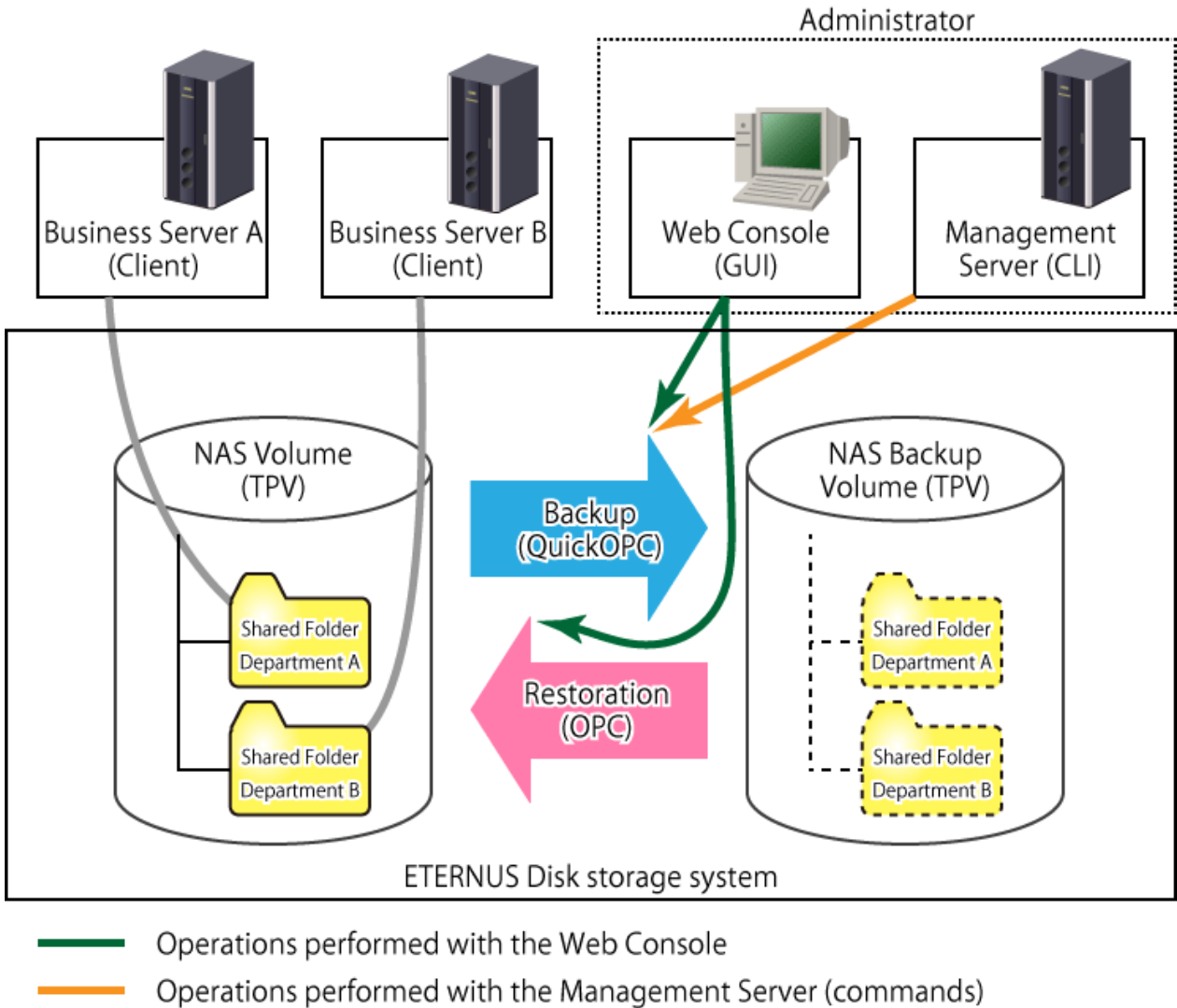
Information

- Backup / restore of the NAS volume can either be executed with Web Console, or be executed with commands from the Management Server.

- When recovering individual files from the NAS backup volume, mount the NAS backup volume and manually copy the files.

- The number of NAS volumes and NAS backup volumes creatable on one ETERNUS Disk storage system varies with the device model and its firmware version. Refer to the ETERNUS Disk storage system manuals for details.

3.6.1.2.2 Mounting/Unmounting NAS Backup Volume

The NAS backup volume that is the backup destination of the NAS volume can be mounted onto the NAS environment as Read-Only. By mounting the NAS backup volume, users can recover files themselves. In addition, a mounted NAS backup volume can be unmounted when recovery has been completed.

Figure 3.9 Mounting/Unmounting the NAS Backup Volume
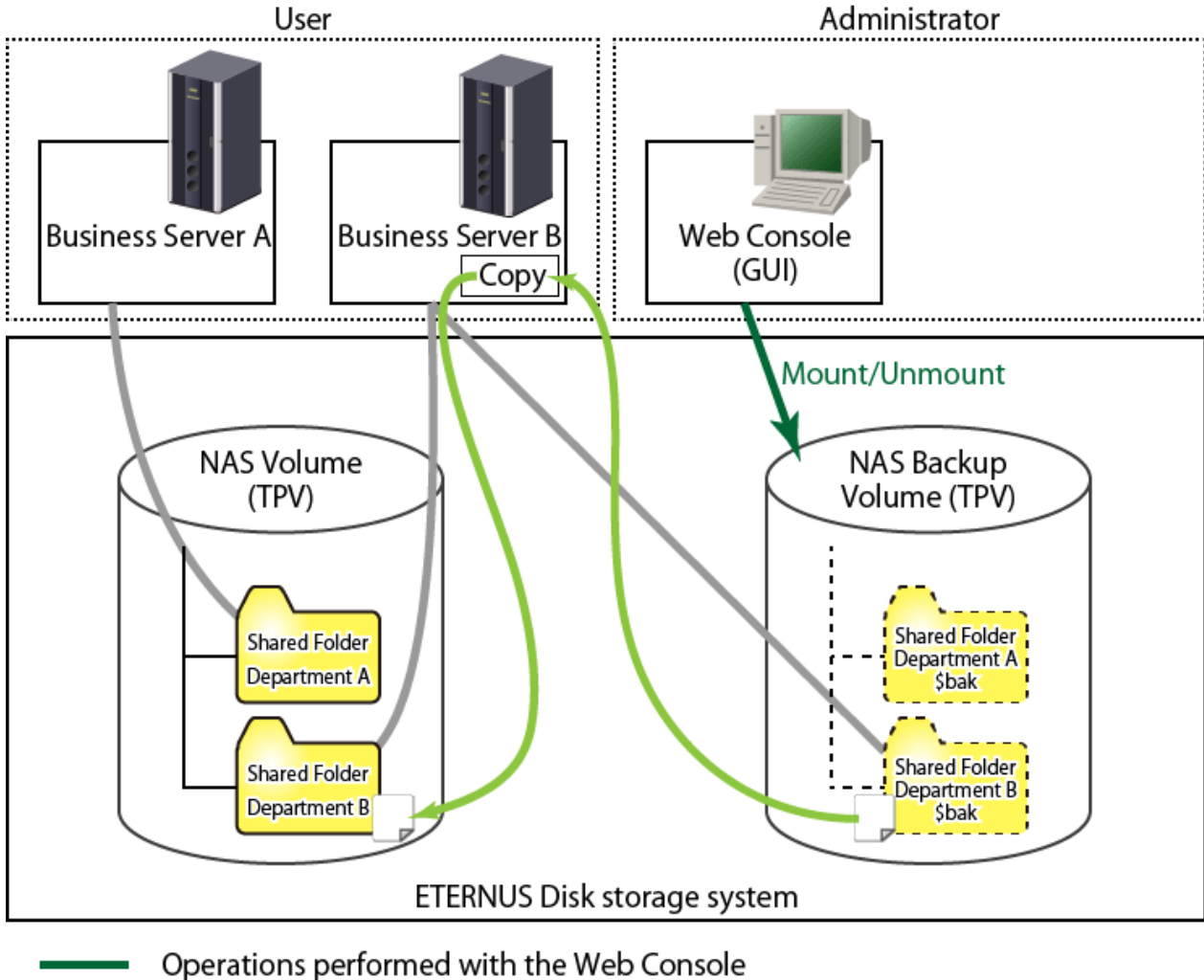
Information

- Mounting and unmounting of the NAS backup volume can be done from Web Console.

- While the NAS backup volume is mounted, it is not possible to backup or restore the NAS volume.

- When accessing the shared folder in the NAS backup volume after mounting with the CIFS protocol, the name of the shared folder is "the name of the shared folder at the time of backup" + "$bak". Furthermore, the name of the shared folder of the NAS backup volume is not displayed in Web Console.

3.6.1.3 NAS Environment Snapshot

This section provides an outline of the NAS environment snapshot function for the ETERNUS Disk storage system.

3.6.1.3.1 NAS Snapshot

NAS snapshots can be periodically captured and the captured snapshots can be browsed by a snapshot captured client. The NAS volume snapshot is achieved using SnapOPC+. This is provided for the purposes of NAS volume generation management and to be able to recover files and folders deleted due to operating errors.

The NAS snapshot feature can be used by configuring the snapshot from Web Console.

P Point
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There are two modes in NAS snapshot of NAS volumes: Automatic and Manual. In this product, Automatic mode can be set up/changed/cancelled.
To set up/change/cancel Manual mode that captures snapshots at any timing, refer to the ETERNUS Disk storage system manuals.
....

The following items are configured:

- Snapshot generation number
  Set the number of snapshot generations for that you want to own.
  The settable number of NAS snapshot generations varies with the device model and firmware version number, and with the total number of NAS snapshot generations specified for a target device. Set a value in this item for a target device so that the maximum settable number of NAS snapshot generations is not exceeded.
  The total number of NAS snapshot generations specified for a device means the sum of NAS snapshot generations set for all the NAS volumes in the device. The number of generations includes the number of generations taken in Automatic mode and the number of generations taken in Manual mode, as well. Refer to the NAS snapshot specification described in the ETERNUS Disk storage system manual for details.

- Schedule configuration
  Sets the schedule for capturing the snapshots. A snapshot is taken on the day set every week or the hour set every day.

Figure 3.10 Outline of NAS Snapshot
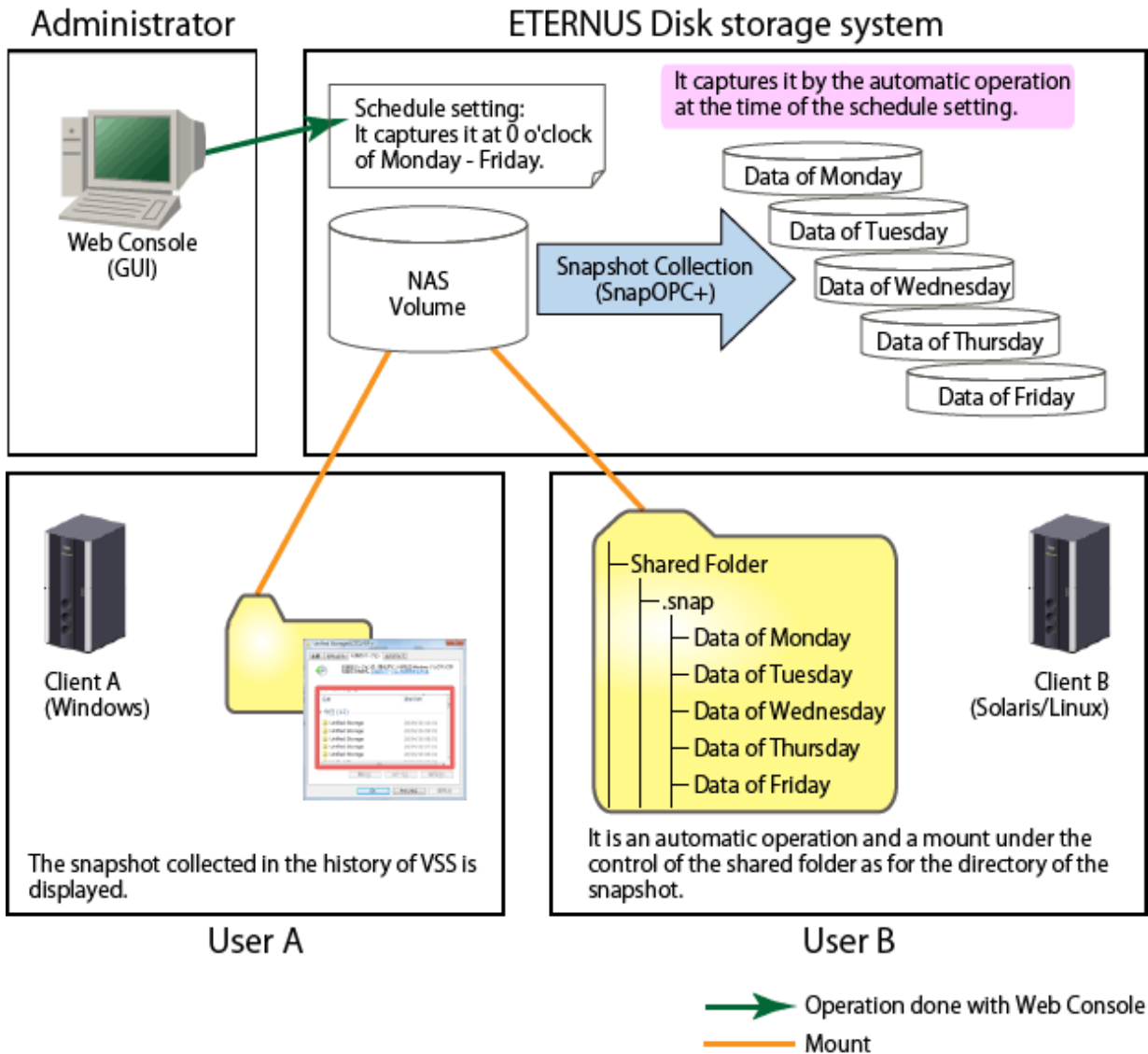
> **Note**
> ....
> If a snapshot is collected while accessing a volume from an application, a snapshot at a point in time at which half-done data was written to the volume could be created. In this case, the data consistency in the snapshot is not ensured, so that the operation of the file in the snapshot is made impossible or the file content becomes incomplete.
> Generally, to collect a snapshot whose data is consistent, the application accessing a volume must be stopped beforehand.
> Configure a schedule for snapshot collection and the number of generations in a snapshot so that correct data can be traced back through generations when data inconsistency is found in the snapshot.
> ....

3.6.1.3.2 Automatic Snapshot Collection Stop/Start

Where the NAS volume is temporarily not updated due to device maintenance period or long break, overwriting of past snapshots can be prevented by stopping the automatic snapshot collection. When restarting the automatic snapshot collection, execute automatic snapshot collection start. Automatic snapshot collection can be restarted carrying on with the snapshot before stopping.

Figure 3.11 Automatic Snapshot Collection Stop/Start
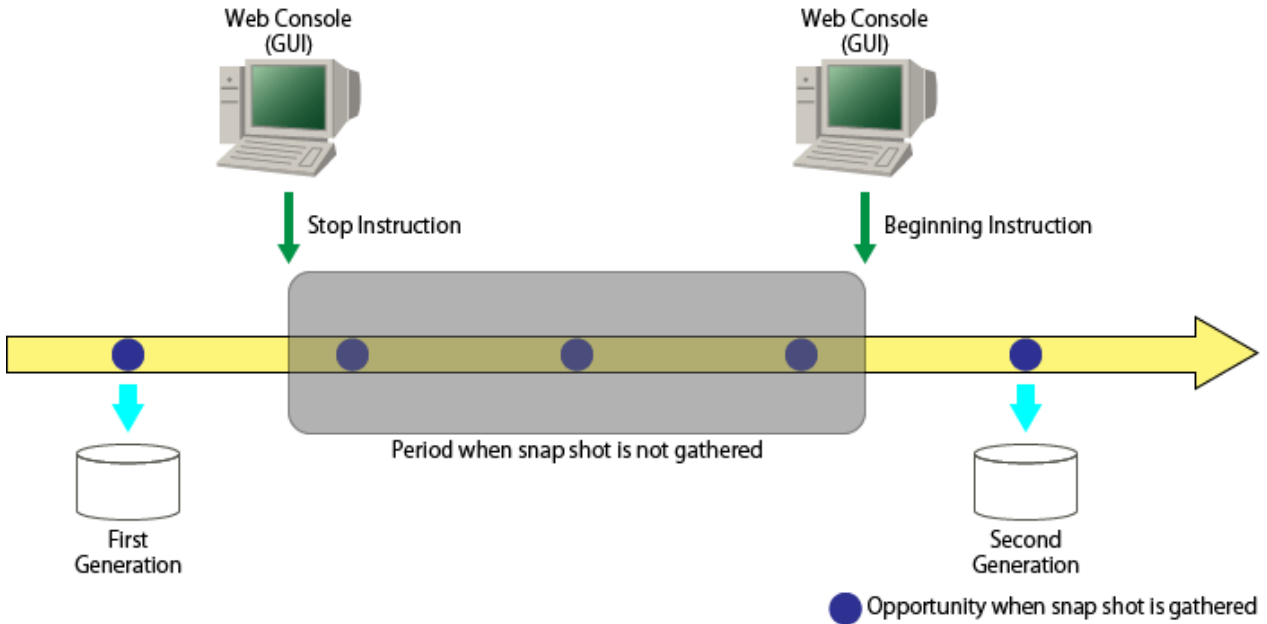
3.6.1.4 About NAS Environment Quota Management

This section provides an outline of NAS environment quota management for the ETERNUS Disk storage system.

3.6.1.4.1 NAS Environment Quota Management

With quota management, the amount of usable resources can be limited. This prevents the depletion of the whole system resources that is caused by disk capacity being consumed away by some users/groups or on some shared folders.

When accessing a shared folder with CIFS protocol, disk usage and the number of files can be limited for the users and shared folders. When accessing a shared folder with NFS protocol, disk usage and the number of files can be limited for the users, groups, and shared folders.

The following two values can be set:

- Limit value
  This is the upper limit value actually used. When updating data that exceeds the limit value, there is an error for the update.

- Warning value
  This is the value for providing pre-notification before reaching the limit value. When updating data that has exceeded the warning value, an SNMP Trap and event shall be notified to the Management Server.

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- Quota can be set for the user/group and shared folder at the same time. There is no order of priority in settings, and control is executed by a warning value or limit value that is reached first.

- Even if a disk is used with a limit value exceeded, it may not cause any error. In this case, it is used up to disk use amount limitation value + 2 GB in the maximum.

- When a NAS volume to which quota is set is backed up, its quota setting information is backed up at the same time. For this reason, when it is restored, its quota setting information backed up is applied.

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When using the quota management function, enable SNMP Trap settings. If they are not enabled, no alarm notification is output when a quota threshold is exceeded.
To change SNMP Trap settings on Web Console, refer to "Change ETERNUS Disk Storage System Information" in the *Web Console Guide*.

Figure 3.12 Quota Management Outline
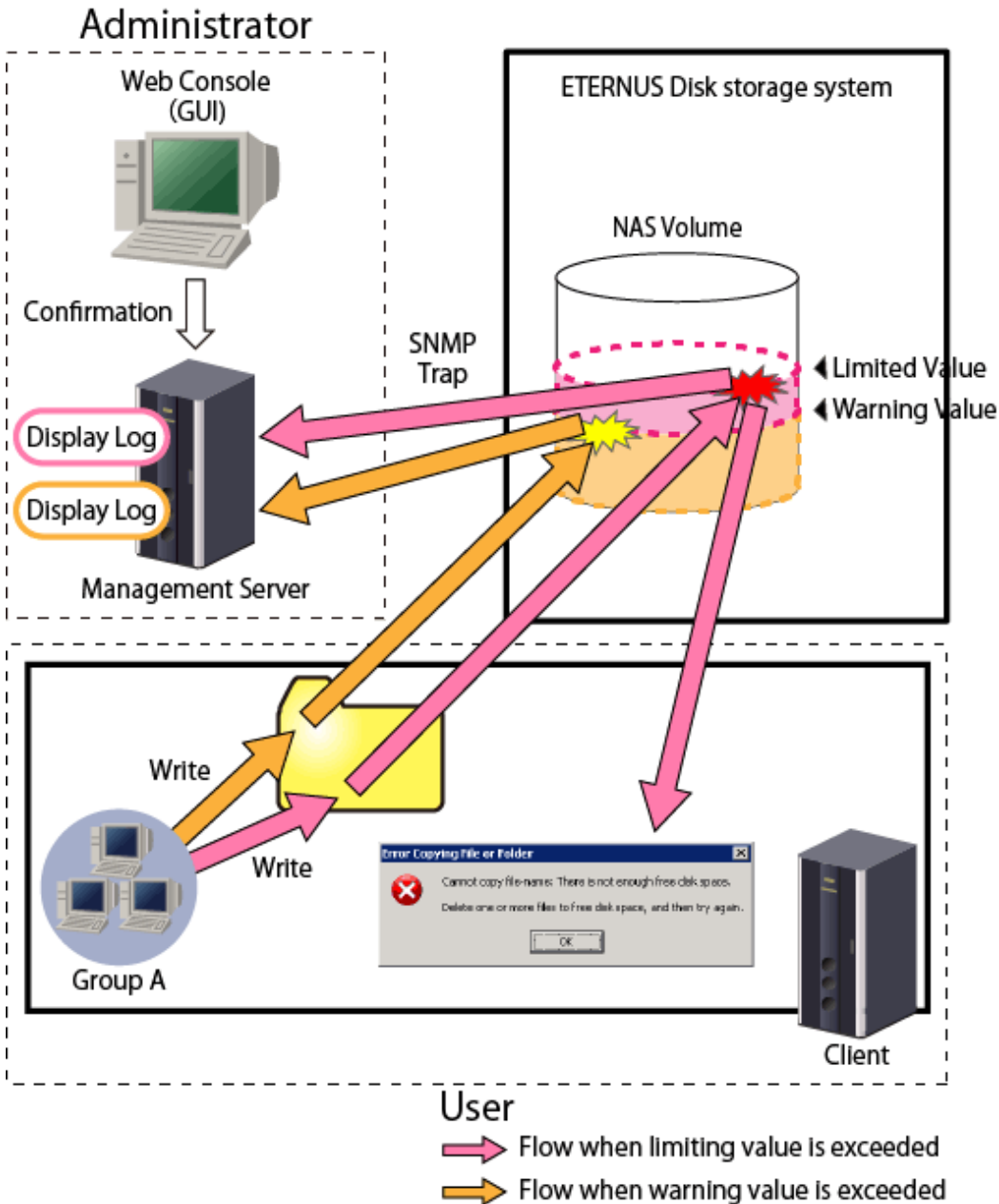
- Sets a quota for the users/groups or shared folders registered on the authentication server set in "3.6.3.3 NAS File System Environment Settings".

- By setting the transmission of an event notification E-mail, a notification by E-mail can be made when the quota management limits value or warning value are exceeded.

3.6.1.4.2 Events Notified by Quota Management

With quota management, an SNMP Trap is notified by the Management Server in the following cases.

- Error occurred when data update or file creation was attempted with the limit value reached (Limit value exceeded)

- Warning value exceeded (predicted)

- Returned below warning value

The notified event can be confirmed on the quota management log screen on Web Console. Logs are stored for 30 days.

🖼 See
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Refer to "Display Quota Information" in the *Web Console Guide* for the procedure to display the Quota Management Log screen.
....

🅿 Point
....

- Events are categorized by type; warning value exceeded, limit value exceeded, warning value removed, and notified every 10 minutes.

- The limit value exceeded event is notified when an error occurred because data update or file creation was attempted with a limit value reached.
....

3.6.1.5 Operating Environment

The functions of the NAS option of the ETERNUS Disk storage system can be used with the following environments.

Table 3.1 Operating Environment

Object	Environment
Platform	Platforms on which the ETERNUS SF Manager can be operated.
Required licenses (software)	- ETERNUS SF Express (*1) - ETERNUS SF AdvancedCopy Manager Local Copy License (*2)
ETERNUS Disk storage system	ETERNUS DX100 S5/DX200 S5 ETERNUS DX100 S4/DX200 S4 ETERNUS DX100 S3/DX200 S3
Required options (hardware)	NAS Option
Authentication methods (*3)	When accessing with the CIFS protocol: Active Directory When accessing with the NFS protocol: LDAP

*1: Required to construct the NAS file system.
*2: Required to back up the NAS volumes.
*3: Required when performing access control using an authentication server for the NAS file system. When no authentication server is configured, all accesses are permitted.

3.6.2 Required Setup Configuration

This section explains requirements for installing ETERNUS Disk storage system NAS management.

Table 3.2 Prior Configurations

Subject of Configuration	Configuration Details
ETERNUS Disk storage system	- Application of NAS Option - Preparing ETERNUS for Registration to This Product

Subject of Configuration	Configuration Details
Authentication server	- Registration of User/Group
	- Creating Redundant Authentication Servers
DNS server	- NAS Server Name Registration
Management Server	- Device Registration
	- License Registration
	- Creating Thin Provisioning Pool
	- Configuration of Connection Type of Advanced Copy
	- Creating RAID Groups
	- SDP Capacity Expansion
	- Copy Table Size Settings

3.6.2.1   ETERNUS Disk Storage System Configuration

This section explains ETERNUS Disk storage system configuration.

The items to be configured are as follows:

- Application of NAS Option

- Preparing ETERNUS for Registration to This Product

- Registration of Local User/Local Group for Connecting to NAS

Application of NAS Option

To apply the ETERNUS Disk storage system NAS option, refer to the ETERNUS Disk storage system manuals.

Skip this work if the NAS option has already been applied to the target ETERNUS Disk storage system.

Preparing ETERNUS for Registration to This Product

Prepare the ETERNUS Disk storage system to be registered to this product. Refer to "2.1 Setup Required in Advance" for details about the configuration.

Skip this work if the target ETERNUS Disk storage system has already been registered to this product.

Registration of Local User/Local Group for Connecting to NAS

When the firmware version number of an ETERNUS Disk storage system is V10L53 or later, you can register a local user/local group for connecting to NAS on the ETERNUS Disk storage system. Refer to the ETERNUS Disk storage system manuals for information on how to register them.

Point

The local user/local group configuration and the authentication server configuration are exclusively correlated. When you use an authentication system by an authentication server, do not register any local user/local group on the ETERNUS Disk storage system.

3.6.2.2   Authentication Server Setup

This section explains required configuration for the authentication server.

When the firmware version number of an ETERNUS Disk storage system is V10L53 or later, before executing this configuration, delete the local user/local group registered on the ETERNUS Disk storage system for connecting to NAS.

The items to be configured are as follows:

- Registration of User/Group

- Creating Redundant Authentication Servers

Registration of User/Group

On the domain controller or LDAP server, register the users and groups that have access to the shared folders. Refer to the LDAP or domain controller manuals for information on how to perform the registration.

![Note icon] **Note**
....

When using both protocols of CIFS and NFS, ensure uniqueness of user/group information between Active Directory authentication server and LDAP authentication server.
Mapping Windows security identifier (SID) and UNIX server's user ID (UID)/group ID (GID) can secure the uniqueness of user/group information.
When mapping user/group information, set the UID/GID of an LDAP authentication server based on the user ID/group ID of an Active Directory authentication server.
When registering a user/group on the LDAP authentication server, register as UID/GID the number that has 10,000,000 added to the end part of SID of the user/group registered on the Active Directory authentication server (e.g.: when the value of SID is S-1-5-21-*xxxx-yyyy-zzzz-nnnn*, *nnnn* is the end part).
....

Creating Redundant Authentication Servers

In this product, redundant authentication servers can be registered up to 3 units. Refer to the LDAP or domain controller manuals for information on how to create redundant configuration.

3.6.2.3 Prior Configuration of DNS Server

This section describes the pre-configuration of the DNS server.

The items to be configured are as follows:

- NAS Server Name Registration

NAS Server Name Registration

When the NAS server name is specified when accessing the shared folder, the NAS server can be registered on the DNS server using any name set uniquely in the ETERNUS Disk storage system.

Refer to the manual accompanying the DNS server for the registration method.

3.6.2.4 Prior Configuration of Management Server

This section explains the prior setting of this product when installed in the Management Server.

The details to be configured are as follows:

- Device Registration

- License Registration

- Creating Thin Provisioning Pool

- Configuration of Connection Type of Advanced Copy

- Creating RAID Groups

- SDP Capacity Expansion

- Copy Table Size Settings

Device Registration

Register the ETERNUS Disk storage system to be managed with this product. Refer to "2.3 Registering Disk Storage Systems" for information on how to register the device.

When a target ETERNUS Disk storage system has already been registered to this product, and when application of the addition of the NAS option has been performed with "3.6.2.1 ETERNUS Disk Storage System Configuration", perform the **Reload Conf.** operation for the ETERNUS Disk storage system.

Note

When using the snapshot function or quota management function, enable SNMP Trap Setup when you register devices. If SNMP Trap Setup is not enabled, snapshot collection result and an alarm output when a quota threshold is exceeded are not notified.

See

Refer to "Reload ETERNUS Disk Storage System Configuration Information" in the *Web Console Guide* for information on how to perform the **Reload Conf.** operation.

License Registration

Register the ETERNUS Disk storage system NAS license, and any other required license that is not already registered.

Refer to required licenses (software) of the "3.6.1.5 Operating Environment" for required and optional licenses.

Skip this work if the license of the object has already been registered in this product.

See

Refer to "Register License" in the *Web Console Guide* for information on how to register the license.

Creating Thin Provisioning Pool

Create a Thin Provisioning Pool in which the NAS volume is created.

Skip this work if the Thin Provisioning Pool for the NAS volume has already been made.

See

Refer to "Create Thin Provisioning Pool" in the *Web Console Guide* for information on how to create a Thin Provisioning Pool.

Information

For increased reliability, it is recommended to create the primary NAS volume and the backup NAS volume in separate Thin Provisioning Pools. When performing NAS volume backup, create two Thin Provisioning Pools; one for the primary NAS volume and one for the backup NAS volume.

Configuration of Connection Type of Advanced Copy

Configure the access connection type for Advanced Copy in order to define the NAS volume backup.

Skip this work if the backup is not being used for NAS environment or if the connection has been configured already.

See

Refer to "Configure Connection Type for ETERNUS Disk Storage System" in the *Web Console Guide* for information on how to perform the configuration.

Information

For the configuration of the connection type, select "Access through volumes" or "Access through network".

Creating RAID Groups

When using the NAS snapshot, a NAS snapshot volume is created on the RAID group. The capacity is calculated according to the following formula, and is required as free space within the RAID group.

```
RAID group free space = Total capacity of NAS volume for NAS snapshot * snapshot generation numbers
* 0.001
```

Skip this work if not creating a NAS snapshot or if a NAS snapshot volume on the RAID group has already been created.

Point
. . . .

For the number of snapshot generations, calculate the sum of the number of generations taken in Automatic mode and the number of generations taken in Manual mode.
. . . .

Note
. . . .

As shown below, if the RAID group where the NAS snapshot volume is created is shared, it may not be possible to set the maximum number of snapshot generations.

- Where creating SDPV with "SDP Capacity Expansion"

- Where creating a NAS snapshot volume for other NAS volumes

- When creating volumes for SAN
. . . .

See
. . . .

For the RAID group creation procedure, Refer to "Create RAID Group" in the *Web Console Guide*.
. . . .

SDP Capacity Expansion

SDP capacity may need to be expanded in order to use the NAS snapshot.
Skip this work when not using NAS snapshot.

The physical capacity allocated for the snapshot captured with NAS snapshot is provided by creating an SDPV. Create so that the total SDPV capacity becomes the capacity estimated below.

```
SDP additional capacity = total value for updated volume (*1) of NAS volumes for each generation
```

*1: NAS volume content that is changed between the time of one snapshot and the next snapshot.

When it is difficult to estimate size of the changed content, we recommend adding the following capacity. This is only a recommended value, so it should be modified according to the operational state.

```
SDP additional capacity = Total capacity of NAS volumes for NAS snapshot * a number between 0.3 and
0.5
```

Point
. . . .

SDPV and SDP are shared with SAN AdvancedCopy.

For this reason, when using SAN AdvancedCopy and NAS snapshot on the ETERNUS Disk storage system simultaneously, prepare SDP capacity that is the total estimated volume for SAN and NAS.
. . . .

See

. . . .
Refer to "Create Volume" in the *Web Console Guide* for the SDPV creation procedure.
. . . .

Copy Table Size Settings

In order to use NAS snapshot, configure the copy table size and resolution.

See

. . . .
- Values that can be configured for the copy table size and resolution differ depending on the model of the storage device. Refer to the ETERNUS Disk storage system manuals for information on the specification of the copy table size.

- Refer to "Configure Copy Table Size for Advanced Copy" in the *Web Console Guide* for the copy table size configuration procedure. However, if an AdvancedCopy Manager license is not purchased, this cannot be configured from Web Console. Configure from ETERNUS Web GUI.
. . . .

3.6.3   Installation Steps

The installation steps for performing ETERNUS Disk storage system NAS operation is explained.

Installation is implemented in the following order.

Order	Installation Item	Title of Sections Listed in Web Console Guide	Optional/Required (*1)
1	Creating Shared Folder	Create Shared Folder	Required
2	Creating NAS Interface	Create NAS Interface	Required
3	NAS File System Environment Settings	Configure DNS Server	Optional
		Configure Authentication Server	Optional

*1: Tasks that must be performed in order to operate the NAS file system are "Required", while tasks that may be omitted are "Optional".

Point

. . . .
If an authentication system is not implemented then the NAS file system can be accessed from any clients connected to the business LAN. It is strongly recommended that an authentication server is properly configured and implemented.
. . . .

3.6.3.1   Creating Shared Folder

Create a shared folder in order to configure the folder of the access destination of the NAS file system.

Configure the following for the shared folder:

Table 3.3 Create Shared Folder

Subject of Configuration	Configuration Details
Shared Folder	- Usage - Shared Folder Name - Protocol - Oplocks Setting - Data Access SMB Encryption

Subject of Configuration	Configuration Details
	- Enumeration Based on Access Permission Settings
	- Destination Volume of Shared Folder Creation Destination
	- NAS File System Block Size of Shared Folder Creation Destination
	- NAS Volume Capacity of Shared Folder Creation Destination
	- NAS Volume Number of Shared Folder Creation Destination
NAS Backup	- NAS Backup Volume
NAS Snapshot	- Number of Snapshot Generations
	- Schedule Configuration
Access Settings	- Access Configurations of Shared Folder
	- Host Access Configurations of Shared Folder
	- Configurations of CIFS Access Permission to Shared Folder
Quota Settings	- Quota Configurations of Shared Folder

Shared Folder

Usage

Purpose and intended use of the shared folder. You can select either "File Sharing" or "Home Directory".
If you select "Home Directory", you cannot specify values of the following items.

Item Name	Explanation
Shared Folder Name	"homes" is fixed.
Protocol	"CIFS" is fixed.
Enumeration Based on Access Permission Settings	"Disable" is fixed.
Configurations of CIFS Access Permission to Shared Folder	No specification is allowed.

The setting items other than listed above are common to all the home directories that are created under the shared folder.

Shared Folder Name

The name of the shared folder.

Protocol

The protocol to be used by the shared folder.

It is possible to select CIFS, NFS, or both of these protocols.

Oplocks Setting

This is the configuration of the Oplocks function that prevents concurrent file access.

It is possible to configure this only when using the CIFS protocol.

When the Oplocks function is enabled, although improvement of access performance from the client can be expected, it becomes impossible to use the Alternate Data Stream. In addition, when selecting both protocols of CIFS and NFS, it is recommended that the Oplocks function is not enabled.

Data Access SMB Encryption

Settings that are for the SMB encryption function.

The settings can be configured only when using the CIFS protocol.

When the SMB encryption function is enabled, the communications between the client and the ETERNUS Disk storage system are encrypted. In order to use this function, the client must support SMB 3.0.

Note
....

When data access encryption is enabled, clients that do not support SMB 3.0 cannot access the shared folder.

....

Enumeration Based on Access Permission Settings

This is the Access Based Enumeration (ABE) function settings.

The settings can be configured only when using the CIFS protocol.

When the ABE function is enabled, folders and files that cannot be referenced by users accessing the shared folder are not displayed.

Destination Volume of Shared Folder Creation Destination

This is the volume where the shared folder is to be created.

When no NAS volumes are already defined, a new NAS volume is created.
When NAS volumes are already defined, one of them may be selected, or a new NAS volume may be created.

NAS File System Block Size of Shared Folder Creation Destination

This is NAS file system block size.

Only specified when creating a new NAS volume.

Information
....

If you increase the block size, the maximum volume capacity and the maximum file size increases, but the capacity efficiency decreases.

....

NAS Volume Capacity of Shared Folder Creation Destination

This is the capacity of the NAS volume.

Only specified when creating a new NAS volume.

The capacity that can be specified differs depending on the NAS file system block size.

For details, refer to the NAS file system specification described in the ETERNUS Disk storage system manuals.

Information
....

For NAS volume, a system area of 300 GB is reserved. For this reason, the area available as a file system is the value after subtracting the system area from the area specified for the NAS volume.

For example, if a NAS volume of 3 TB is created, the user area is 2.7 TB and the system area is 0.3 TB.

....

NAS Volume Number of Shared Folder Creation Destination

This is a NAS volume number.

Specify this number when execute the inter-box backup of NAS volumes.
In the ETERNUS DX100 S3/DX200 S3 whose firmware version is earlier than V10L51, the NAS volume number must be the same at ETERNUS Disk storage systems as backup source and backup destination respectively.

NAS Backup

This is set for the purpose of backing up the NAS volume data.

NAS Backup Volume

When there is no NAS backup volume, create a new NAS backup volume. Where there is a NAS backup volume, you can choose to either create a new NAS backup volume or use an existing NAS backup volume.

The NAS backup volume is created with the following details.

Volume Name	*nasVolumeName*$bak_*N* (*1)
Capacity	Same as the source NAS volume.
Volume Type	Same as the source NAS volume.
Thin Provisioning Pool of the Creation Destination	User Selection

*1: "*N*" is a sequential number from 0. The number of digits varies.

When a NAS backup volume is created, the following copy group and copy pair are automatically created.

- Copy group

  The copy group is a group of copy pairs. A copy pair is comprised of a source NAS volume and a destination NAS backup volume.

Copy Group Name	NAS_QuickOPC_*nasVolumeName_N* (*1,*2)
Copy Group Type	QuickOPC

  *1: "*N*" is a sequential number from 0. The number of digits varies.

  *2: Characters other than those listed below in nasVolumeName are replaced with hash (#):
  One-byte alphanumeric character, minus (-), underscore (_), hash (#), period (.), plus (+)

- Copy pair

  The copy pair is a definition of a source NAS volume and a destination NAS backup volume. A copy pair is defined within a copy group.

In addition, it is also possible to configure NAS backup individually. Refer to "3.6.4.10 Configuring NAS Backup" for this procedure.

 Point

- For increased reliability, it is recommended to create Thin Provisioning Pools of the creation destination for the NAS backup volume and the NAS volume in separate Thin Provisioning Pools.

- When configuring NAS backup or backing up the NAS volume, an ETERNUS SF AdvancedCopy Manager Local Copy License is required.

NAS Snapshot

Sets the number of generations that the NAS snapshot has and the schedule that the snapshot is captured automatically. This can be configured only when setting a new NAS snapshot. When using an existing NAS snapshot, the existing setting is used. This cannot be modified.

Number of Snapshot Generations

Sets the number of snapshot generations owned.
The settable number of NAS snapshot generations varies with the device model and firmware version number, and with the total number of NAS snapshot generations specified for a target device. Set a value in this item for a target device so that the maximum settable number of NAS snapshot generations is not exceeded.
The total number of NAS snapshot generations specified for a device means the sum of NAS snapshot generations set for all the NAS volumes in the device. The number of generations includes the number of generations taken in Automatic mode and the number of generations taken in Manual mode, as well. Refer to the NAS snapshot specification described in the ETERNUS Disk storage system manual for details.

Schedule Configuration

Sets the schedule that the snapshot is captured automatically. The following items are set.

Item	Explanation
Cycle	Selects the cycle for capturing snapshots. Daily: Snapshots captured every day at selected "Time". Weekly: Snapshots captured on the selected "Day" and "Time" of every week.
Day	Selects the days to capture the snapshot. This cannot be selected when Daily is selected for the [Cycle]. Check the check box of the days you wish to capture the snapshot.
Time	Selects the time to capture the snapshot. Check the check box of the time you wish to capture the snapshot. When an interval of capturing a snapshot is selected, the selected interval time is automatically checked from the start point of zero time.

When configuring a new NAS snapshot, the NAS snapshot volume for the collected snapshot backup is automatically created. The NAS snapshot volume is created with the following content.

Volume Name	*nasVolumeName*$snap_N (*1)
Capacity	Same as the NAS volume of the backup source
Volume Type	SDV
RAID Group Created	User Selection

*1: "*N*" is a sequential number from 0. The number of digits varies.

Point

- The snapshot is collected based on the time set for the ETERNUS Disk storage system.

- When a new NAS snapshot is configured, it automatically goes into start state.

Note

When using the snapshot function, enable SNMP Trap Setup. If SNMP Trap Setup is not enabled, snapshot collection result is not notified. Refer to "Change ETERNUS Disk Storage System Information" in the *Web Console Guide* for the procedure to change SNMP Trap Setup via Web Console.

Access Settings

Access Configurations of Shared Folder

The owner and group that issue access rights in relation to the shared folder are configured. For the owner and group, configure a user and group on the authentication server configured with "3.6.3.3 NAS File System Environment Settings" or configure a local user and local group registered with "3.6.2.1 ETERNUS Disk Storage System Configuration" for connecting to NAS. When root is configured as the owner and group that has the access rights of the shared folder, it is possible to access the shared folder from all clients on the business LAN.

Point

- Set root to the owner and the group when making first time of the shared folder or the authentication server is a unsetting. Refer to "3.6.4.3 Changing Access Setting for Shared Folder" for the modification procedure when the access authority is given to a specific owner and the group after the authentication server is set.

- In order to perform detailed access control such as specifying Read-Only to individual users other than the owner, directly configure this in relation to the authentication server.

Host Access Configurations of Shared Folder

Configure host access, permitted and denials, to the shared folder. When a host to permit is not specified, access from all hosts is permitted.

It is possible to configure hosts to deny only when CIFS is specified for the protocol.
It is possible to configure hosts allowed access with root privileges only when NFS is specified for the protocol.

P Point
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- If a user other than root user is specified for an NFS owner and group, the root user of an NFS client cannot operate files in a shared folder with root privileges.

- If you specify a host allowed access with root privileges, only the root user of the specified NFS client can operate files in a shared folder with root privileges.

....

Note
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The host access control to the shared folder when NFS is specified for protocol complies with the standard NFS server control.

Since there is priority on the order of specified host names, the specified order is important. Also, the host name specified for root Access Allowed Hosts must correspond to a NFS allowed host in the format of the character string.
Concretely speaking, when specifying multiple host names for the NFS allowed host, the priority order applied to root Access Allowed Hosts differs with the specified format and order. The priority order is as follows. The number 1 shows the highest priority and the number 4 shows the lowest priority. When the priority order is the same, the number listed to the left has a priority.

Priority Order	Specified Format
1	FQDN
2	IP address, IP network (for example: 192.0.2.0/255.255.255.0)
3	Others (host name, FQDN that includes *)
4	*

Depending on the specified order, access may not be allowed with root privileges from a host specified for root Access Allowed Hosts. The following is the example:

- Inaccessible example with root privileges

  Specified IP address and IP network are mixed.

  ```
  Allowed hosts: 192.0.2.0/255.255.255.0, 192.0.2.100
  root Access Allowed Hosts: 192.0.2.100
  ```

  In the above configuration, the access from the host with IP address 192.0.2.100 is not allowed with root privileges. The reason of being inaccessible is that the IP address 192.0.2.100 falls under 192.0.2.0/255.255.255.0 specified to the left of the allowed host and 192.0.2.0/255.255.255.0 is not specified for root Access Allowed Hosts.

  In this case, considering the priority order, specify the IP address first as follows.

  ```
  Allowed hosts: 192.0.2.100, 192.0.2.0/255.255.255.0
  root Access Allowed Hosts: 192.0.2.100
  ```

- Accessible example with root privileges

  Specified FQDN and IP network are mixed.

  ```
  Allowed hosts: 192.0.2.0/255.255.255.0, fqdn.example.com
  root Access Allowed Hosts: fqdn.example.com
  ```

When "fqdn.example.com" specified in FQDN is defined as IP address 192.0.2.100, set as listed above, and when accessing from the host of 192.0.2.100, access is allowed with root privileges. The reason of being accessible is that "fqdn.example.com" specified in FQDN is applicable to high priority of allowed hosts.

Configurations of CIFS Access Permission to Shared Folder

Configure access permission to the shared folder with CIFS protocol on a per user/group basis.

📋 Note

When CIFS access permission has been configured, the users/groups that are not permitted to access cannot access the shared folder with CIFS protocol.

Quota Settings

Quota Configurations of Shared Folder

Sets limits on the quantity consumed of disk/number of files for shared folders.

The following items are set:

- Disk Space (Warning, Limit)

- File Count (Warning, Limit)

In addition, the following are automatically configured when creating the shared folder:

- Writing Authority of Shared Folder

- Shared Status of Shared Folder

Writing Authority of Shared Folder

The state of whether writing to the shared folder is enabled or disabled is displayed. The client can only write into a shared folder for which writing authority is enabled, or folders and files subordinate to such a shared folder.

When the shared folder is created, writing is enabled by default.

Refer to "3.6.4.2 Changing Basic Setting for Shared Folder" for information on how to change write authority.

Shared Status of Shared Folder

The state of whether the sharing of the shared folder is active (Online) or inactive (Offline) is displayed. For a folder where sharing has been made active, a client is able to access files via the NAS interface.

When the shared folder is created, sharing is in an active state by default.

Refer to "3.6.4.8 Activating Sharing" or "3.6.4.9 Stopping Sharing" for information on how to change the shared status.

Shared folders can be created up to 256 folders per device.

📚 See

Refer to "Create Shared Folder" in the *Web Console Guide* for information on how to create using Web Console.

3.6.3.2   Creating NAS Interface

Create a NAS Interface in order to configure a public IP address and a port to access the shared folder.

The following can be configured with this function:

Subject of Configuration	Configuration Details
NAS Interface (Port)	- RIP Setting Enable/Disable - Port for Access - Connection Access Method - Port Bonding
NAS Interface (network)	- IP Address for Access - VLAN ID

NAS Interface (Port)

RIP Setting Enable/Disable

Configure whether to enable/disable RIP configuration.

When the RIP setting is enabled, its own routing table is automatically generated based on the routing table broadcast from the router connected to the port, and the access route set in the NAS interface can be automatically selected.

When the RIP setting is disabled, there is dynamic generation of the routing table.

🅿 Point
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- When the RIP configuration is enabled, in order to dynamically create the routing table of the NAS interface, enable the RIP configuration of the router that is connected.

- When the RIP setting is disabled, the NAS interface cannot select its own access route. Set the routing table manually using the ETERNUS Disk storage system command.

. . . .

Port for Access

Configure the Allocation port and the Redundant port of the NAS interface. The shared folder is accessed via the port configured as the Allocation port.
When the Allocation port is down, the shared folder can be accessed via the port configured as the Redundant port. It is also possible to use a single port operation format where a Redundant port is not configured.

🅿 Point
. . . .

- By setting the VLAN ID, 1 port can be allocated to multiple NAS interfaces.

- The following ports cannot be selected for the Allocation port:

    - Member ports of bonding port

- The following port cannot be selected for Redundant port:

    - Port of same CM as assignment Allocation port

    - Redundant port of other port

    - Member port of bonding port

- When a Redundant port is not configured, it is not possible to access the shared folder when the Allocation port goes down. For this reason, it is recommended that a Redundant port be configured.

. . . .

Connection Access Method

Configure the Allocation port and Redundant port for the shared folder access connection method.

The method for configuration of the connection type is as follows:

Connection Settings	Configuration Method
Single connection	Specify only an Allocation port, and create a NAS interface.
Active-Standby connection	Specify an Allocation port and a Redundant port, and create a NAS interface.
Active-Active connection	There are the two following configuration methods. - Method 1 　1. Create a NAS interface of an Active-Standby connection. 　2. Again, create a NAS interface. During this, specify the "Redundant port of the NAS interface" created in step 1 as the port. - Method 2 　1. Create a NAS interface of a Single connection. 　2. Again, create a NAS interface. During this, specify the "port of the NAS interface" created in step 1 as the Redundant port.

Port Bonding

The Allocation ports and the Redundant ports for the NAS interface can be set as operating mode of member port and bonding port.

P Point
. . . .

 - The following ports cannot be selected for bonding ports.

   - Port of CM different from the master port

   - Port to which a NAS interface has already been assigned

   - Duplicated port

. . . .

The operating mode that is the method of determining the communication ports from the bonding ports can be selected from the following.

Mode	Name	Explanation
0	Load distribution (round robin)	Performs load distribution using round robin.
1	Active backup	Communicates on one port, and when communication is not possible, switches over to other ports. This does not perform load distribution.
2	Load distribution (EXCLUSIVE OR)	Performs load distribution based on EXCLUSIVE OR of recipient/ sender
4	IEEE802.3ad	Performs load distribution following the IEEE802.3ad standard. As it communicates with the switch using Link Aggregation Control Protocol, an 802.3ad-compatible switch is required.
5	Load distribution (link speed[only transmit])	Transmit performs load distribution in line with Link speed. Receive is only performed on one port.
6	Load distribution (link speed[transmit and receive])	Send performs load distribution in line with Link speed. Receive appropriately allocates communicate ports to each communication partner.

Further, when the operating mode is "load distribution (EXCLUSIVE OR)" or "IEEE802.3ad", has policy is set as the method of determining the port.

Name	Explanation
MAC Address	This is determined using an EXCLUSIVE OR of the sender and recipient MAC addresses.
MAC Address and IP Address	This is determined using an EXCLUSIVE OR of the sender and recipient MAC addresses and IP addresses.
IP Address and Port Number	This is determined using an EXCLUSIVE OR of the sender and recipient IP addresses and port numbers.

Point

- Specify "1" for Restriction on the number of detached ports of the switch. The number "1" is set by default.
  The Restriction on the number of detached ports indicates the allowable number of ports disconnected from members making up a bonding port. When the number of detached ports is less than the restriction number, the bonding port is disabled. For example, if number "1" is specified for the Restriction on the number of detached ports and 4 ports make up a bonding port, when all the 4 ports become unavailable, the bonding port is disabled. When all the ports are recovered, the bonding port gets enabled.

- The function required for LAN switch varies depending on the operating mode of bonding port.
  Refer to the ETERNUS Disk storage system manuals for the function required for switch by operating mode.

NAS Interface (network)

IP Address for Access

Sets the IP address used for the NAS interface.

VLAN ID

Sets the tag VLAN ID configured for the NAS interface.

By setting the VLAN ID for the NAS interface, the NAS interface can be additionally allocated for ports that other NAS interfaces have allocated.

Note

- When multiple NAS interface are assigned to the same port using the VLAN ID, the NAS interface must all be in different subnets.

- Port VLAN is not supported for connection between ETERNUS Disk storage system and switch.

See

Refer to "Create NAS Interface" in the *Web Console Guide* for information on settings using Web Console.

Note

- When the same subnet is assigned to the same CM, the behavior is to communicate using only a specific port.

- Where the network is allocated in an Active-Active connection form, it is necessary to set the same network address between CM.

- To create a NAS interface, allocate a new NAS interface to NAS ports and then restart the service to access the shared folder by the CIFS protocol. Before the restart process is completed, the shared folder is not accessible from the existing NAS interface by the CIFS protocol. Wait a few moments to access it again.

- If Spanning Tree Protocol (STP) is implemented into the LAN switch for connecting to NAS ports, when the STP function is enabled, access to the shared folders may fail.
  Take the following steps to disable the STP function:

  - When the STP function is not required for network configuration:
    Disable the STP function of the LAN switch.

  - When the STP function is required for network configuration:
    At only the NAS port connected part of the connection ports of the LAN switch, disable the STP function or configure Port-Fast.

3.6.3.3   NAS File System Environment Settings

Configures the NAS file system environment settings

DNS Server

The ETERNUS Disk storage system NAS file system sets the DNS Server for performing name resolution.

A primary DNS Server and secondary DNS Server can be registered.

Information

When Active Directory authentication Servers on which the DNS feature is enabled are registered in the ETERNUS Disk storage system, name resolution is performed using the DNS feature on the Active Directory authentication server. In this case, the DNS Server information can be displayed on Web Console.

Authentication Server

Perform configuration of the authentication server to perform client access control to the NAS file system.

Depending on the type of protocol for access, specify the following for the authentication method:

Active Directory

　Specify this when accessing the NAS file system using the CIFS protocol.

LDAP

　Specify this when accessing the NAS file system using the NFS protocol.

Note

- The authentication methods that can be operated differ with each protocol. For this reason, when the shared folder is accessed with an authentication method that is not supported, the authentication system does not operate.

- In the operation using Active Directory, it is required to synchronize the time between the ETERNUS Disk storage system and the Active Directory installed authentication server. It is recommended to automatically correct the time by Network Time Protocol (NTP).

- When a local user/local group for connecting to NAS is created on the ETERNUS Disk storage system, you cannot set up an authentication server.

It is possible to register a maximum of 3 authentication servers for each authentication method.

See

Refer to "Configure Authentication Server" in the *Web Console Guide* for information on settings using Web Console.

Set the access authority to the owner and the group if necessary for the shared folder made by "3.6.3.1 Creating Shared Folder" after setting the authentication server.

3.6.4 Operation Method

This section explains the operation method for performing ETERNUS Disk storage system NAS operations with this product.

The functions that can be executed during operation are as follows:

- Access to Shared Folder
- Changing Basic Setting for Shared Folder
- Changing Access Setting for Shared Folder
- Changing NAS Interface
- Changing NAS Server Name
- Changing DNS Server
- Changing Authentication Server
- Activating Sharing
- Stopping Sharing
- Configuring NAS Backup
- Setting/Changing/Disabling NAS Snapshot
- Snapshot Reference
- Restoring from Snapshot
- Start Automatic Snapshot Collection
- Stop Automatic Snapshot Collection
- Adding Quota Settings (User/Group)
- Changing Quota Settings (User/Group)
- Deleting Quota Settings (User/Group)
- Adding Quota Settings (Shared Folder)
- Changing Quota Settings (Shared Folder)
- Deleting Quota Settings (Shared Folder)
- Performance Management for NAS Volume and NAS System
- Capacity Management of Thin Provisioning Pool
- Expansion of NAS File System
- Deleting of NAS Environment

3.6.4.1 Access to Shared Folder

The access method to the shared folder is the following:

- Access Using CIFS Protocol
- Access Using NFS Protocol

Access Using CIFS Protocol

The shared folder is accessible by the Windows file sharing or network drive mapping.

Enter the following format to the address bar or to the network drive mapping window:

```
\\nasInterfaceIpAddress\sharedFolderName
```

When the shared folder is home directory, enter the following format.

```
\\nasInterfaceIpAddress\userName
```

When authenticating by Active Directory, the operation method varies depending on the presence of setup of an authentication server.

- If Active Directory is configured as an authentication server:
  Enter the user name and password registered to Active Directory.
  When connecting from the client participating in Active Directory, authentication is not needed.

- If an authentication server is not set up:
  Enter the user name and password described in the ETERNUS Disk storage system manuals or local user name and password registered in the ETERNUS Disk storage system for connecting to NAS.

Information
. . . .
Entering the IP address for NAS interface in the address bar can view sharable folders.
. . . .

Access Using NFS Protocol

The shared folder is accessible by performing the NFS mount from a UNIX server using the following procedure:

When authenticating through LDAP, there is no difference in operation method with the presence of setup of an authentication server. Make the UNIX server participate in the LDAP domain to perform the NFS mount.

1. Check the NFS export path for the shared folder.
   The **NFS Export Path** displayed in the **Basic** tab of the Detail Shared Folder screen is the shared folder path.
   Refer to "Display Shared Folder" in the *Web Console Guide* for the procedure to display the **Basic** tab of the Detail Shared Folder screen.

2. Log in to the UNIX server with administrator privileges.

3. Execute the "mount" command to mount the shared folder.
   When executing the "mount" command, specify the following:

   For Solaris

   ```
   mount -F nfs nasInterfaceIpAddress:nfsExportPath mountDestinationDir
   ```

   For Linux

   ```
   mount -t nfs nasInterfaceIpAddress:nfsExportPath mountDestinationDir
   ```

Information
. . . .
- Executing the "showmount" command on the UNIX server can view NFS mountable shared folders.

  ```
  showmount -e nasInterfaceIpAddress
  ```

- The format for the *nfsExportPath* is as follows:

  ```
  /mnt/nas/nvnasVolumeNumber/data/sharedfolderName
  ```
. . . .

After NFS mounted, logging in to the UNIX server as the user registered to LDAP can access the shared folder with the owner/group permissions set to the shared folder.

When not authenticating through LDAP, logging in to the UNIX server can access the shared folder.

3.6.4.2   Changing Basic Setting for Shared Folder

The items of the shared folder can be changed. The items that can be changed are as follows:

- Oplocks Configuration (when the protocol is CIFS or both CIFS and NFS)

- Data Access SMB Encryption (when the protocol is CIFS or both CIFS and NFS)

- Enumeration Based on Access Permission Settings (when the protocol is CIFS or both CIFS and NFS)

- Writing Authority

Note

- When the configuration of a shared folder is changed, sharing is temporarily suspended and it is not possible to access the shared folder. When the changes to the shared folder are complete, sharing is automatically resumed.

- When data access encryption is enabled, clients that do not support SMB 3.0 cannot access the shared folder.

- When accessing the shared folder for which CIFS access permission is configured with CIFS protocol, priority is given to CIFS access permission settings, and the write permission settings are disabled.

- For "homes" that is the shared folder for home directory, the settings in the following items cannot be changed:

    - Enumeration Based on Access Permission Settings

    - Writing Authority

See

Refer to "Change Shared Folder" in the *Web Console Guide* for information on how to make changes to the shared folder using Web Console.

3.6.4.3   Changing Access Setting for Shared Folder

The items of the shared folder can be changed. The items that can be changed are as follows:

- Owner/Group of Shared Folder

- Hosts Permitted Access

- Hosts Denied Access (When the protocol is CIFS or both CIFS and NFS)

- Hosts Allowed Access with root privilege (When the protocol is NFS or both CIFS and NFS)

- User/Group Privileges that Permits CIFS Access

Note

- When the shared folder settings have been changed, since the share is temporarily stopped, the shared folder gets inaccessible. When the change of the shared folder has been completed, the share is automatically resumed.

- If CIFS access permission is configured, users/groups that are not permitted to access cannot access the shared folder with CIFS protocol. Also, if other access permission level is specified for a user and a group to which the user belongs, priority is given to "Read/Write".

- When a user/group for which Read/Write permission is configured with CIFS access permission accesses the shared folder, even if "No" is set for write permission to shared folder, the shared folder is writable.

- For "homes" that is the shared folder for home directory, the setting in the following item cannot be changed:

    - User/Group Privileges that Permits CIFS Access

- When changing a host to which access is allowed with root privileges, change it according to the instruction listed in [Note] of "Host Access Configurations of Shared Folder" in "3.6.3.1 Creating Shared Folder".

See

Refer to "Change Shared Folder" in the *Web Console Guide* for information on how to make changes to the shared folder using Web Console.

3.6.4.4 Changing NAS Interface

The items of the NAS interface can be changed. The items that can be changed are as follows:

- IP Address

- RIP Setting

- Port

- Redundant port

- Member ports of bonding port

- Operating mode of bonding port

Information

- Only when a new port is set to the NAS interface to which the port is not set, the setting of the port can be changed.

- The following ports cannot be selected as the port:

    - Member ports of bonding port

- The following ports cannot be selected for Redundant ports:

    - Port of same CM as assignment Allocation port

    - Redundant port of other port

    - Member ports of bonding port

- The following ports cannot be selected as member ports of bonding port:

    - Port of CM different from the master port

    - Port to which a NAS interface has already been assigned

    - Duplicated port

    - Master ports of bonding port

- It is not possible to delete all member ports and disable port bonding.

- The NAS interface IP addresses allocated for the ports on which redundancy has been set cannot be changed.

- With ETERNUS SF, the same operating mode and hash policy are set for the ports and Redundant ports. When a different operating mode is set for the Redundant ports using the ETERNUS Disk storage system CLI etc, the Redundant port side operating mode shall be set to the same setting as the port side operating mode when an ETERNUS SF NAS interface operation takes place.

See

Refer to "Change NAS Interface" in the *Web Console Guide* for information on how to change NAS interface using Web Console.

Note

When changing the settings of the Redundant port, access to the shared folder using the CIFS protocol shall become temporarily impossible.

3.6.4.5　Changing NAS Server Name

Changes the name of the NAS Server. It is also possible to return it to the same setting as when the ETERNUS Disk storage system was shipped.

See
. . . .
Refer to "Change NAS Server Name" in the *Web Console Guide* for the procedure for configuring from Web Console.
. . . .

Note
. . . .
When the Active Directory authentication Server is configured, delete the Active Directory authentication server before changing the name of the NAS Server. Refer to "Deleting Authentication Server" for how to delete the authentication server. Re-register the Active Directory Server, as well, after changing the NAS Server name.
. . . .

3.6.4.6　Changing DNS Server

Change the DNS Server settings. The change procedure and items that can be changed are the same as when configuring the DNS Server. Refer to "DNS Server".

3.6.4.7　Changing Authentication Server

The values of the authentication server can be changed.

The steps for making changes and the items that can be changed are the same as those when configuring the authentication server. Refer to "3.6.3.3 NAS File System Environment Settings".

Point
. . . .
When changing the domain administrator name of the authentication server, it is necessary to re-enter the password of the domain administrator. When changing items other than the domain administrator name, the password of the domain administrator is not required.
. . . .

3.6.4.8　Activating Sharing

The sharing status of the shared folder can be activated.

When sharing is activated, it is possible to access the shared folder via the NAS interface.

See
. . . .
Refer to "Change NAS Interface" in the *Web Console Guide* for information on how to change NAS interface using Web Console.
. . . .

3.6.4.9　Stopping Sharing

The sharing status of the shared folder can be stopped.

When sharing is stopped, it is not possible to access the shared folder.

See
. . . .
Refer to "Start/Stop Sharing" in the *Web Console Guide* for information on the procedure using Web Console.
. . . .

3.6.4.10 Configuring NAS Backup

Configures the backup of NAS volume data.

For the NAS backup configuration, apart from creating a NAS backup volume, a copy group and copy pair can be configured.

If NAS backup is not set up, this function is enabled to create a NAS volume backup system.

Configure the following for the NAS volume:

- NAS Backup Volume

- Copy Group

- Copy Pair

NAS Backup Volume

This is the volume for backup of the data of the NAS volume.

When there is no NAS backup volume, create a new NAS backup volume. Where there is a NAS backup volume, you can choose to either create a new NAS backup volume or use an existing NAS backup volume.

The NAS backup volume is created with the following details.

Volume Name	*nasVolumeName*$bak_*N* (*1)
Capacity	Same as the source NAS volume
Volume Type	Same as the source NAS volume
Thin Provisioning Pool of the Creation Destination	User Selection

*1: "*N*" is a sequential number from 0. The number of digits varies.

Point

For increased reliability, it is recommended to create Thin Provisioning Pools of the creation destination for the NAS backup volume and the NAS volume in separate Thin Provisioning Pools.

Copy Group

This is a group for defining copy pairs of a NAS volume and a NAS backup volume.

If no copy group definition for backup exists, a copy group is automatically created with the following settings:

Copy Group Name	NAS_QuickOPC_nasVolumeName_*N* (*1,*2)
Copy Group Type	QuickOPC

*1: "*N*" is a sequential number from 0. The number of digits varies.

*2: Characters other than those listed below in nasVolumeName are replaced with hash (#):
One-byte alphanumeric character, minus (-), underscore (_), hash (#), period (.), plus (+)

Copy Pair

This is a copy pair of a source NAS volume and backup NAS volume.

It is created when creating a copy group.

See

Refer to "Set NAS Backup" in the *Web Console Guide* for information on how to configure steps using Web Console.

....

- When it is possible to execute this function from Web Console, the NAS backup configuration is not setup or is incomplete. When constructing a backup system of the NAS volume, implement this task.

- When configuring NAS backup or backing up the NAS volume, an ETERNUS SF AdvancedCopy Manager Local Copy License is required.

....

3.6.4.11　Setting/Changing/Disabling NAS Snapshot

Configures the NAS snapshot settings. Disabling NAS snapshot also uses this operation. The items that can be set are as follows:

- Whether automatic snapshot is used

- Number of snapshot generations

- Schedule configuration (cycle, day, time)

- RAID group on which NAS snapshot volume created (can only be set when newly set)

 Note

....

- When disabling the NAS snapshot settings, the snapshots already captured are discarded. The NAS snapshot volumes are also deleted.

- When using the snapshot function, enable SNMP Trap Setup. If SNMP Trap Setup is not enabled, snapshot collection result is not notified. Refer to "Change ETERNUS Disk Storage System Information" in the *Web Console Guide* for the procedure to change SNMP Trap Setup via Web Console.

- If snapshot settings for NAS volume is Manual mode, this operation cannot be executed. To set up/change/cancel Manual mode, refer to the ETERNUS Disk storage system manuals.

....

 P Point
....

- When a new NAS snapshot is set, a NAS snapshot volume is automatically created on the specified RAID group.

- The snapshot is collected based on the time set for the ETERNUS Disk storage system.

- The RAID group on which the NAS snapshot volume is created cannot be modified while the NAS snapshot is in use. Reconfigure after disabling the NAS snapshot settings.

- When a new NAS snapshot is configured, it automatically goes into start state.

....

 See
....

Refer to "Set/Change/Release NAS Snapshot" in the *Web Console Guide* for the procedure for setting via Web Console.

....

3.6.4.12　Snapshot Reference

The captured snapshot is referenced from the client in the following way.

- Where the client server is the Windows environment
  The captured snapshot can be referenced as the "previous version" using the Windows OS VSS feature.

- Where the client server is the Linux/Solaris environment
  The data in the shared folder when a snapshot was captured from ".snap" under the shared folder mounted on the client can be referenced. Each snapshot is in a directory named below:

Directory Name	@GMT-*yyyy.mm.dd-hh.mm*.00 (*yyyy.mm.dd-hh.mm* is the time that a snapshot was captured (Greenwich Mean Time). The second is rounded down.)

Point

Users can access the ".snap" directory. However, since ".snap" is a virtual directory, it is not displayed. The following is the example of a directory content displayed by the "ls" command:

```
[root@esf nas]# ls -a
.  ..  dir1 dir2 nas.txt
[root@esf nas]# ls .snap
@GMT-2014.06.11-08.00.00  @GMT-2014.06.11-09.00.00  @GMT-2014.06.11-10.00.00
```

3.6.4.13 Restoring from Snapshot

It is possible to restore files and folders that have been modified/deleted due to operator error using the captured snapshot. The restore procedure is as follows:

- Where the client server is the Windows environment
  The snapshot to be restored can be specified and executed from "Restoring a previous version" using the Windows OS VSS feature.

- Where the client server is the Linux/Solaris environment
  There are directories for each snapshot in the ".snap" directory under the shared folder. Copy the files or directories you want to restore to the shared folder from the snapshots using the OS function.

Note

When data inconsistency is found in a snapshot, trace back the data through generations.

3.6.4.14 Start Automatic Snapshot Collection

Starts automatic snapshot collection.

See

Refer to "Start/Stop Automatic Snapshot Collection" in the *Web Console Guide* for the procedure for setting via Web Console.

3.6.4.15 Stop Automatic Snapshot Collection

Stops automatic snapshot collection.

See

Refer to "Start/Stop Automatic Snapshot Collection" in the *Web Console Guide* for the procedure for setting via Web Console.

3.6.4.16 Adding Quota Settings (User/Group)

Sets limits on the quantity consumed of disk/number of files for users/groups.
The following items are set:

- NAS volume

- Restricted users/groups

- Disk Space (Warning, Limit)

- File Count (Warning, Limit)

ⓟ Point
....
- Quotas can be set for users and groups that are registered on the authentication server.

- When accessing a shared folder with CIFS protocol, quotas can be set for users.
  When accessing a shared folder with NFS protocol, quotas can be set for users and groups.
....

📖 See
....
Refer to "Add Quota Setting" in the *Web Console Guide* for the procedure for setting via Web Console.
....

📝 Note
....
The users/groups that can be added with one quota configuration are as follows:

- Total number of user name characters within 2,048

- Total number of group name characters within 2,048

When exceeding the above described number of characters when configuring, add quota configurations by dividing into multiple instances.
....

3.6.4.17   Changing Quota Settings (User/Group)

Changes the quantity consumed of disk/file number limits for users/groups.
The items that can be changed are as follows:

- Disk Space (Warning, Limit)

- File Count (Warning, Limit)

📖 See
....
Refer to "Change Quota Setting" in the *Web Console Guide* for the procedure for changing via Web Console.
....

3.6.4.18   Deleting Quota Settings (User/Group)

Disables the quantity consumed of disk/file number limits for users/groups.

After deleting, the quantity consumed of disk/file number limits for users/groups are "unlimited".

📖 See
....
Refer to "Delete Quota Setting" in the *Web Console Guide* for the procedure for deleting via Web Console.
....

3.6.4.19   Adding Quota Settings (Shared Folder)

Sets limits on the quantity consumed of disk/number of files for shared folders.
The items that can be changed are as follows:

- Disk Space (Warning, Limit)

- File Count (Warning, Limit)

3.6.4.20　Changing Quota Settings (Shared Folder)

Changes the quantity consumed of disk/file number limits for shared folders.
The items that can be changed are as follows:

- Disk Space (Warning, Limit)

- File Count (Warning, Limit)

3.6.4.21　Deleting Quota Settings (Shared Folder)

Disables the quantity consumed of disk/file number limits for shared folders.

After deleting, the quantity consumed of disk/file number limits for shared folders are "unlimited".

3.6.4.22　Performance Management for NAS Volume and NAS System

The performance of NAS volume and NAS system can be managed.

Refer to "3.2 Performance Management" for details.

 Information
. . . .
- The performance monitoring and threshold monitoring functions cannot be used for NAS port.

- The threshold monitoring function cannot be used for NAS volume and NAS system.
. . . .

3.6.4.23　Capacity Management of Thin Provisioning Pool

Capacity management for the Thin Provisioning Pool in which the NAS volume is created is implemented.

Refer to "3.5 Thin Provisioning Management" for details.

3.6.4.24 Expansion of NAS File System

Expansion of the NAS file system can be performed.

- Expansion of NAS Volume
  This is performed when there is a possibility that total free space on the NAS volume on which the NAS file system has been created may be insufficient.

- Expansion of Thin Provisioning Pool
  This is performed when there is a possibility that the used capacity of the Thin Provisioning Pool in which the NAS volume is created may exceed the total capacity.

Expansion of NAS Volume

NAS volume expansion is performed using the following procedure:

1. Confirms the total free capacity for the NAS volume.

   Confirms the total free capacity of the NAS volume from Web Console.
   Expand the NAS volume capacity based on the size of the free capacity.

   ### 🖼 See
   ....
   Refer to "Display Shared Folder" in the *Web Console Guide* for the procedure for displaying the total free capacity of the NAS volume from Web Console.
   ....

2. Disables NAS backup settings.

   When NAS backup has already been set for the NAS volume to be expanded, this releases the NAS backup settings.

   ### 🖼 See
   ....
   Refer to "Deleting NAS Backup Settings" in the *AdvancedCopy Manager Operation Guide for Copy Control Module* for information on how to disable NAS backup settings.
   ....

3. Disable NAS snapshot settings.

   When NAS snapshot has already been set for the NAS volume to be expanded, this disables the NAS snapshot settings.

   ### 🖼 See
   ....
   Refer to "3.6.4.11 Setting/Changing/Disabling NAS Snapshot" for how to delete NAS snapshot settings.
   ....

4. Expands NAS volume capacity.

   Expands the NAS volume capacity using a new provisioning volume capacity extension function from Web Console.

   ### 🖼 See
   ....
   Refer to "Expand Capacity of Thin Provisioning Volume" in the *Web Console Guide* for the procedure for expanding capacity via Web Console.
   ....

   ### 📒 Note
   ....
   - The NAS volume cannot be expanded in the following cases.

       - Where there is a copy session on the NAS volume

       - A NAS snapshot is configured on the NAS volume

- NAS backup volume and NAS system volume cannot be expanded

- When NAS backup or NAS snapshot operation is continued after expansion of the NAS volume, reconfigure after expansion.

Expansion of Thin Provisioning Pool

Expansion of the Thin Provisioning Pool in which the NAS volume is created is implemented with the following steps.

1. Confirm the capacity of the Thin Provisioning Pool.
   Confirm the capacity of the Thin Provisioning Pool in which the NAS volume is created.
   Refer to "3.6.4.23 Capacity Management of Thin Provisioning Pool".
   Depending on the size of the available capacity of the Thin Provisioning Pool, perform the expansion of the capacity of the Thin Provisioning Pool with the following steps.

2. Expand the capacity of the Thin Provisioning Pool.
   Perform the expansion of the capacity of the Thin Provisioning Pool from Web Console.

See

Refer to the "Expand Capacity of/Format/Change Threshold Value of/Delete Thin Provisioning Pool" in the *Web Console Guide* to expand capacity.

A disk that is not being used is necessary to expand the capacity of the Thin Provisioning Pool. Add more disks as needed before performing the extension of the capacity.
Refer to the manual included with the ETERNUS Disk storage system for information on how to add disks.

3.6.4.25 Deleting of NAS Environment

This section explains the steps for deleting the NAS environment.

The deletion is performed with the following steps.

Table 3.4 Dismantling of NAS Environment

Order	Item	Title of Sections Listed in Web Console Guide
1	Disable NAS Snapshot	Set/Change/Release NAS Snapshot
2	Deleting Authentication Server	Configure Authentication Server
3	Deleting DNS Server	Configure DNS Server
4	Deleting NAS Interface	Delete NAS Interface
5	Deleting NAS Backup Settings	Delete NAS backup settings
6	Deleting Shared Folder	Delete Shared Folder
7	Deleting NAS Volume	Delete Volume

Note

When these steps are implemented, the NAS environment is deleted. All the data that had been stored on the NAS volume and the NAS backup volume are deleted. Do not implement this step except when deleting the NAS environment.

Disable NAS Snapshot

Disables the settings for NAS snapshot.

When dismantling the NAS environment, disable the NAS snapshot settings for all of the NAS volumes. When disabling the NAS snapshot settings individually, specify the target NAS volume and delete.

When disabling the NAS snapshot settings, the snapshots already captured are discarded. The NAS snapshot volumes are also deleted.

Deleting Authentication Server

The authentication server is deleted from the configuration.

Delete domain information and all authentication server information when you dismantle the NAS environment.

See

Refer to "Configure Authentication Server" in the *Web Console Guide* for the procedure with Web Console.

Point

After deleting the authentication server, quota cannot be added, changed or deleted.
When a NAS volume targeted for quota management is deleted, the quota setting is also deleted.

Deleting DNS Server

Deletes the DNS Server.

When dismantling the NAS environment, delete all the information from the primary server and secondary server.

See

Refer to "Configure DNS Server" in the *Web Console Guide* for the delete procedure.

Deleting NAS Interface

Deletes the NAS interface.

When deleting the NAS environment, be sure to delete all NAS interfaces. In order to delete a specific NAS interface, specify the chosen NAS interface and execute the deletion.

See

Refer to "Delete NAS Interface" in the *Web Console Guide* for information on how to delete.

Point

When the following two conditions are met, the redundancy of ports is removed:

- All NAS interfaces are deleted from Allocation ports.

- A Redundant port is set to an Allocation port.

Deleting NAS Backup Settings

Deletes the NAS backup settings.

Select "Yes" to **Delete NAS Backup Volume**, and delete the copy group, copy pair, and NAS backup volume.

 Information
....
Even if all shared folders have been deleted, the NAS backup settings are not deleted. When deleting NAS backup settings, such as when reconfiguring the NAS file system, delete the settings from Web Console.
....

Deleting Shared Folder

Deletes the shared folder.

When deleting the NAS environment, be sure to delete all shared folders. In order to delete a specific shared folder, specify a shared folder of choice and execute the deletion.

 Note
....
- Delete the files and the folders in the shared folders beforehand.
  When the files or the folders are existed in the shared folder, it is an error of the deletion the shared folders.

- If you delete "homes" that is the shared folder for home directory, before deleting "homes", use the Clear NAS Data function of the ETERNUS Disk storage system to delete all the files and folders (including home directory) under "homes". Refer to the ETERNUS Disk storage system manuals for details about the Clear NAS Data function.

- The shared folder at the time of being accessed from the client might not be able to be deleted.
  Delete this after stopping access to the shared folder.
....

Deleting NAS Volume

Deletes the NAS volume.

 Information
....
Even if all shared folders have been deleted, the NAS volume is not deleted. In order to delete the NAS volume, perform the deletion from Web Console.
....

 Point
....
In the following cases, the volume for NAS cannot be deleted from Web Console.

- When a shared folder is present on the NAS volume

- When the NAS backup volume is mounted

- When the volume is a NAS system volume

Delete the NAS system volume from the ETERNUS Disk storage system. Refer to the ETERNUS Disk storage system manuals for the deletion procedure.

. . . .

3.7 Model Upgrade for ETERNUS Disk Storage System

When applying Model upgrade options for ETERNUS Disk storage system, ETERNUS SF Manager cannot manage the corresponding ETERNUS Disk storage system since the device information of it is changed.

Reload configuration information and delete the license registered with ETERNUS Disk storage system. Then, re-register the license with ETERNUS Disk storage system.

Refer to "Operation on Model Upgrade for ETERNUS Disk Storage System" in the *Web Console Guide* for details on the operation procedures.

When you use the performance management function, update configuration information of the performance management function in reference to "3.2.2.8 Updating Configuration Information".

Chapter 4   Maintenance

This chapter describes the maintenance of Express's manager.

4.1   Maintenance of Express's Manager Environment (Windows)

4.1.1   Backing Up Express's Manager Environment (Windows)

It is required to back up the Express's manager environment to recover from failure on the Management Server.
Perform the following procedure to back up the Express's manager environment.
Perform all operations on the Management Server.

📖 Information

⋯⋯⋯

Notation in Procedure

Directory Name	Explanation
$BAK_DIR	This is a backup destination directory.
$INS_DIR	This is the "Program Directory" specified at the ETERNUS SF Manager installation.
$ENV_DIR	This is the "Environment Directory" specified at the ETERNUS SF Manager installation.
$TMP_DIR	This is the "Work Directory" specified at the ETERNUS SF Manager installation.

⋯⋯⋯

1. Stop the ETERNUS SF Express Tomcat service.

   Open Service Control Manager to stop the following service.

   - ETERNUS SF Express Tomcat Service

2. Create the backup data.

   a. Using Explorer or a similar program, create the following backup destination directory.

      - $BAK_DIR\Common

   b. Execute the following command to create the backup data. If you have not changed the port number, specify the default value 15432 to *portNumber*. If you have changed the port number, specify the changed port number to *portNumber*. The file name of the created backup data is *fileName*.

   ```
   > $INS_DIR\Common\sys\postgres\bin\pg_dump -U esfpostgres -C --attribute-inserts -p
   portNumber -f $BAK_DIR\Common\fileName esfdb
   ```

   The prompt is displayed, and waiting for input. Input the following strings.

   ```
   master01!
   ```

3. Execute the following batch to stop the ETERNUS SF Manager services.

   ```
   > $INS_DIR\Common\bin\Stop_ESFservice.bat
   ```

📖 Information

⋯⋯⋯

When the batch is executed, the message that ETERNUS SF Manager Tomcat Service has been already stopped is displayed many times. Ignore because there is no problem.

⋯⋯⋯

4. Back up files related to the performance management function.

This step can be skipped if you are not using the performance management function. If there is no subdirectories or files, you do not need to back up.

   a. Using Explorer or a similar program, create the following backup destination directories.

     - $BAK_DIR\ESC\Manager\etc\opt\FJSVssmgr\current

     - $BAK_DIR\ESC\Manager\etc\opt\FJSVssmgr\current\perfconf

     - $BAK_DIR\ESC\Manager\var\opt\FJSVssmgr\current\perf

   b. Using Explorer or a similar program, copy the following backup source file to its backup destination directory.

Backup Source File	Backup Destination Directory
$ENV_DIR\ESC\Manager\etc\opt\FJSVssmgr\current\perf.conf	$BAK_DIR\ESC\Manager\etc\opt\FJSVssmgr\current

   c. Using Explorer or a similar program, copy the subdirectories and files in the following backup source directories to their backup destination directories.

Backup Source Directory	Backup Destination Directory
$ENV_DIR\ESC\Manager\etc\opt\FJSVssmgr\current\perfconf	$BAK_DIR\ESC\Manager\etc\opt\FJSVssmgr\current\perfconf
$TMP_DIR\ESC\Manager\var\opt\FJSVssmgr\current\perf	$BAK_DIR\ESC\Manager\var\opt\FJSVssmgr\current\perf

5. Back up the other files which can be customized.

It is unnecessary to back up the files or the directories which do not exist.

   a. Using Explorer or a similar program, create the following backup destination directories.

     - $BAK_DIR\ESC\Manager\etc\opt\FJSVssmgr\current

     - $BAK_DIR\ESC\Manager\etc\opt\FJSVssmgr\current\eventmail

   b. Using Explorer or a similar program, copy the following backup source file to its backup destination directory.

Backup Source File	Backup Destination Directory
$ENV_DIR\ESC\Manager\etc\opt\FJSVssmgr\current\sanma.conf	$BAK_DIR\ESC\Manager\etc\opt\FJSVssmgr\current

   c. Using Explorer or a similar program, copy the subdirectories and files in the following backup source directory to their backup destination directory.

Backup Source Directory	Backup Destination Directory
$ENV_DIR\ESC\Manager\etc\opt\FJSVssmgr\current\eventmail	$BAK_DIR\ESC\Manager\etc\opt\FJSVssmgr\current\eventmail

6. Back up the role group configuration file.

This step can be skipped if you have not customized the role group configuration file or if the file does not exist.

   a. Using Explorer or a similar program, create the following backup destination directory.

     - $BAK_DIR\Common\etc\authentication

   b. Using Explorer or a similar program, copy the file in the following backup source directory to its backup destination directory.

Backup Source Directory	Backup Destination Directory
$ENV_DIR\Common\etc\authentication	$BAK_DIR\Common\etc\authentication

7. Back up the polling service setting file.

   This step can be skipped if you have not customized the polling service setting file. If you have customized the polling service setting file "pollingService.xml", back up it using the step shown below.

   a. Using Explorer or a similar program, create the following backup destination directory.

      - $BAK_DIR\ESC\Manager\etc\opt\FJSVssmgr\current\polling

   b. Using Explorer or a similar program, copy the following backup source file to its backup destination directory.

Backup Source File	Backup Destination Directory
$ENV_DIR\ESC\Manager\etc\opt\FJSVssmgr \current\polling\pollingService.xml	$BAK_DIR\ESC\Manager\etc\opt\FJSVssmgr \current\polling

8. Back up files related to the definition of copy groups and copy pairs.

   This step is required only if you are using the Advanced Copy function.

   a. Using Explorer or a similar program, create the following backup destination directories.

      - $BAK_DIR\CCM\etc
      - $BAK_DIR\CCM\etc\db
      - $BAK_DIR\CCM\etc\db\cg
      - $BAK_DIR\CCM\etc\prop
      - $BAK_DIR\CCM\var\micc\database

   b. Using Explorer or a similar program, copy the following backup source files to their backup destination directories.

Backup Source File	Backup Destination Directory
$ENV_DIR\CCM\etc\db\eternus.xml	$BAK_DIR\CCM\etc\db
$TMP_DIR\CCM\var\micc\database \DeviceRegList.xml	$BAK_DIR\CCM\var\micc\database

   c. If the following backup source files exist, copy them to their backup destination directories using Explorer or a similar program.

Backup Source File	Backup Destination Directory
$ENV_DIR\CCM\etc\prop\user.properties	$BAK_DIR\CCM\etc\prop
$ENV_DIR\CCM\etc\stxc.alias	$BAK_DIR\CCM\etc
$ENV_DIR\CCM\etc\stxc_ext.alias	
$ENV_DIR\CCM\etc\stxcvolinf	

   d. Using Explorer or a similar program, copy the subdirectories and files in the following backup source directory to their backup destination directory.

Backup Source Directory	Backup Destination Directory
$ENV_DIR\CCM\etc\db\cg	$BAK_DIR\CCM\etc\db\cg

9. Back up the license management database.

   a. Using Explorer or a similar program, create the following backup destination directory.

      - $BAK_DIR\LM

b. Execute the following command. The file specified with *fileName* is created as a backup file.

```
> $INS_DIR\LM\bin\esflm backup $BAK_DIR\LM\fileName
```

10. Execute the following batch to start the ETERNUS SF Manager services.

```
> $INS_DIR\Common\bin\Start_ESFservice.bat
```

4.1.2 Restoring Express's Manager Environment (Windows)

If any failure occurs in the Management Server, perform the following procedure to restore Express's manager environment.
Perform all operations on the Management Server.

Information

Notation in Procedure:

Directory Name	Explanation
$BAK_DIR	This is a backup destination directory.
$INS_DIR	This is the "Program Directory" specified at the ETERNUS SF Manager installation.
$ENV_DIR	This is the "Environment Directory" specified at the ETERNUS SF Manager installation.
$TMP_DIR	This is the "Work Directory" specified at the ETERNUS SF Manager installation.

1. Reconfigure the Express's manager.

   Install the ETERNUS SF Manager and set up it as the Express's manager.
   Refer to "Installation of ETERNUS SF Manager" and "Setup of ETERNUS SF Manager" in the *Installation and Setup Guide* for details on how to install and setup.

2. Stop the ETERNUS SF Express Tomcat service.

   Open Service Control Manager to stop the following service.

   - ETERNUS SF Express Tomcat Service

3. Restore the backup data.

   a. Execute the following command. If you have not changed the port number, specify the default value 15432 to *portNumber*. If you have changed the port number, specify the changed port number to *portNumber*.

   ```
   > $INS_DIR\Common\sys\postgres\bin\psql -U esfpostgres -p portNumber postgres
   ```

   The prompt is displayed, and waiting for input. Input the following strings in order.

   ```
   master01!
   drop database esfdb;
   \q
   ```

   b. Execute the following command to restore the backup data. If you have not changed the port number, specify the default value 15432 to *portNumber*. If you have changed the port number, specify the changed port number to *portNumber*. For *fileName*, input the file name which was specified when the backup data was created.

   ```
   > $INS_DIR\Common\sys\postgres\bin\psql -U esfpostgres -p portNumber -f $BAK_DIR\Common
   \fileName postgres
   ```

   The prompt is displayed, and waiting for input. Input the following strings.

   ```
   master01!
   ```

4. Execute the following batch to stop the ETERNUS SF Manager services.

```
> $INS_DIR\Common\bin\Stop_ESFservice.bat
```

🄖 Note

. . . .

When the batch is executed, the message that ETERNUS SF Manager Tomcat Service has been already stopped is displayed many times. Ignore because there is no problem.

. . . .

5. Restore files related to the performance management function.

This step can be skipped if you are not using the performance management function or if you are not backing up files related to the performance management function.
If you are upgrading from a previous version, restore only the files which were backed up in the previous version.

   a. Using Explorer or a similar program, delete files and subdirectories under the following restore destination directory. However, do not delete the restore destination directory itself. If the restore destination directory does not exist, create it.

      - $TMP_DIR\ESC\Manager\var\opt\FJSVssmgr\current\perf

   b. Using Explorer or a similar program, copy the following restore source file to its restore destination directory.

Restore Source File	Restore Destination Directory
$BAK_DIR\ESC\Manager\etc\opt\FJSVssmgr\current\perf.conf	$ENV_DIR\ESC\Manager\etc\opt\FJSVssmgr\current

   c. Using Explorer or a similar program, copy the subdirectories and files in the following restore source directories to their restore destination directories.

Restore Source Directory	Restore Destination Directory
$BAK_DIR\ESC\Manager\etc\opt\FJSVssmgr\current\perfconf	$ENV_DIR\ESC\Manager\etc\opt\FJSVssmgr\current\perfconf
$BAK_DIR\ESC\Manager\var\opt\FJSVssmgr\current\perf	$TMP_DIR\ESC\Manager\var\opt\FJSVssmgr\current\perf

6. Restore the other files which can be customized.

It is unnecessary to restore the files or the directories which have not been backed up.
If you are upgrading from a previous version, restore only the files which were backed up in the previous version.

   a. Using Explorer or a similar program, copy the following restore source file to its restore destination directory.

Restore Source File	Restore Destination Directory
$BAK_DIR\ESC\Manager\etc\opt\FJSVssmgr\current\sanma.conf	$ENV_DIR\ESC\Manager\etc\opt\FJSVssmgr\current

   b. Using Explorer or a similar program, copy the subdirectories and files in the following restore source directory to their restore destination directory.

Restore Source Directory	Restore Destination Directory
$BAK_DIR\ESC\Manager\etc\opt\FJSVssmgr\current\eventmail	$ENV_DIR\ESC\Manager\etc\opt\FJSVssmgr\current\eventmail

7. Restore the role group configuration file.

If the role group configuration file is not backed up, this step is unnecessary.

a. Check whether the following restore destination directory exist.
   If the directory does not exist, create it.

   - $ENV_DIR\Common\etc\authentication

b. Using Explorer or a similar program, copy the file in the following restore source directory to its restore destination directory.

Restore Source Directory	Restore Destination Directory
$BAK_DIR\Common\etc\authentication	$ENV_DIR\Common\etc\authentication

8. Restore the polling service setting file.

   It is unnecessary to restore the files which have not been backed up.

   Using Explorer or a similar program, copy the following restore source file to its restore destination directory.

Restore Source File	Restore Destination Directory
$BAK_DIR\ESC\Manager\etc\opt\FJSVssmgr\current\polling\pollingService.xml	$ENV_DIR\ESC\Manager\etc\opt\FJSVssmgr\current\polling

9. Restore files related to the definition of copy groups and copy pairs.

   This step is required only if you are using the Advanced Copy function.
   If you are upgrading from a previous version, restore only the files which were backed up in the previous version.

   a. Using Explorer or a similar program, delete files under the following restore destination directory.

      - $ENV_DIR\CCM\etc\db\cg

      In addition, if the following files exist, delete them.

      - $ENV_DIR\CCM\etc\prop\user.properties

      - $ENV_DIR\CCM\etc\stxc.alias

      - $ENV_DIR\CCM\etc\stxc_ext.alias

      - $ENV_DIR\CCM\etc\stxcvolinf

   b. Using Explorer or a similar program, copy the following restore source files to their restore destination directories.

Restore Source File	Restore Destination Directory
$BAK_DIR\CCM\etc\db\eternus.xml	$ENV_DIR\CCM\etc\db
$BAK_DIR\CCM\var\micc\database\DeviceRegList.xml	$TMP_DIR\CCM\var\micc\database

   c. If the following restore source files exist, copy them to their restore destination directories using Explorer or a similar program.

Restore Source File	Restore Destination Directory
$BAK_DIR\CCM\etc\prop\user.properties	$ENV_DIR\CCM\etc\prop
$BAK_DIR\CCM\etc\stxc.alias	$ENV_DIR\CCM\etc
$BAK_DIR\CCM\etc\stxc_ext.alias	
$BAK_DIR\CCM\etc\stxcvolinf	

   d. Using Explorer or a similar program, copy the subdirectories and files in the following restore source directory to their restore destination directory.

Restore Source Directory	Restore Destination Directory
$BAK_DIR\CCM\etc\db\cg	$ENV_DIR\CCM\etc\db\cg

10. Restore the license management database.

    If the license management database is not backed up (in case of upgrading from a previous version), this step is unnecessary.

    Execute the following command. For *fileName*, input the file name which was specified when the backup data was created.

    ```
    > $INS_DIR\LM\bin\esflm restore $BAK_DIR\LM\fileName
    ```

11. Execute the following batch to start the ETERNUS SF Manager services.

    ```
    > $INS_DIR\Common\bin\Start_ESFservice.bat
    ```

4.1.3   Changing Express's Manager Environment (Windows)

This section describes the following procedure:

- How to change the port numbers used in Express or Web Console

- How to change the IP address of the Management Server

4.1.3.1   Changing Port Numbers (Windows)

Changing Port Numbers Used in Express

This section describes how to change port number that is used by Express.

The port numbers are defined in the operating system's services file. The ports shown in the following table are used by Express. The default values for the port numbers are shown. If you have changed the value for these port numbers, read the numbers to replace after the change in this section.

Port Number	Service Name	Protocol	Note
9855	esfmanagerweb	tcp	Port number used for Web Console
1226	stgxfws	tcp	Port number used for configuration management and polling monitoring
24916	sscruiserm	tcp	Port numbers used inside Express

📖 Information

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Notation in Procedure:

- $INS_DIR: "Program Directory" specified at the ETERNUS SF Manager installation

- $ENV_DIR: "Environment Directory" specified at the ETERNUS SF Manager installation

. . . .

Perform the following procedure to change the port numbers used by Express.

1. Open the file "%SystemRoot%\system32\drivers\etc\services" with a notepad.

2. Pick out the entry of a service name to be changed to change its entry port number.
   A port number can be entered between 1024 and 65535. However, a port number from 5001 to 32768 is recommended.

   ```
   # <service name> <port number>/<protocol> [aliases...] [#<comment>]
   #
   stgxfws 1226/tcp
   esfmanagerweb 9855/tcp
   sscruiserm 24916/tcp
   ```

3. Save the "%SystemRoot%\system32\drivers\etc\services" file and close it.

4. Edit httpd.conf file if the port number used by Web Console is changed.

    a. Open the "$INS_DIR\Common\sys\apache\conf\httpd.conf" file with text editor.

    b. Replace the port number (9855) in red letters with the other port number listed immediately after the Listen directive.

```
Listen 9855
```

    c. Save the "$INS_DIR\Common\sys\apache\conf\httpd.conf" file and close it.

5. Restart services.

    a. Execute the following batch on the Management Server to stop the ETERNUS SF Manager services.

```
> $INS_DIR\Common\bin\Stop_ESFservice.bat
```

    b. Execute the following batch on the Management Server to start the ETERNUS SF Manager services.

```
> $INS_DIR\Common\bin\Start_ESFservice.bat
```

6. Create a server information change instruction file on the Management Server, then execute the "stgxfwcmmodsrv" command with the -f option specified to change the port numbers.

[Example] In the case that name of the server information change instruction file is "c:\acm\modfile".

```
> $INS_DIR\ACM\bin\stgxfwcmmodsrv -f c:\acm\modfile
```

7. Restart the Management Server.

See
....
Refer to "stgxfwcmmodsrv (Server Information Change Command)" in the *AdvancedCopy Manager Operation Guide* corresponding to the operating system of the Management Server for information on the "stgxfwcmmodsrv" command and the server information change instruction file.
....

Changing Port Numbers Used in Web Console

Web Console uses the following ports internally.

Port Number	Protocol	Note
28005	tcp	Port numbers used inside Web Console
28009	tcp	
28443	tcp	
15432	tcp	

If the above port numbers are used by other applications, Web Console cannot start. In this case, change the port numbers according to the following steps.

1. Execute the following batch on the Management Server to stop the ETERNUS SF Manager services.

```
> $INS_DIR\Common\bin\Stop_ESFservice.bat
```

2. Open the following files with text editor.

    - $INS_DIR\Common\sys\tomcat\conf\server.xml

    - $INS_DIR\Common\sys\apache\conf\httpd.conf

    - $ENV_DIR\Common\etc\db\data\postgresql.conf

    - $INS_DIR\Common\sys\tomcat\webapps\esf\WEB-INF\config\database.yml

3. Change the default port numbers (28005, 28009, 28443, and 15432) in red letters to other numbers.

   - server.xml

     Change the port number of the Server tag.

     ```
     <Server port="28005" shutdown="SHUTDOWN">
     ```

     Change the port number listed in the port of the Connector tag and redirectPort.

     ```
         <Connector port="28009" address="127.0.0.1"
                    enableLookups="false" redirectPort="28443" protocol="AJP/1.3" />
     ```

   - httpd.conf

     Change the port numbers of the ProxyPass and ProxyPassReverse directive.

     ```
     ProxyPass / ajp://localhost:28009/ timeout=900
     ProxyPassReverse / ajp://localhost:28009/
     ```

   - postgresql.conf

     Change the port number of the port directive.

     ```
     port = 15432                      # (change requires restart)
     ```

   - database.yml

     Change the port number of the port directive to the same number as described in postgresql.conf.

     ```
     port = 15432
     ```

4. Save and close these files.

5. Execute the following batch on the Management Server to start the ETERNUS SF Manager services.

   ```
   > $INS_DIR\Common\bin\Start_ESFservice.bat
   ```

Changing Port Number Used for ETERNUS SF SNMP Trap Service

Normally port 162/udp is used for the ETERNUS SF SNMP Trap Service used to monitor SNMP Traps using SNMPv3 protocol. However, when changing the port, take the following steps:

1. Edit the %SystemRoot%\system32\drivers\etc\services file to change the port number used for ETERNUS SF SNMP Trap Service. Edit the port number in the following line to a port number you want to change. (If this line is not listed, add the line.)

   ```
   escwksttr-trap      28162/udp
   ```

2. Stop the ETERNUS SF Manager.
   Refer to "Starting and Stopping Manager" in the *Storage Cruiser Operation Guide* for information on how to stop.
   Also, stop the ETERNUS SF SNMP Trap Service, too.

3. Start the ETERNUS SF Manager.
   Refer to "Starting and Stopping Manager" in the *Storage Cruiser Operation Guide* for information on how to start.
   Also, start the ETERNUS SF SNMP Trap Service, too.

4.1.3.2   Changing IP Address (Windows)

The following is the procedure to change the IP address of Management Server.

Information

Notation in Procedure:

- $INS_DIR: "Program Directory" specified at the ETERNUS SF Manager installation

Perform the following procedure to change the IP address of Management Server.

1. Execute the following batch file on the Management Server to stop the ETERNUS SF Manager services.

```
> $INS_DIR\Common\bin\Stop_ESFservice.bat
```

2. Change the IP address of the Management Server.

3. Execute the following batch file on the Management Server to start the ETERNUS SF Manager services.

```
> $INS_DIR\Common\bin\Start_ESFservice.bat
```

4. Create a server information change instruction file on the Management Server, then execute the "stgxfwcmmodsrv" command with the -f option specified to change the IP addresses.

   [Example] In the case that name of the server information change instruction file is "c:\acm\modfile".

```
> $INS_DIR\ACM\bin\stgxfwcmmodsrv -f c:\acm\modfile
```

5. If the IP address of the Management Server is specified for SNMP Trap destination, change the specified IP address using the ETERNUS Web GUI.
   Refer to the ETERNUS Web GUI manuals for more information.

6. Restart the Management Server.

7. Launch Web Console and connect to Express's manager running on the Management Server whose IP address has been changed.

See
....
Refer to "stgxfwcmmodsrv (Server Information Change Command)" in the *AdvancedCopy Manager Operation Guide* corresponding to the operating system of the Management Server for information on the "stgxfwcmmodsrv" command and the server information change instruction file.
....

4.1.3.3 Changing SNMP Communication Protocol

On Management Server that executes fault monitoring on devices using SNMPv1 protocol alone, when making the following operational environment changes, it is required to change SNMP Trap daemon settings.

- Add a device on which fault monitoring is executed with SNMPv3 protocol.

- Change the communication protocol of a fault monitoring executed device from SNMPv1 to SNMPv3.

1. Take the following steps to stop Express's manager.

   a. Click **Control Panel** > **System and Security** > **Administrative Tools** > **Services** to open the **Services** screen.

   b. Select the service "ETERNUS SF Manager Tomcat Service", and click **Stop**.

2. Take the following steps to stop the trap monitoring service.

   a. Open the **Services** screen.

   b. Select the service "SNMP Trap monitoring service", and click **Stop**.

3. Refer to either of the following sections in "When Monitoring Devices Using Only SNMPv3 Protocol or When Monitoring Devices Using SNMPv1 Protocol and SNMPv3 Protocol" in "SNMP Trap Setting (for Windows)" in " Setup of Express's Manager" in the *Installation and Setup Guide* to set up an environment.

   - Step 2 or later in "When Other Applications (Systemwalker Centric Manager, ServerView Resource Orchestrator, etc.) Using SNMP Traps Do Not Coexist".

   - Step 2 or later in "When Other Applications (Systemwalker Centric Manager, ServerView Resource Orchestrator, etc.) Using SNMP Traps Coexist".

4. After changing the SNMP Trap daemon settings, it is required to register SNMPv3 user information and set up SNMP v3 user to a managed device. Refer to "SNMPv3" in "SNMP Communication Authentication" in the *Storage Cruiser Operation Guide* for setting method.

4.1.3.4 Changing the SSL Version Settings for Communicating with Supported Devices

If you change the SSL version setting for communicating with the following devices that are registered for this product, restart the ETERNUS SF Manager if the protocol Maintenance-Secure TLSv1.2 is disabled, or TLSv1.2 and TLSv1.1 are disabled:

- ETERNUS DX60 S5/S4/S3

- ETERNUS DX100 S5/S4/S3

- ETERNUS DX200 S5/S4/S3

- ETERNUS AF150 S3

- ETERNUS AF250 S3/S2

- ETERNUS AF250

- ETERNUS DX200F

4.2 Maintenance of Express's Manager Environment (Linux)

4.2.1 Backing Up Express's Manager Environment (Linux)

It is required to back up the Express's manager environment to recover from failure on the Management Server.
Perform the following procedure to back up the Express's manager environment.
Perform all operations on the Management Server.

📖 Information

Notation in Procedure

Directory Name	Explanation
$BAK_DIR	This is a backup destination directory.

1. Stop the ETERNUS SF Manager Web service.

   Execute the following shell script to stop the service.

   ```
   # /opt/FJSVesfcm/bin/stop-webservice.sh
   ```

2. Create the backup data.

   a. Execute the following command to create the backup destination directory.

   ```
   # mkdir -p $BAK_DIR/Common
   ```

   b. Execute the following command to create the backup data. If you have not changed the port number, specify the default value 15432 to *portNumber*. If you have changed the port number, specify the changed port number to *portNumber*. The file name of the created backup data is *fileName*.

   ```
   # /opt/FJSVesfcm/postgres/bin/pg_dump -U esfpostgres -C --attribute-inserts -p portNumber -f $BAK_DIR/Common/fileName esfdb
   ```

   The prompt is displayed, and waiting for input. Input the following strings.

   ```
   master01!
   ```

3. Execute the following shell script to stop the ETERNUS SF Manager services.

   ```
   # /opt/FJSVesfcm/bin/stopesf.sh
   ```

📖 Information

. . . .

When the shell script is executed, the message that ETERNUS SF Manager Web Service has been already stopped is displayed many times. Ignore because there is no problem.

. . . .

4. Back up files related to the performance management function.

   This step can be skipped if you are not using the performance management function.

   a. Execute the following commands to create the backup destination directories.

   ```
   # mkdir -p $BAK_DIR/etc/opt/FJSVssmgr/current
   # mkdir -p $BAK_DIR/etc/opt/FJSVssmgr/current/perfconf
   # mkdir -p $BAK_DIR/var/opt/FJSVssmgr/current/perf
   ```

   b. Execute the following commands to copy the subdirectories and files to their backup destination directories.

   ```
   # cp -p /etc/opt/FJSVssmgr/current/perf.conf $BAK_DIR/etc/opt/FJSVssmgr/current/
   # cp -p /etc/opt/FJSVssmgr/current/perfconf/* $BAK_DIR/etc/opt/FJSVssmgr/current/perfconf/
   # cp -Rp /var/opt/FJSVssmgr/current/perf/* $BAK_DIR/var/opt/FJSVssmgr/current/perf/
   ```

5. Back up the other files which can be customized.

   It is unnecessary to back up the files or the directories which do not exist.

   a. Execute the following commands to create the backup destination directories.

   ```
   # mkdir -p $BAK_DIR/etc/opt/FJSVssmgr/current
   # mkdir -p $BAK_DIR/etc/opt/FJSVssmgr/current/eventmail
   ```

   b. Execute the following commands to copy the subdirectories and files to their backup destination directories.

   ```
   # cp -p /etc/opt/FJSVssmgr/current/sanma.conf $BAK_DIR/etc/opt/FJSVssmgr/current/
   # cp -Rp /etc/opt/FJSVssmgr/current/eventmail/* $BAK_DIR/etc/opt/FJSVssmgr/current/
   eventmail/
   ```

6. Back up the polling service setting file.

   This step can be skipped if you have not customized the polling service setting file. If you have customized the polling service setting file "pollingService.xml", back up it using the step shown below:

   a. Execute the following command to create the backup destination directory.

   ```
   # mkdir -p $BAK_DIR/etc/opt/FJSVssmgr/current/polling
   ```

   b. Execute the following command to copy the file to its backup destination directory.

   ```
   # cp -p /etc/opt/FJSVssmgr/current/polling/pollingService.xml $BAK_DIR/etc/opt/FJSVssmgr/
   current/polling/
   ```

7. Back up files related to the definition of copy groups and copy pairs.

   This step is required only if you are using the Advanced Copy function.

   a. Execute the following commands to create the backup destination directories.

   ```
   # mkdir -p $BAK_DIR/CCM/etc
   # mkdir -p $BAK_DIR/CCM/etc/db
   # mkdir -p $BAK_DIR/CCM/etc/db/cg
   # mkdir -p $BAK_DIR/CCM/etc/prop
   # mkdir -p $BAK_DIR/CCM/var/micc/database
   ```

b. Execute the following commands to copy the subdirectories and files to their backup destination directories.
It is unnecessary to back up files which do not exist.

```
# cp -p /etc/opt/FJSVccm/db/eternus.xml $BAK_DIR/CCM/etc/db
# cp -p /var/opt/FJSVccm/micc/database/DeviceRegList.xml $BAK_DIR/CCM/var/micc/database
# cp -p /etc/opt/FJSVccm/prop/user.properties $BAK_DIR/CCM/etc/prop
# cp -p /etc/opt/FJSVccm/accc/etc/stxc.alias $BAK_DIR/CCM/etc
# cp -p /etc/opt/FJSVccm/accc/etc/stxc_ext.alias $BAK_DIR/CCM/etc
# cp -p /etc/opt/FJSVccm/accc/etc/stxcvolinf $BAK_DIR/CCM/etc
# cp -Rp /etc/opt/FJSVccm/db/cg/* $BAK_DIR/CCM/etc/db/cg
```

8. Back up the license management database.

   a. Execute the following command to create the backup destination directory.

   ```
   # mkdir -p $BAK_DIR/LM
   ```

   b. Execute the following command. The file specified with *fileName* is created as a backup file.

   ```
   # /opt/FJSVesflm/bin/esflm backup $BAK_DIR/LM/fileName
   ```

9. Execute the following shell script to start the ETERNUS SF Manager services.

```
# /opt/FJSVesfcm/bin/startesf.sh
```

4.2.2 Restoring Express's Manager Environment (Linux)

If any failure occurs in the Management Server, perform the following procedure to restore Management Server environment.
Perform all operations on the Management Server.

Information

Notation in Procedure:

Directory Name	Explanation
$BAK_DIR	This is a backup destination directory.

1. Reconfigure the Express's manager.

   Install the ETERNUS SF Manager and set up it as the Express's manager.
   Refer to "Installation of ETERNUS SF Manager" and "Setup of ETERNUS SF Manager" in the *Installation and Setup Guide* for details
   on how to install and setup.

2. Stop the ETERNUS SF Manager Web service.

   Execute the following shell script to stop the service.

   ```
   # /opt/FJSVesfcm/bin/stop-webservice.sh
   ```

3. Restore the backup data.

   a. Execute the following command. If you have not changed the port number, specify the default value 15432 to
   portNumber. If you have changed the port number, specify the changed port number to *portNumber*.

   ```
   # /opt/FJSVesfcm/postgres/bin/psql -U esfpostgres -p portNumber postgres
   ```

   The prompt is displayed, and waiting for input. Input the following strings in order.

   ```
   master01!
   drop database esfdb;
   /q
   ```

b. Execute the following command to restore the backup data. If you have not changed the port number, specify the default value 15432 to *portNumber*. If you have changed the port number, specify the changed port number to *portNumber*. For *fileName*, input the file name which was specified when the backup data was created.

```
# /opt/FJSVesfcm/postgres/bin/psql -U esfpostgres -p portNumber -f $BAK_DIR/Common/fileName
postgres
```

The prompt is displayed, and waiting for input. Input the following strings.

```
master01!
```

4. Execute the following shell script to stop the ETERNUS SF Manager services.

```
# /opt/FJSVesfcm/bin/stopesf.sh
```

📖 Information
. . . .
When the shell script is executed, the message that ETERNUS SF Manager Web Service has been already stopped is displayed many times. Ignore because there is no problem.
. . . .

5. Restore files related to the performance management function.

This step can be skipped if you are not using the performance management function or if you are not backing up files related to the performance management function.

a. Execute the following commands to delete files and subdirectories under the following restore destination directories. However, do not delete the restore destination directories themselves. If the restore destination directories do not exist, create them.

```
# rm -f /etc/opt/FJSVssmgr/current/perf.conf
# rm -rf /etc/opt/FJSVssmgr/current/perfconf/*
# rm -rf /var/opt/FJSVssmgr/current/perf/*
```

b. Execute the following commands to copy the subdirectories and files in the backup locations to their restore destination directories.

```
# cp -p $BAK_DIR/etc/opt/FJSVssmgr/current/perf.conf /etc/opt/FJSVssmgr/current/
# cp -p $BAK_DIR/etc/opt/FJSVssmgr/current/perfconf/* /etc/opt/FJSVssmgr/current/perfconf/
# cp -Rp $BAK_DIR/var/opt/FJSVssmgr/current/perf/* /var/opt/FJSVssmgr/current/perf/
```

6. Restore the other files which can be customized.

It is unnecessary to restore the files or the directories which have not been backed up.

a. Execute the following commands to delete files and subdirectories under the following restore destination directories. However, do not delete the restore destination directories themselves. If the restore destination directories do not exist, create them.

```
# rm -f /etc/opt/FJSVssmgr/current/sanma.conf
# rm -rf /etc/opt/FJSVssmgr/current/eventmail/*
```

b. Execute the following commands to copy the subdirectories and files in the backup locations to their restore destination directories.

```
# cp -p $BAK_DIR/etc/opt/FJSVssmgr/current/sanma.conf /etc/opt/FJSVssmgr/current/
# cp -Rp $BAK_DIR/etc/opt/FJSVssmgr/current/eventmail/* /etc/opt/FJSVssmgr/current/
eventmail/
```

7. Restore the polling service setting file.

It is unnecessary to restore the files which have not been backed up.

Execute the following command to copy the file in the backup location to its restore destination directory.

```
# cp -p $BAK_DIR/etc/opt/FJSVssmgr/current/polling/*.xml /etc/opt/FJSVssmgr/current/polling/
```

8. Restore files related to the definition of copy groups and copy pairs.

   This step is required only if you are using the Advanced Copy function.

   a. Execute the following commands to delete the subdirectories and files under the restore destination directories.

   ```
   # rm -rf /etc/opt/FJSVccm/db/cg/*
   # rm -f /etc/opt/FJSVccm/prop/user.properties
   # rm -f /etc/opt/FJSVccm/accc/etc/stxc.alias
   # rm -f /etc/opt/FJSVccm/accc/etc/stxc_ext.alias
   # rm -f /etc/opt/FJSVccm/accc/etc/stxcvolinf
   ```

   b. Execute the following commands to copy the subdirectories and files in the backup locations to their restore destination directories.
      It is unnecessary to restore files which do not exist.

   ```
   # cp -p $BAK_DIR/CCM/etc/db/eternus.xml /etc/opt/FJSVccm/db
   # cp -p $BAK_DIR/CCM/var/micc/database/DeviceRegList.xml /var/opt/FJSVccm/micc/database
   # cp -p $BAK_DIR/CCM/etc/prop/user.properties /etc/opt/FJSVccm/prop
   # cp -p $BAK_DIR/CCM/etc/stxc.alias /etc/opt/FJSVccm/accc/etc
   # cp -p $BAK_DIR/CCM/etc/stxc_ext.alias /etc/opt/FJSVccm/accc/etc
   # cp -p $BAK_DIR/CCM/etc/stxcvolinf /etc/opt/FJSVccm/accc/etc
   # cp -Rp $BAK_DIR/CCM/etc/db/cg/* /etc/opt/FJSVccm/db/cg
   ```

9. Restore the license management database.

   Execute the following command. For *fileName*, input the file name which was specified when the backup data was created.

   ```
   # /opt/FJSVccm/bin/esflm restore $BAK_DIR/LM/<file_name>
   ```

10. Execute the following shell script to start the ETERNUS SF Manager services.

   ```
   # /opt/FJSVccm/bin/startesf.sh
   ```

4.2.3   Changing Express's Manager Environment (Linux)

This section describes the following procedure:

- How to change the port numbers used in Express or Web Console

- How to change the IP address of the Management Server

4.2.3.1   Changing Port Numbers (Linux)

Changing Port Numbers Used in Express

This section describes how to change port number that is used by Express.

The port numbers are defined in the operating system's services file. The ports shown in the following table are used by Express. The default values for the port numbers are shown. If you have changed the value for these port numbers, read the numbers to replace after the change in this section.

Port Number	Service Name	Protocol	Note
9855	esfmanagerweb	tcp	Port number used for Web Console
1226	stgxfws	tcp	Port number used for configuration management and polling monitoring
24916	sscruiserm	tcp	Port numbers used inside Express

Perform the following procedure to change the port numbers used by Express.

1. Open the file "/etc/services" with a notepad.

2. Pick out the entry of a service name to be changed to change its entry port number.
   A port number can be entered between 1024 and 65535. However, a port number from 5001 to 32768 is recommended.

```
# <service name> <port number>/<protocol> [aliases...] [#<comment>]
#
stgxfws 1226/tcp
esfmanagerweb 9855/tcp
sscruiserm 24916/tcp
```

3. Save the "/etc/services" file and close it.

4. Edit httpd.conf file if the port number used by Web Console is changed.

   a. Open the "/etc/opt/FJSVesfcm/conf/apache/httpd.conf" file with text editor.

   b. Change the port number listed immediately after the Listen directive.

   ```
   Listen 0.0.0.0:9855
   ```

   c. Save the "/etc/opt/FJSVesfcm/conf/apache/httpd.conf" file and close it.

5. Restart services.

   a. Execute the following shell script on the Management Server to stop the ETERNUS SF Manager services.

   ```
   # /opt/FJSVesfcm/bin/stopesf.sh
   ```

   b. Execute the following shell script on the Management Server to start the ETERNUS SF Manager services.

   ```
   # /opt/FJSVesfcm/bin/startesf.sh
   ```

6. Create a server information change instruction file on the Management Server, then execute the "stgxfwcmmodsrv" command with the -f option specified to change the port numbers.

   [Example] In the case that name of the server information change instruction file is "/acm/modfile".

   ```
   # /opt/FJSVswstf/bin/stgxfwcmmodsrv –f /acm/modfile
   ```

7. Restart the Management Server.

See
. . . .
Refer to "stgxfwcmmodsrv (Server Information Change Command)" in the *AdvancedCopy Manager Operation Guide* corresponding to the operating system of the Management Server for information on the "stgxfwcmmodsrv" command and the server information change instruction file.
. . . .

Changing Port Numbers Used in Web Console

Web Console uses the following ports internally.

Port Number	Protocol	Note
28005	tcp	Port numbers used inside Web Console
28009	tcp	
28443	tcp	
15432	tcp	

If the above port numbers are used by other applications, Web Console cannot start. In this case, change the port numbers according to the following steps.

1. Execute the following shell script on the Management Server to stop the ETERNUS SF Manager services.

```
# /opt/FJSVesfcm/bin/stopesf.sh
```

2. Open the following files with text editor.

    - /etc/opt/FJSVesfcm/conf/tomcat/server.xml

    - /etc/opt/FJSVesfcm/conf/apache/httpd.conf

    - /var/opt/FJSVesfcm/db/data/postgresql.conf

    - /opt/FJSVesfcm/tomcat/webapps/esf/WEB-INF/config/database.yml

    - /etc/services

3. Change the default port numbers (28005, 28009, 28443, and 15432) in red letters to other numbers.

    - server.xml

      Change the port number of the Server tag.

```
<Server port="28005" shutdown="SHUTDOWN">
```

      Change the port number listed in the port of the Connector tag and redirectPort.

```
    <Connector port="28009" address="127.0.0.1"
               enableLookups="false" redirectPort="28443" protocol="AJP/1.3" />
```

    - httpd.conf

      Change the port numbers of the ProxyPass and ProxyPassReverse directive.

```
ProxyPass / ajp://localhost:28009/ timeout=900
ProxyPassReverse / ajp://127.0.0.1:28009/
```

    - postgresql.conf

      Change the port number of the port directive.

```
port = 15432
```

    - database.yml

      Change the port number of the port directive to the same number as described in postgresql.conf.

```
port = 15432
```

    - services

      Change the port number of the "esfpostgres" entry.

```
esfpostgres 15432/tcp
```

4. Save and close these files.

5. Execute the following shell script on the Management Server to start the ETERNUS SF Manager services.

```
# /opt/FJSVesfcm/bin/startesf.sh
```

4.2.3.2   Changing IP Address (Linux)

The following is the procedure to change the IP address of Management Server.

1. Execute the following batch file on the Management Server to stop the ETERNUS SF Manager services.

```
# /opt/FJSVesfcm/bin/stopesf.sh
```

2. Change the IP address of the Management Server.

3. Execute the following shell script on the Management Server to start the ETERNUS SF Manager services.

```
# /opt/FJSVesfcm/bin/startsf.sh
```

4. Create a server information change instruction file on the Management Server, then execute the "stgxfwcmmodsrv" command with the -f option specified to change the IP addresses.

   [Example] In the case that name of the server information change instruction file is "c:/acm/modfile".

```
# /opt/FJSVswstf/bin/stgxwcmmodsrv -f /acm/modfile
```

5. If the IP address of the Management Server is specified for SNMP Trap destination, change the specified IP address using the ETERNUS Web GUI. Refer to the ETERNUS Web GUI manuals for more information.

6. Restart the Management Server.

7. Launch Web Console and connect to Express's manager running on the Management Server whose IP address has been changed.

See
. . . .
Refer to "stgxfwcmmodsrv (Server Information Change Command)" in the *AdvancedCopy Manager Operation Guide* corresponding to the operating system of the Management Server for information on the "stgxfwcmmodsrv" command and the server information change instruction file.
. . . .

4.2.3.3 Changing SNMP Communication Protocol

On Management Server that executes fault monitoring on devices using SNMPv1 protocol alone, when making the following operational environment changes, it is required to change SNMP Trap daemon settings.

- Add a device on which fault monitoring is executed with SNMPv3 protocol.

- Change the communication protocol of a fault monitoring executed device from SNMPv1 to SNMPv3.

Refer to the following section in "SNMP Trap Setting (for Linux)" in "Setup of Express's Manager" in the *Installation and Setup Guide* to set up an environment.

- When Monitoring Devices Using Only SNMPv3 Protocol or When Monitoring Devices Using SNMPv1 Protocol and SNMPv3 Protocol

After changing the SNMP Trap daemon settings, it is required to register SNMPv3 user information and set up SNMP v3 user to a managed device. Refer to "SNMPv3" in "SNMP Communication Authentication" in the *Storage Cruiser Operation Guide* for setting method.

4.3 Action Required When Management Server Functionality Is Stopped

If processing stops in Express's manager or the Management Server before an operation started in Web Console is complete, the operation result may not be reflected properly in the Express's manager. In this case, reload the device information to reflect in Express's manager.

Refer to "Reload ETERNUS Disk Storage System Configuration Information" in the *Web Console Guide* for details on the operation procedures.

4.4 Caution about Disk Storage System Managed in Several Express's Managers

If the same Disk storage system is managed by multiple Express's managers, the result of an operation initiated in a Web Console connected to an Express's manager is not reflected in the other Express's manager. In this case, reload the device information on other Express's manager, and reflect it in other Express's manager.

Refer to "Reload ETERNUS Disk Storage System Configuration Information" in the *Web Console Guide* for details on the operation procedures.

4.5 Caution about Operating Disk Storage System Outside Express's Manager

If an operation has been initiated directly in the ETERNUS Disk storage system by the ETERNUS Web GUI, the operation result is not reflected in Express's manager. To reflect the operation result in Express's manager, follow the same procedure as in "4.4 Caution about Disk Storage System Managed in Several Express's Managers".

Appendix A   Advanced Copy Function

A.1   Overview of Advanced Copy Function

A.1.1   What Is Advanced Copy Function?

Advanced Copy functions allow ETERNUS Disk storage system to carry out high-speed copying operations itself, with no need to draw on server CPU resources. With Advanced Copy functions, at any point in time a business data volume can be copied to a separate copy volume, quickly and within ETERNUS Disk storage system. Once the copy is complete, the copy volume can be separated from the business volume ensuring no further updates to the business volume are applied to the copy volume. This allows the copy volume data to be backed up to a tape device, as a point in time copy of the business data, while normal operations continue.

Advanced Copy Methods

Two types of Advanced Copy methods are supported:
One snapshot copy method (SnapOPC+) and three clone copy methods (EC, OPC, and QuickOPC).
Of these types Express supports only the snapshot copy method.

 - Snapshot creates a virtual point in time image of the original data.

 - Clone make a full (physical) copy of the original data.

SnapOPC+

 A function that creates a copy of the data prior to it being updated (Copy-on-Write).

 As requires less copy volume capacity compared with clone, SnapOPC+ is ideal for copy operations for systems with relatively few updates such as file servers.

EC (Equivalent Copy)

 A function that maintains a synchronized copy of a business data volume on a copy volume (Mirroring method).

 The business volume and copy volume are synchronized but can be separated at any required time (mirror suspend). The copy volume can then be backed up to a tape device while business operations continue on the business volume.

 Suspend/Resume functions can be used to re-establish the mirror by copying only updated data since the mirror was suspended.

OPC (One Point Copy)

 A function that creates a copy of the business data volume at any point in time (Background Copy).

 Data on the business volume is copied logically to a copy volume, quickly, as and when required.

 The copy volume can be used for backup operation, to a tape device, without waiting for physical copy completion, while business operations can continue on the business volume.

QuickOPC

 A function that creates a copy of all the business data volume and subsequently only copies updated data (Background Copy). This suits large database operation where backup times must be reduced.
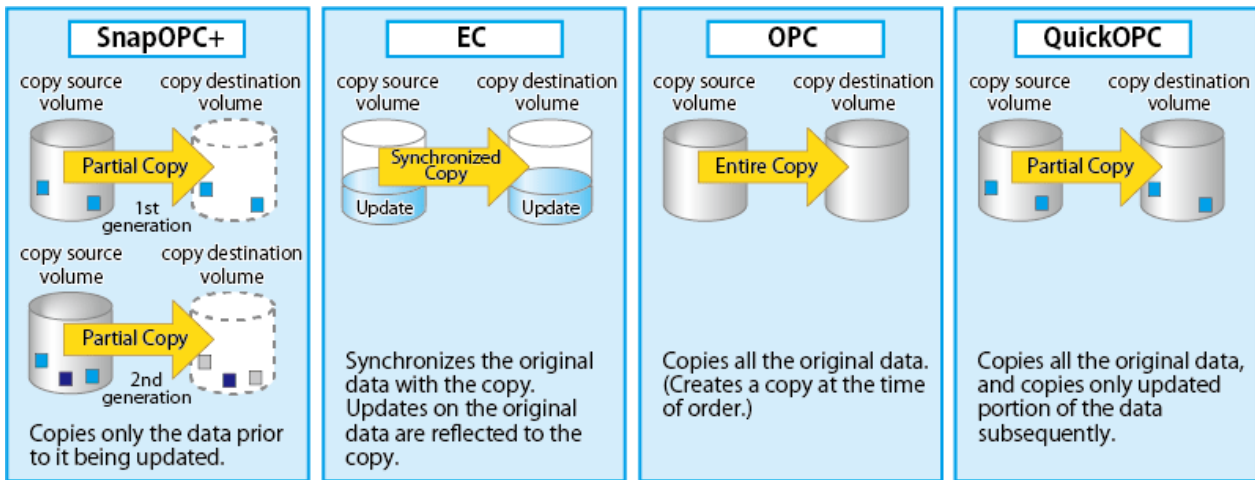
These copy methods all provide access to the data as it exists at a specific point in time, but there are different features, advantages and disadvantages to each method as detailed below:

Function Name	Copy Type			
	Snapshot Copy	Clone Copy		
	SnapOPC+	EC	OPC	QuickOPC
Copy method	Copy-on-write method	Mirror breaking method	Background copy method	Background copy method
Timing of actual copy load	-	Before "mirror breaking"	After the copy command is issued	After the copy command is issued
Effect on access to the copy source while copy is running	Yes	None	Minor	Minor
Effect on access to the copy source after copy has "finished"	Yes	None	Slight during background copy	Slight during background copy
Lifetime of copy session	Until session is stopped	Until the Equivalent state is stopped	Until background copy is completed	Until session is stopped and copy is completed
Size of copy destination area	Sufficient for changed areas (Snapshot)	Same as the copy source (Clone)	Same as the copy source (Clone)	Same as the copy source (Clone)
Copy action during restore	Copy back only the already copied data For the ETERNUS DX60 S2, restore operation is not available (use OS tools to copy whole files instead)	- Copy back all the data by OPC - EC Reverse (Suspend -> Reverse -> Resume) only copies updated areas	- If OPC is active, copy back only the already copied data (Restore OPC) - If OPC is completed, copy back all of the copied data	Copy back only the already copied data
Best used for...	- Temporary backup area for backup to tape - Backup to disk for file server and	- Backup to disk - Creation of testing data	- Backup to disk - Creation of testing data	- Backup to disk - Creation of testing data

Function Name	Copy Type			
	Snapshot Copy	Clone Copy		
	SnapOPC+	EC	OPC	QuickOPC
	other low modification rate data (generational management is available)		- Restoring from backup disk	- Recovery from physical disk failure when data modification rate is low

Note

These are generic observations based on the mechanisms involved. Actual effect on servers depends on the specifics of the usage environment.

A.2 Configuration of Advanced Copy Function

A.2.1 Common Configuration in All Copy Methods

Copy Table Size Settings

Specify the following table size parameters for Advanced Copy. These parameters should be determined based on aggregate copy capacity and number of active sessions (volumes), and then set them using Web Console, ETERNUS Web GUI, or ETERNUS CLI.

- Copy table size

    The copy table size is memory area reserved for meta-data required for Advanced Copy management. Allocate the this table size in advance.

- Resolution

    Resolution represents the amount of data represented by each bit in the copy table.
    The following table shows the possible values depending on the model:

Device Name	Specifiable Magnification
ETERNUS DX60 S5/S4/S3 ETERNUS DX100 S5/S4/S3 ETERNUS DX200 S5/S4/S3 ETERNUS AF150 S3 ETERNUS AF250 S3/S2 ETERNUS AF250 ETERNUS DX200F	1, 2, 4, 8, 16(default), 32, 64
ETERNUS DX60 S2 ETERNUS DX80 S2 ETERNUS DX90 S2	1(default), 2, 4, 8, 16

The default setting of 1 results in minimal internal overhead.
Use the default value unless larger value is required due to the copy capacity.

A.2.2 Configuration of Snapshot Copy

Copy Destination Volumes

When creating copy destination volumes for snapshot copy, note the following:

- The type of a copy destination volume must be TPV or SDV.
  OPEN, SDPV and standard cannot be used as a copy destination for snapshot copy.

- The size of a copy destination volume must be the same as that of copy source volume (the original volume).

- Estimate the physical capacity of the copy destination volume from the update amount on the copy source volume.
  If an estimation is difficult, it is recommended that the physical capacity of the copy destination volume is 30 to 50 % of the capacity of the copy source volume. As this is a recommended value, you must adjust according to the operational status.

See

- Refer to "SnapOPC+ Copy Destination Volume" in the *AdvancedCopy Manager Operation Guide for Copy Control Module* for information on how to estimate the physical capacity of a copy destination volume.

- Refer to "Create Volume" in the *Web Console Guide* for procedures about creating a copy destination volume.

When Using SDV as Copy Destination Volume

When using SDV as a copy destination volume, Snap Data Pool (SDP) can be used for the snapshot copy (SnapOPC+).

By registering standby storage areas in the SDP, it is possible to supply extra storage areas (SDPE: Snap Data Pool Elements) from the SDP whenever the amount of updates exceeds the capacity of the copy destination SDV, allowing the copy session to continue without failing.

- If storage area capacity runs short in an SDV, extra storage area (SDPE) is automatically supplied from the SDP.

- Once the copy session is completed, all extra storage area (SDPE) supplied to the SDV is returned to the SDP. The SDPE is also returned to the SDP if the copy session fails.

Point

When SDV is used as a copy destination volume on the ETERNUS DX100 S5/DX200 S5, DX100 S4/DX200 S4, DX100 S3/DX200 S3, DX80 S2/DX90 S2, the ETERNUS AF150 S3, AF250 S3/AF250 S2/AF250, and the ETERNUS DX200F, at least one Snap Data Pool Volume (SDPV) is required.

Figure A.1 SDP Concept
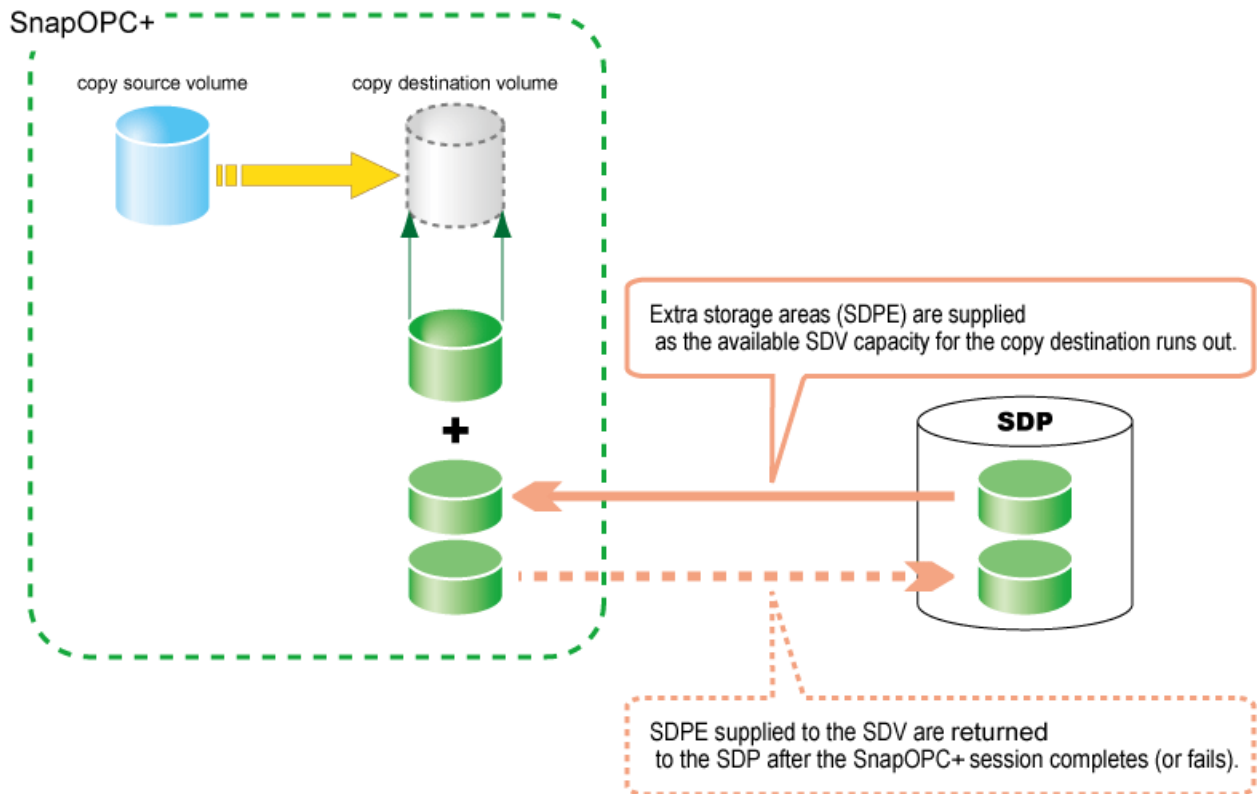
When using an SDP, note the following:

- One SDP can be created per ETERNUS Disk storage system.

- SDP becomes available upon creating a dedicated SDPV. After creation, the SDPV is automatically allocated to the SDP.
  SDPs can be expanded by creating additional SDPVs of the required physical capacity in the copy destination volume.

- If the SDV is encrypted, make sure the SDPV is also encrypted.

- If the ETERNUS Disk storage system contains both encrypted and non-encrypted SDVs, then both encrypted and non-encrypted
  SDPVs are needed.

Figure A.2 Construction of SDP
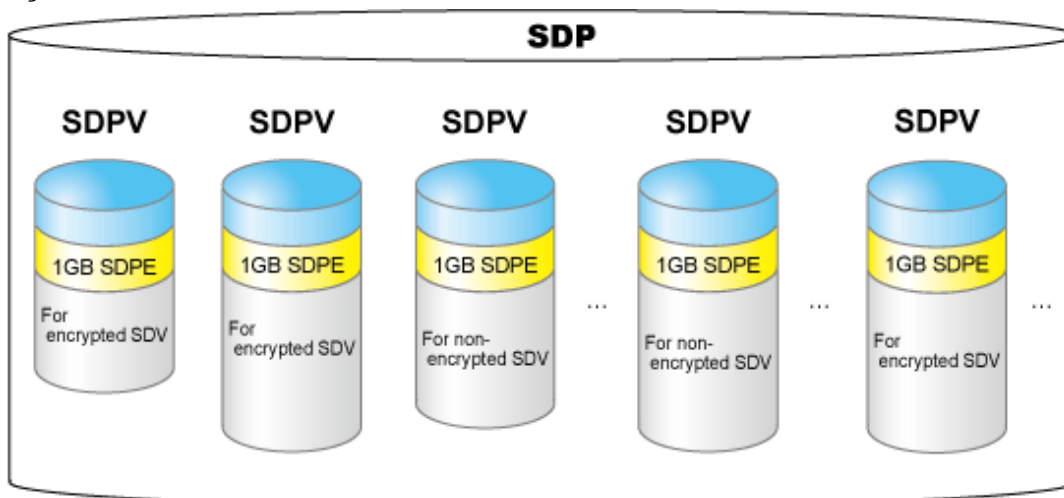
A.3   Snapshot Copy (SnapOPC+)

A.3.1   How SnapOPC+ Works

Figure A.3 State Transition for SnapOPC+
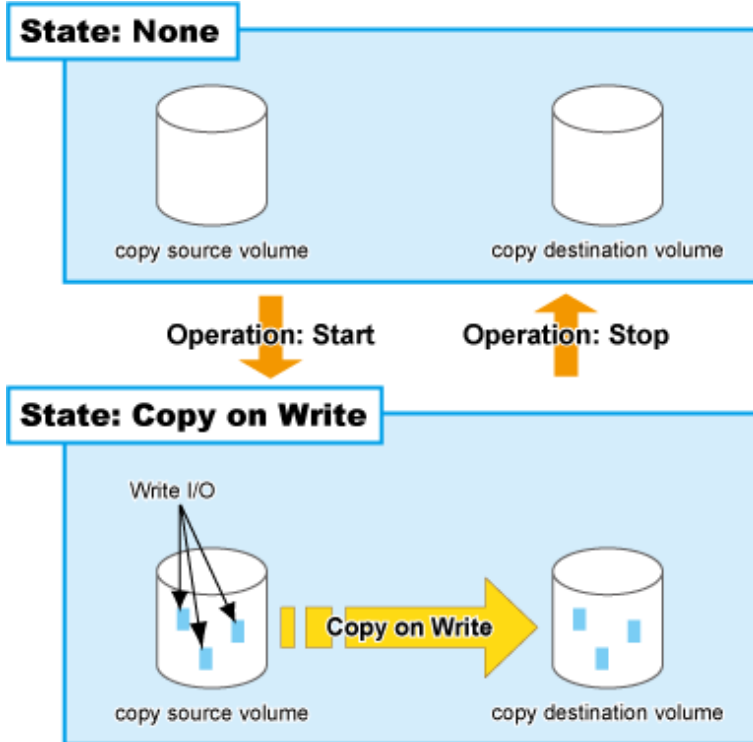
Table A.1 Relationship Between Session Operation and Express Function

Session Operation	Express Function
Start SnapOPC+	acsnap start
Stop	acsnap cancel

Start

When the SnapOPC+ session is started, the copy-on-write process is started. For information on the maximum number of copy sessions that can be executed, refer to "Data Copy" in "Express Features" of the *Overview*.

When a write I/O is issued to the source volume, the copy-on-write process copies the old-data to the copy destination before writing the new data to the source volume. By doing so the copy-on-write process maintains the Point in Time image. This process is an internal background system in the ETERNUS Disk storage system and it is transparent to the host server. The copy destination area becomes accessible after SnapOPC+ session has been started.

- Unlike the Clone methods (OPC, QuickOPC, and EC) the physical capacity for the destination need to be large enough to contain updated areas. So the size requirement is typically small.

- When the target volume is being read it needs to reference the original source volume to obtain the unmodified data. This dependence to the source volume means that SnapOPC+ is not suited for persistent or long-term data retention or as a backup data for recovery in case of physical loss of source media.

In this example regular SnapOPC+ backups of the data are taken each night.
1st generation is oldest and 3rd generation is newest.
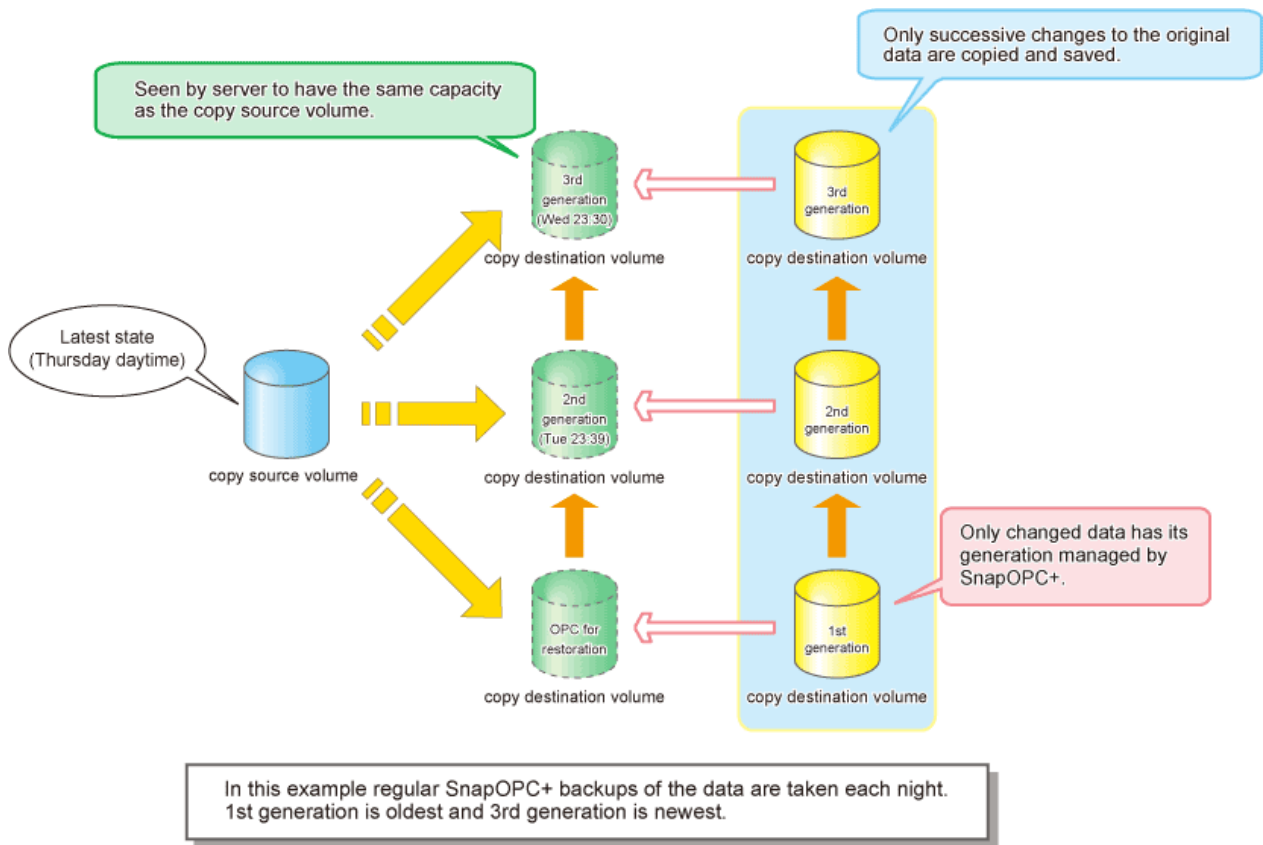
Stop

When the SnapOPC+ session is stopped, the copy-on-write process terminates and all the data saved in the copy destination volume is lost.

If there are older SnapOPC+ sessions than the SnapOPC+ session to stop, it cannot be stopped. Such a SnapOPC+ session can be stopped by using the force option. However, the Stop operation with the force option stops not only the specified SnapOPC+ session but also all the older SnapOPC+ sessions.

A.3.2   Restore

Restoration requires the SnapOPC+ copy destination be mounted by the OS and the target data restored using normal file copying.
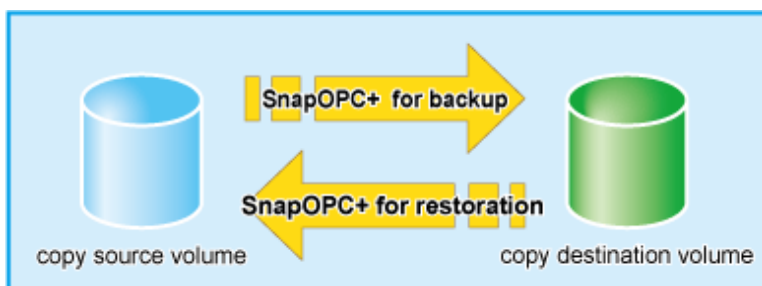
![Note]Note

Restoration by the SnapOPC+ cannot be performed for the ETERNUS DX60 S2.
For the restoration, mount the copy destination volume and copy each file on the operating system.

A.3.3   Monitoring Usage of Copy Destination Volume

If the physical capacity of the copy destination volume is insufficient, you cannot access the copy destination volume. This status makes it impossible to read data from the copy destination volume and write data into the copy destination volume. As for SnapOPC+, read/write is not allowed not only on the copy destination volume, but also on earlier generation's copy destination volumes.

For this reason, you must monitor so that a capacity shortage of the physical space in the copy destination volume does not occur during operation.

Monitoring When Using TPV as Copy Destination Volume

The physical space on the TPV is assigned per block. This may require more physical space than estimated. To prevent a capacity shortage of the physical space in the copy destination volume, change the settings of capacity threshold as required and monitor the usage.
Refer to "3.5 Thin Provisioning Management" for details about TPV monitoring.

Monitoring When Using SDV as Copy Destination Volume

Table A.2 Relationship Between SDV/SDP Operation and Express Function

SDV Operation	Express Function
Monitoring the SDV capacity	acsdv stat
Initialize the SDV	acsdv init
Monitoring the SDP capacity	acsdv poolstat

Monitoring SDV Capacity

If an SDP is not used, the SDV should be monitored on a periodic basis to ensure that adequate remaining capacity leeway is maintained.

Initializing SDV

- Even if no copy sessions are running, programs may write data to SDV. If SDV capacity becomes large, the "Initialize SDV" operation should be performed with ETERNUS Web GUI or ETERNUS CLI.

- When copy session is running, space for SDV or SDP used by the copy session is decreased. In this case, amount of maintaining data may be decreased.

  Note that when a Snap Data Volume is initialized, any existing data on it becomes inaccessible, so this data should be backed up beforehand, using OS commands.

Monitoring SDP Capacity

If an SDP is used, the SDP should be monitored on a periodic basis to ensure that adequate remaining capacity leeway is maintained.

A.4   Eco-mode

Eco Mode based on MAID (Massive Arrays of Idle Disks) can be configured for ETERNUS Disk storage systems.

Performing either of the following controls during a period of time of not accessing disk drives can reduce power consumption, leading to the reduction of loads on environments.

a. Spindle rotation control of disk drives

b. Power control of disk drives

The above "b" is recommended. It can reduce power consumption more effectively than the above "a".

The devices that support "b" are shown in "Table A.3 Devices That Support Power Control of Disk Drives".

Table A.3 Devices That Support Power Control of Disk Drives

Device Name	Firmware Version
ETERNUS DX60 S5/S4/S3 ETERNUS DX100 S5/S4 ETERNUS DX200 S5/S4	All versions
ETERNUS DX100 S3 ETERNUS DX200 S3	V10L20 or later

Express can monitor the Disk storage systems where the Eco-mode has been enabled.

A.5 Note on Backup and Restore by Express

Express performs backup and restoration regardless of the state of the server to be backed up. Therefore, make sure that both copy source and destination volumes are inaccessible in order to ensure consistency of backup data. For absolute assurance of data consistency, we highly recommend to stop the target server before executing backups and restorations. If the server cannot be suspended, dismount a target volume using the OS function to prevent data within a file cache from being reflected and inhibit access to the target volume.

Appendix B   Command References

All the command path names listed here are described as those installed in the default installation directory.

📖Information
....

Express provides other commands besides those described in this manual. Refer to "Command References" in the *AdvancedCopy Manager Operation Guide for Copy Control Module* for details.

....

B.1   storageadm perfdata (Performance Information Management Command)

NAME

storageadm perfdata - Manages performance information

SYNOPSIS

For Windows

```
$INS_DIR\ESC\Manager\opt\FJSVssmgr\sbin\storageadm perfdata export outDirName -ipaddr ipAddr [-
recent 24]
```

($INS_DIR means "Program Directory" specified at the ETERNUS SF Manager installation.)

For Linux

```
/opt/FJSVssmgr/sbin/storageadm perfdata export outDirName -ipaddr ipAddr [-recent 24]
```

DESCRIPTION

This command outputs one-hour or 24-hour performance information for disk storage system before the command is executed.

By specifying the IP address of a disk storage system whose performance information is output and the time in the command operand, the disk storage system performance information is output in CSV format.

A target disk storage system must be managed by Express and performance monitoring is either still running or already completed.

The details about CSV files are as follows.

Table B.1 CM Performance Information for Disk Storage System

Items	Explanation
File name	CM.csv
Header line	Date, CM0xX - CPU Use Rate, CM0xX - Copy Remain, ...
Data line	*date,CM0u,CM0r, ... ,CMNu,CMNr* The following information is output for each field. (After *date*, the information is repeated for the actual number of CMs.) *date* : Performance Information Acquisition Time (YYYY/MM/DD hh:mm:ss format) *CM0u* : CM0x0 CPU Load at *date* (Decimal notation. The unit is %.) *CM0r* : CM0x0 CM Copy remaining amount at *date*. (Decimal notation. The unit is GB.) *CMNu* : CM0xN CPU Load at *date*. (Decimal notation. The unit is %.) *CMNr* : CM0xN CM Copy remaining amount at *date*. (Decimal notation. The unit is GB.)

Table B.2 Logical Volume Performance Information for Disk Storage System

Items	Explanation
File name	LogicalVolume/*nnnn*.csv (*nnnn* indicates the Logical Volume number by hexadecimal notation.)
Header line	Date, LogicalVolume0x*XXXX* - Read IOPS, LogicalVolume0x*XXXX* - Write IOPS, LogicalVolume0x*XXXX* - Read Throughput, LogicalVolume0x*XXXX* - Write Throughput, LogicalVolume0x*XXXX* - Read Response Time, LogicalVolume0x*XXXX* - Write Response Time, LogicalVolume0x*XXXX* - Read Cache Hit Rate, LogicalVolume0x*XXXX* - Write Cache Hit Rate, LogicalVolume0x*XXXX* - Prefetch Cache Hit Rate, LogicalVolume0x*XXXX* - Read Cache Hit Rate(Extreme Cache), LogicalVolume0x*XXXX* - Read Cache Hit Rate(DRAM + Extreme Cache), LogicalVolume0x*XXXX* - Read QoS Delay Time, LogicalVolume0x*XXXX* - Write QoS Delay Time
Data line	*date,read,write,through-r,through-w,resp-r,resp-w,hit-r,hit-w,fetch,* *hit-r-extreme-cache,hit-r-dram-extreme-cache,delay-r-qos,delay-w-qos* The following information is output for each field. *date* : Performance Information Acquisition Time. (YYYY/MM/DD hh:mm:ss format) *read* : Read Count at *date*. (Decimal notation. The unit is IOPS.) *write* : Write Count at *date*. (Decimal notation. The unit is IOPS.) *through-r* : Read data transfer rate at *date*. (Decimal notation. The unit is MB/s.) *through-w* : Write data transfer rate at *date* (Decimal notation. The unit is MB/s.) *resp-r* : Read Response Time at *date*. (Decimal notation. The unit is msec.) *resp-w* : Write Response Time at *date*. (Decimal notation. The unit is msec.) *hit-r* : Read Cache Hit Rate at *date*. (Decimal notation. The unit is %.) *hit-w* : Write Cache Hit Rate at *date*. (Decimal notation. The unit is %.) *fetch* : Read Pre-fetch Cache Hit Rate at *date*. (Decimal notation. The unit is %.) *hit-r-extreme-cache* : Read Cache Hit Rate at *date*. (Extreme Cache) (Decimal notation. The unit is %.) (*1, *2) *hit-r-dram-extreme-cache* : Read Cache Hit Rate at *date*. (DRAM + Extreme Cache) (Decimal notation. The unit is %.) (*1, *2) *delay-r-qos* : Read QoS Delay Time at *date*. (Decimal notation. The unit is msec.) (*3) *delay-w-qos* : Write QoS Delay Time at *date*. (Decimal notation. The unit is msec.) (*3)

*1: For a device that does not support Extreme Cache performance information, a value is not output and instead a series of commas are output.

```
Example: For a device that does not support Extreme Cache performance information
...,hit-r-extreme-cache,hit-r-dram-extreme-cache
...,,
```

*2: When this function is disabled for a device that supports Extreme Cache performance information, "0" is output.

```
Example: For a device that supports Extreme Cache performance information (function disabled)
...,hit-r-extreme-cache,hit-r-dram-extreme-cache
...,0,0
```

*3: For a device that does not support Host-LU QoS performance information (QoS Delay Time), a value is not output and instead a series of commas are output.

```
Example: For a device that does not support Host-LU QoS performance information
...,delay-r-qos,delay-w-qos
...,,
```

Table B.3 RAID Group Performance Information for Disk Storage System

Items	Explanation
File name	RAIDGroup/*nnnn*.csv (*nnnn* indicates the RAID Group number by hexadecimal notation.)
Header line	Date, RAIDGroup0x*XXXX* - Read IOPS, RAIDGroup0x*XXXX* - Write IOPS, RAIDGroup0x*XXXX* - Read Throughput, RAIDGroup0x*XXXX* - Write Throughput, RAIDGroup0x*XXXX* - Read Response Time, RAIDGroup0x*XXXX* - Write Response Time, RAIDGroup0x*XXXX* - Read Cache Hit Rate, RAIDGroup0x*XXXX* - Write Cache Hit Rate, RAIDGroup0x*XXXX* - Prefetch Cache Hit Rate, RAIDGroup0x*XXXX* - Read Cache Hit Rate(Extreme Cache), RAIDGroup0x*XXXX* - Read Cache Hit Rate(DRAM + Extreme Cache), RAIDGroup0x*XXXX* - Read QoS Delay Time, RAIDGroup0x*XXXX* - Write QoS Delay Time
Data line	*date,read,write,through-r,through-w,resp-r,resp-w,hit-r,hit-w,fetch,* *hit-r-extreme-cache,hit-r-dram-extreme-cache,delay-r-qos,delay-w-qos* The following information is output for each field. *date* : Performance Information Acquisition Time. (YYYY/MM/DD hh:mm:ss format) *read* : Read Count at *date*. (Decimal notation. The unit is IOPS.) *write* : Write Count at *date*. (Decimal notation. The unit is IOPS.) *through-r* : Read data transfer rate at *date*. (Decimal notation. The unit is MB/s.) *through-w* : Write data transfer rate at *date*. (Decimal notation. The unit is MB/s.) *resp-r* : Read Response Time at *date*. (Decimal notation. The unit is msec.) *resp-w* : Write Response Time at *date*. (Decimal notation. The unit is msec.) *hit-r* : Read Cache Hit Rate at *date*. (Decimal notation. The unit is %.) *hit-w* : Write Cache Hit Rate at *date*. (Decimal notation. The unit is %.) *fetch* : Read Pre-fetch Cache Hit Rate at *date*. (Decimal notation. The unit is %.) *hit-r-extreme-cache* : Read Cache Hit Rate at *date*. (Extreme Cache) (Decimal notation. The unit is %.) (*1, *2) *hit-r-dram-extreme-cache* : Read Cache Hit Rate at *date*. (DRAM + Extreme Cache) (Decimal notation. The unit is %.) (*1, *2) *delay-r-qos* : Read QoS Delay Time at *date*. (Decimal notation. The unit is msec.) (*3) *delay-w-qos* : Write QoS Delay Time at *date*. (Decimal notation. The unit is msec.) (*3)

*1: For a device that does not support Extreme Cache performance information, a value is not output and instead a series of commas are output.

```
Example: For a device that does not support Extreme Cache performance information
...,hit-r-extreme-cache,hit-r-dram-extreme-cache
...,,
```

*2: When this function is disabled for a device that supports Extreme Cache performance information, "0" is output.

```
Example: For a device that supports Extreme Cache performance information (function disabled)
...,hit-r-extreme-cache,hit-r-dram-extreme-cache
...,0,0
```

*3: For a device that does not support Host-LU QoS performance information (QoS Delay Time), a value is not output and instead a series of commas are output.

```
Example: For a device that does not support Host-LU QoS performance information
...,delay-r-qos,delay-w-qos
...,,
```

Table B.4 Disk Performance Information for Disk Storage System

Items	Explanation
File name	Disk/*nnnn*.csv (*nnnn* indicates the DE number by hexadecimal notation.)
Header line	Date, DE0xXX:DiskX - busy time, ...
Data line	*date,Disk0, ... ,DiskN* The following information is output for each field. (After *date*, the information is repeated for the actual number of Disks.) *date* : Performance Information Acquisition Time. (YYYY/MM/DD hh:mm:ss format) *Disk0* : Disk0 Disk busy rate at *date*. (Decimal notation. The unit is %.) *DiskN* : DiskN Disk busy rate at *date*. (Decimal notation. The unit is %.)

Table B.5 CA/CM Port Performance Information for Disk Storage System

Items	Explanation
File name	Port/*nnnn*.csv (*nnnn* indicates the CA/CM Port number by hexadecimal notation. CA/CM port numbers are assigned in ascending order, starting with 0000 for the lowest CA/CM port number in the device. CM0x0 CA0x0 Port0 is 0000, CM0x0 CA0x0 Port1 is 0001, : CM0x7 CA0x3 Port2 is 007E, CM0x7 CA0x3 Port3 is 007F.)

Header line	- Case of CA Port
	
	    Date, CM0xX:CA0xX:PortX - Read IOPS, CM0xX:CA0xX:PortX - Write IOPS, CM0xX:CA0xX:PortX - Read Throughput, CM0xX:CA0xX:PortX - Write Throughput
	
	- Case of CM Port
	
	    Date, CM0xX:PortX - Read IOPS, CM0xX:PortX - Write IOPS, CM0xX:PortX - Read Throughput, CM0xX:PortX - Write Throughput

Data line	*date,read,write,through-r,through-w* The following information is output for each field. *date* : Performance Information Acquisition Time. (YYYY/MM/DD hh:mm:ss format) *read* : Read Count at *date*. (Decimal notation. The unit is IOPS.) *write* : Write Count at *date*. (Decimal notation. The unit is IOPS.) *through-r* : Read data transfer rate at *date*. (Decimal notation. The unit is MB/s.) *through-w* : Write data transfer rate at *date*. (Decimal notation. The unit is MB/s.)

Table B.6 Performance Information for Disk Storage System Active Disks

Items	Explanation
File name	ACTIVE_DISK.csv
Header line	Date, Total Disks, Active Disks
Data line	*date,total,active* The following information is output for each field. *date* : Performance Information Acquisition Time. (YYYY/MM/DD hh:mm:ss format) *total* : Overall number of loaded disk devices at *date*. (Decimal notation. The unit is Disk.) *active* : Overall number of active disk devices at *date*. (Decimal notation. The unit is Disk.)

Table B.7 Power Consumption Performance Information for Disk Storage System

Items	Explanation
File name	SYSTEM_POWER_CONSUMPTION.csv
Header line	Date, System Power Consumption
Data line	*date*, *power* The following information is output for each field. *date* : Performance Information Acquisition Time. (YYYY/MM/DD hh:mm:ss format) *power:* Power used by the device as a whole at *date*. (Decimal notation. The unit is W.)

Table B.8 Temperature Performance Information for Disk Storage System

Items	Explanation
File name	SYSTEM_TEMPERATURE.csv
Header line	Date, System Temperature
Data line	*date*, *temperature* The following information is output for each field. *date* : Performance Information Acquisition Time. (YYYY/MM/DD hh:mm:ss format) *temperature:* Air intake temperature at device at *date*. (Decimal notation. The unit is degrees Centigrade.)

Table B.9 Storage Device NAS System Performance Information

Items	Explanation
File name	NAS/System/*nnnn*.csv (*nnnn* indicates the CM number by hexadecimal notation.)
Header line	Date, CM0xX - CPU Use Rate, CM0xX - CIFS Operations, CM0xX - NFS Operations
Data line	*date*,*CMuse*,*CMcifs*,*CMnfs* The following information is output for each field. *date* : Performance Information Acquisition Time (YYYY/MM/DD hh:mm:ss format) *CMuse* : CPU usage rate within the CM at *date* (Decimal notation. The unit is %.) *CMcifs* : Number of CIFS processes within CM at *date* (Decimal notation. The unit is ops/s.) *CMnfs* : Number of NFS processes within CM at *date* (Decimal notation. The unit is ops/s.)

Table B.10 Storage Device NAS Volume Performance Information

| Items	Explanation
File name	NAS/LogicalVolume/*nnnn*.csv (*nnnn* indicates the LogicalVolume number by hexadecimal notation.)
Header line	Date, LogicalVolume0xXXXX - Read Throughput, LogicalVolume0xXXXX - Write Throughput
Data line	*date*,*through-r*,*through-w* The following information is output for each field. *date* : Performance Information Acquisition Time (YYYY/MM/DD hh:mm:ss format) *through-r* : Read data transfer rate at *date* (Decimal notation. The unit is MB/s.) *through-w* : Write data transfer rate at *date* (Decimal notation. The unit is MB/s.)

OPERANDS

export

Outputs performance information for the specified time in CSV format.

outDirName

Specify the directory that outputs performance information.
Performance information is output to the *outDirName* directory based on the following configuration.
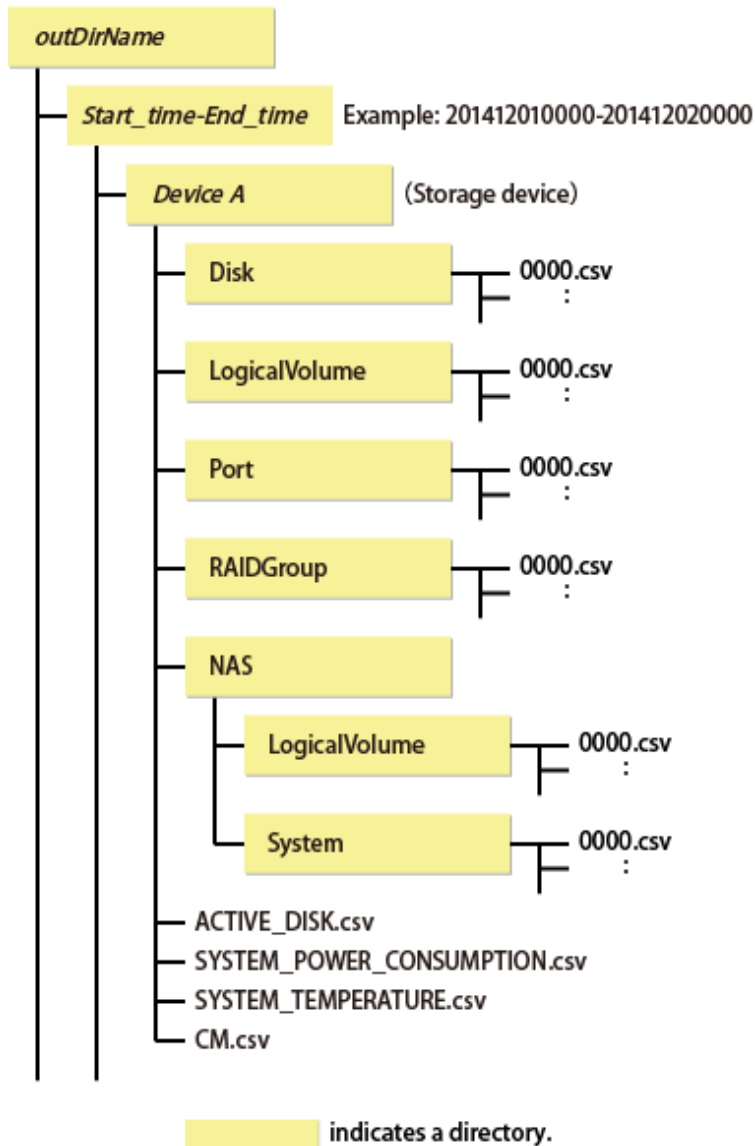
The following free space (unit: MB) is required for this directory.

```
(((0.1 + 0.4 * installed DEs + 0.1 * installed CM ports + 0.2 * (LUs + RAID groups)) * 1440)
+ (0.2 + 0.6 * installed DEs + 0.2 * installed CM ports + 0.4 * (LUs + RAID groups))) / 1024
```

OPTIONS

-ipaddr *ipAddr*

This option specifies the IP address of the device that outputs performance information.

The output target device must satisfy the following conditions:

- Storage devices output performance information must be registered in this software.

Refer to "Performance management" for the settings of performance monitoring.

-recent 24

This option collects the latest 24-hour performance data.
If this option is skipped, the latest 1-hour performance data is collected.

EXAMPLES

For Windows

Output of performance information for a device with IP address 192.0.2.10 to the c:\work directory:

```
> C:\ETERNUS_SF\ESC\Manager\opt\FJSVssmgr\sbin\storageadm perfdata export "C:\work" -ipaddr
192.0.2.10
```

For Linux

Output of performance information for a device with IP address 192.0.2.10 to the /tmp directory:

```
# /opt/FJSVssmgr/sbin/storageadm perfdata export /tmp -ipaddr 192.0.2.10
```

NOTES

The full path of an existing directory must be specified in *outDirName*.

B.2   esfsnap (Express's Manager Troubleshooting Information Collection Command)

NAME

esfsnap - Collects the troubleshooting information of the Express's manager

SYNOPSIS

For Windows

```
$INS_DIR\Common\bin\esfsnap -dir dirName [-all]
```

($INS_DIR means "Program Directory" specified at the ETERNUS SF Manager installation.)

For Linux

```
/opt/FJSVesfcm/bin/esfsnap -dir dirName [-all]
```

DESCRIPTION

This command collects the troubleshooting information of the Express's manager on the Management Server when a problem occurs. Only user of OS administrative group can execute this command.

Send the collected data to Fujitsu Technical Support.

OPTIONS

-dir *dirName*

For Windows

Specify a directory where the troubleshooting data is stored. It is necessary to specify the full path name that begins with a drive letter for *dirName*.
The maximum length that can be specified for *dirName* is 70 bytes.

The collected troubleshooting data are stored in the directory which its name begins with "esfsnap_". Before executing this command, check that *dirName* directory has the following free space.

Collected Information	Required Free Space
Initial investigation information	More than 40 MB
All troubleshooting information	More than "80 + (2 * number of registered device)" MB

For Linux

Specify a directory where the troubleshooting data is stored. It is necessary to specify the full path name for *dirName*.

The collected troubleshooting data are created as the file which its name begins with "esfsnap_". Before executing this command, check that *dirName* directory has the following free space.

Collected Information	Required Free Space
Initial investigation information	More than 40 MB
All troubleshooting information	More than "80 + (2 * number of registered device)" MB

-all

Collects all troubleshooting data on servers. Data includes lots of information, which increases the size of the data. This option is not necessary for initial investigation.

EXAMPLES

For Windows

Collecting the troubleshooting data for initial investigation on D:\temp directory.

```
> C:\ETERNUS_SF\Common\bin\esfsnap -dir D:\temp
```

For Linux

Collecting the troubleshooting data for initial investigation on /tmp directory.

```
# /opt/FJSVesfcm/bin/esfsnap -dir /tmp
```