

# ETERNUS SF



## ETERNUS SF AdvancedCopy Manager V15.1

### Overview

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# Preface

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## Purpose

This manual provides an overview for understanding the ETERNUS SF AdvancedCopy Manager. ETERNUS SF AdvancedCopy Manager is part of the following Storage Management Software ETERNUS SF products (hereafter referred to as "ETERNUS SF series"):

- ETERNUS SF Express (hereafter abbreviated as "Express")
- ETERNUS SF Storage Cruiser (hereafter abbreviated as "Storage Cruiser")
- ETERNUS SF AdvancedCopy Manager (hereafter abbreviated as "AdvancedCopy Manager")

This manual describes the AdvancedCopy Manager features and functions for backup and replication management in a large-scale storage area network.

## Intended Reader

This manual is intended for anyone who uses or wants to evaluate AdvancedCopy Manager.

Knowledge of the following facilitates an understanding of the contents described in this manual:

- Large-scale storage area networks
- Fujitsu Storage System ETERNUS
- The importance of backup and disaster recovery operations
- Ordinary hard copies, such snapshot, differential, and incremental copy
- Cluster environments

## Organization

This manual is composed as follows:

### [Chapter 1 Overview of AdvancedCopy Manager](#)

This chapter provides an overview of AdvancedCopy Manager.

### [Chapter 2 Operating Models](#)

This chapter explains the operating models of AdvancedCopy Manager.

### [Chapter 3 AdvancedCopy Manager Functions](#)

This chapter explains the functions of AdvancedCopy Manager.

## Notation

The names, abbreviations, and symbols shown below are used in this manual.

Operating systems

Formal name	Abbreviation	
Microsoft(R) Windows Server(R) 2003, Standard Edition	Windows Server 2003	Windows
Microsoft(R) Windows Server(R) 2003, Standard x64 Edition		
Microsoft(R) Windows Server(R) 2003, Enterprise Edition		
Microsoft(R) Windows Server(R) 2003, Enterprise x64 Edition		
Microsoft(R) Windows Server(R) 2003 R2, Standard Edition		
Microsoft(R) Windows Server(R) 2003 R2, Standard x64 Edition		
Microsoft(R) Windows Server(R) 2003 R2, Enterprise Edition		
Microsoft(R) Windows Server(R) 2003 R2, Enterprise x64 Edition		

Formal name	Abbreviation	
Microsoft(R) Windows Server(R) 2008 Standard (32-bit)(64-bit) Microsoft(R) Windows Server(R) 2008 Standard without Hyper-V(TM) (32-bit)(64-bit) Microsoft(R) Windows Server(R) 2008 Enterprise (32-bit)(64-bit) Microsoft(R) Windows Server(R) 2008 Enterprise without Hyper-V(TM) (32-bit)(64-bit) Microsoft(R) Windows Server(R) 2008 Datacenter (32-bit)(64-bit) Microsoft(R) Windows Server(R) 2008 Datacenter without Hyper-V(TM) (32-bit)(64-bit)	Windows Server 2008	
Microsoft(R) Windows Server(R) 2008 R2 Foundation Microsoft(R) Windows Server(R) 2008 R2 Standard Microsoft(R) Windows Server(R) 2008 R2 Enterprise Microsoft(R) Windows Server(R) 2008 R2 Datacenter	Windows Server 2008 R2	
Microsoft(R) Windows(R) XP Professional Edition Microsoft(R) Windows(R) XP Home Edition	Windows XP	
Windows Vista(R) Home Basic Windows Vista(R) Home Premium Windows Vista(R) Business Windows Vista(R) Enterprise Windows Vista(R) Ultimate	Windows Vista	
Windows(R) 7 Home Basic Windows(R) 7 Home Premium Windows(R) 7 Professional Windows(R) 7 Enterprise Windows(R) 7 Ultimate	Windows 7	
Solaris(TM) 9 Operating System	Solaris 9	Solaris or Solaris OS
Oracle Solaris 10	Solaris 10	
Oracle Solaris 11	Solaris 11	
Red Hat(R) Enterprise Linux(R) AS (v.4 for x86) Red Hat(R) Enterprise Linux(R) AS (v.4 for EM64T)	RHEL-AS4	Linux
Red Hat(R) Enterprise Linux(R) ES (v.4 for x86) Red Hat(R) Enterprise Linux(R) ES (v.4 for EM64T)	RHEL-ES4	
Red Hat(R) Enterprise Linux(R) 5 (for x86) Red Hat(R) Enterprise Linux(R) 5 (for Intel64)	RHEL5	
Red Hat(R) Enterprise Linux(R) 6 (for x86) Red Hat(R) Enterprise Linux(R) 6 (for Intel64)	RHEL6	
SUSE(R) Linux Enterprise Server 11 (for x86) SUSE(R) Linux Enterprise Server 11 (for EM64T)	-	
HP-UX 11.0 HP-UX 11i HP-UX 11i v2 HP-UX 11i v3	HP-UX	
AIX 5L(TM) V5.1 AIX 5L(TM) V5.2 AIX 5L(TM) V5.3 AIX(R) V6.1 AIX(R) V7.1	AIX	
VMware(R) Infrastructure 3 Foundation VMware(R) Infrastructure 3 Standard VMware(R) Infrastructure 3 Enterprise	VMware Infrastructure 3	VMware

Formal name	Abbreviation	
VMware vSphere(R) 4 Essentials Kit VMware vSphere(R) 4 Essentials Plus Kit VMware vSphere(R) 4 Standard Edition(TM) VMware vSphere(R) 4 Standard Plus Data Recovery VMware vSphere(R) 4 Advanced Edition(TM) VMware vSphere(R) 4 Enterprise Edition(TM) VMware vSphere(R) 4 Enterprise Plus Edition(TM)	VMware vSphere 4	
VMware vSphere(R) 5 Essentials Kit VMware vSphere(R) 5 Essentials Plus Kit VMware vSphere(R) 5 Standard Edition(TM) VMware vSphere(R) 5 Standard Plus Data Recovery VMware vSphere(R) 5 Enterprise Edition(TM) VMware vSphere(R) 5 Enterprise Plus Edition(TM)	VMware vSphere 5	

Oracle Solaris might be described as Solaris, Solaris Operating System, or Solaris OS.

#### Related products with Fujitsu Storage System ETERNUS and Storage Management Software ETERNUS SF

Formal name	Abbreviation		
ETERNUS DX60/DX60 S2 ETERNUS DX80/DX80 S2 ETERNUS DX90/DX90 S2	-		ETERNUS DX series ETERNUS Disk storage system
ETERNUS DX410 ETERNUS DX440	ETERNUS DX400 series	ETERNUS DX400/DX400 S2 series	
ETERNUS DX410 S2 ETERNUS DX440 S2	ETERNUS DX400 S2 series		
ETERNUS DX8100 ETERNUS DX8400 ETERNUS DX8700	ETERNUS DX8000 series	ETERNUS DX8000/DX8000 S2 series	
ETERNUS DX8100 S2 ETERNUS DX8700 S2	ETERNUS DX8000 S2 series		
ETERNUS2000 ETERNUS4000 ETERNUS8000	-		
Web GUI of ETERNUS DX series ETERNUSmgr	ETERNUS Web GUI		
ETERNUS LT20/LT20 S2 ETERNUS LT40/LT40 S2 ETERNUS LT60/LT60 S2 ETERNUS LT220 ETERNUS LT230 ETERNUS LT250 ETERNUS LT270	ETERNUS Tape library		

#### Software products

Formal name	Abbreviation
Microsoft(R) Internet Explorer(R)	Internet Explorer
Mozilla(R) Firefox(R)	Firefox
Microsoft(R) Cluster Service	MSCS
Microsoft(R) Windows Server(R) Failover Clustering	WSFC

Formal name	Abbreviation
Microsoft(R) Exchange Server	Exchange Server
Microsoft(R) SQL Server(TM)	SQL Server
PRIMECLUSTER Global Disk Services	GDS
PRIMECLUSTER Global File Services	GFS
Symfoware Server Enterprise Extended Edition Symfoware Server Enterprise Edition	Symfoware
HITACHI JP1/HiCommand Dynamic Link Manager	HDLM

## Manuals

Formal name	Abbreviation
ETERNUS SF Express / ETERNUS SF Storage Cruiser / ETERNUS SF AdvancedCopy Manager Installation and Setup Guide	ETERNUS SF Installation and Setup Guide
ETERNUS SF Express / ETERNUS SF Storage Cruiser / ETERNUS SF AdvancedCopy Manager Migration Guide	ETERNUS SF Migration Guide
ETERNUS SF Express / ETERNUS SF Storage Cruiser / ETERNUS SF AdvancedCopy Manager Web Console Guide	ETERNUS SF Web Console Guide
ETERNUS SF Express / ETERNUS SF AdvancedCopy Manager Operation Guide for Copy Control Module	ETERNUS SF Operation Guide for Copy Control Module
ETERNUS SF Storage Cruiser / ETERNUS SF AdvancedCopy Manager Cluster Environment Setup Guide	ETERNUS SF Cluster Environment Setup Guide
ETERNUS SF Express / ETERNUS SF Storage Cruiser / ETERNUS SF AdvancedCopy Manager Messages	ETERNUS SF Messages
ETERNUS SF Express / ETERNUS SF Storage Cruiser Event Guide	ETERNUS SF Event Guide
ETERNUS SF Express / ETERNUS SF Storage Cruiser / ETERNUS SF AdvancedCopy Manager Glossary	ETERNUS SF Glossary

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### Notes

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### Update history

Content of update	Updated section	Revision
Added Oracle Solaris 11, AIX V6.1 and AIX V7.1 in the operating systems.	Notation in Preface	3
Added the information about Symfoware Server Advanced Backup Controller.	1.1, 1.6	

### Manual organization and reading suggestions

#### Manual organization

The following table describes the Manual organization of Express, Storage Cruiser and AdvancedCopy Manager.

When to read	Related manuals (abbreviated)	Related products (NOTE)			Explanation
		EXP	SC	ACM	
Before installation	Quick Reference	Yes	Yes	Yes	This manual is unique for each product. The following manuals are available: <ul style="list-style-type: none"> <li>- Express Quick Reference</li> <li>- Storage Cruiser Quick Reference</li> <li>- AdvancedCopy Manager Quick Reference</li> </ul>
	Overview	No	No	Yes	This manual is unique for each product.

When to read	Related manuals (abbreviated)	Related products (NOTE)			Explanation
		EXP	SC	ACM	
During installation	Installation and Setup Guide	Yes			This manual is common for all products.
	Cluster Environment Setup Guide	No	Yes		This manual is common for Storage Cruiser and AdvancedCopy Manager.
	Migration Guide	Yes			This manual is common for all products.
During operation	Operation Guide	Yes	Yes	Yes	This manual is unique for each product. The following manuals are available: <ul style="list-style-type: none"> <li>- Express Operation Guide</li> <li>- Storage Cruiser Operation Guide</li> <li>- Storage Cruiser Operation Guide for Optimization Option</li> <li>- AdvancedCopy Manager Operation Guide (for Windows)</li> <li>- AdvancedCopy Manager Operation Guide (for Solaris)</li> <li>- AdvancedCopy Manager Operation Guide (for Linux)</li> <li>- AdvancedCopy Manager Operation Guide (for HP-UX)</li> <li>- AdvancedCopy Manager Operation Guide (for AIX)</li> </ul>
	Operation Guide for Copy Control Module	Yes	No	Yes	This manual is common for Express and AdvancedCopy Manager.
	Web Console Guide	Yes			This manual is common for all products.
Anytime	Event Guide	Yes		No	This manual is common for Express and Storage Cruiser.
	Messages	Yes			This manual is common for all products.
	Glossary	Yes			This manual is common for all products.

**NOTE:** "EXP" indicates Express, "SC" indicates Storage Cruiser and "ACM" indicates AdvancedCopy Manager.

## How to read manuals

Please use the following table to find the most useful information in the Express, Storage Cruiser and AdvancedCopy Manager manuals to answer your inquiry.

Purpose	Related products (NOTE)	Manual	Main contents	How to read
Acquiring a product overview and basic operation knowledge	EXP	- Express Quick Reference	- Product overview	Please read if you want to acquire a fundamental knowledge of the product and its operation in order to decide to install it or not.
	SC	- Storage Cruiser Quick Reference	- Installation decision	
	ACM	- AdvancedCopy Manager Quick Reference	- Overview of the necessary tasks from installation to first use	
		- AdvancedCopy Manager Overview	- Main functions - Linkable applications - Procedure overview for Advanced Copy of	

Purpose	Related products (NOTE)	Manual	Main contents	How to read
			ETERNUS Disk storage system	
Deciding if a version upgrade is required	common	- ETERNUS SF Migration Guide	<ul style="list-style-type: none"> <li>- Incompatibilities with previous version</li> <li>- Notes and cautions about version upgrade</li> <li>- Version upgrade procedure</li> </ul>	Please read if you want to upgrade from a previous version.
Installing and correctly operating the product  Setting up operating environment depending on purpose	common	- ETERNUS SF Installation and Setup Guide	<ul style="list-style-type: none"> <li>- Operating environment</li> <li>- Installation procedure</li> <li>- Setup procedure</li> <li>- Uninstallation procedure</li> </ul>	Please read if you want to install and setup the product.
	SC, ACM	- ETERNUS SF Cluster Environment Setup Guide	<ul style="list-style-type: none"> <li>- Supported cluster software</li> <li>- Installation procedure for a clustered system</li> <li>- Setup procedure for a clustered system</li> <li>- Uninstallation procedure for a clustered system</li> </ul>	Please read if you want to install and setup the product on a clustered system.
Administration and operation of the installed system	EXP	- Express Operation Guide	<ul style="list-style-type: none"> <li>- Starting and stopping the software</li> <li>- Device monitoring</li> <li>- Data copy inside the storage system</li> <li>- Necessary tasks after an architectural modification of the system as well as product maintenance</li> </ul>	Please read if you want to start or shutdown the system, monitor the operation status, do backup/restore operations, etc.
	SC	- Storage Cruiser Operation Guide	<ul style="list-style-type: none"> <li>- Starting and stopping the software</li> <li>- Device monitoring</li> <li>- Necessary tasks after an architectural modification of the system as well as product maintenance</li> <li>- Command reference</li> </ul>	
		- Storage Cruiser Operation Guide for Optimization Option	<ul style="list-style-type: none"> <li>- Operating environment construction</li> <li>- Operating status monitoring</li> <li>- Necessary tasks after an architectural modification of the system as well as product maintenance</li> </ul>	



Purpose	Related products (NOTE)	Manual	Main contents	How to read
			- Command reference	
	EXP, ACM	- ETERNUS SF Operation Guide for Copy Control Module	- Starting and stopping the software	
	ACM	- AdvancedCopy Manager Operation Guide (for Windows) - AdvancedCopy Manager Operation Guide (for Solaris) - AdvancedCopy Manager Operation Guide (for Linux) - AdvancedCopy Manager Operation Guide (for HP-UX) - AdvancedCopy Manager Operation Guide (for AIX)	- Data backup/restore inside the storage system - Necessary tasks after an architectural modification of the system as well as product maintenance - Command reference	
	common	- ETERNUS SF Web Console Guide	- Operating environment - Screen layout description	Please read if you want to understand the ETERNUS SF Web Console.
Dealing with messages issued by the software	common	- ETERNUS SF Messages	- Messages and their explanations - Parameter (variable information) description - System action - Countermeasures	Please read if you want a practical way of investigating and dealing with messages issued by the software.
Dealing with events issued by the software	EXP, SC	- ETERNUS SF Event Guide	- Phenomenon of event - Countermeasures	Please read if you need to find a practical way of investigating and dealing with events.
Researching the meaning of specific terms related to the products and other important terms	common	- ETERNUS SF Glossary	- Product specific terminology explanation - Explanation of important terminology appearing in the manual - Synonyms and related terms - Proper form of abbreviated terms	Please read if you want to learn the meaning of important terms, product specific terms or abbreviations used in the manuals.

NOTE: "EXP" indicates Express, "SC" indicates Storage Cruiser and "ACM" indicates AdvancedCopy Manager.

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# Chapter 1 Overview of AdvancedCopy Manager

This chapter provides a product overview of the AdvancedCopy Manager.

## 1.1 What is AdvancedCopy Manager?

AdvancedCopy Manager is a Storage Management Software that provides reliable high-speed backup/restore and replication capabilities utilizing the Advanced Copy function of ETERNUS Disk storage system.

The AdvancedCopy Manager significantly reduces operational downtime for backup and replication requirements in large volume transaction intensive environments.

The product collaborates closely with a range of mainstream database environments, including Symfoware Server, Oracle Database, SQL Server, DB2 and Exchange Server, to provide high speed reliable data copying where high uptime or continuous operation is paramount.

### 1.1.1 Benefits of installing AdvancedCopy Manager

Using the Advanced Copy function of ETERNUS Disk storage system, AdvancedCopy Manager facilitates copying between storage devices both within the same ETERNUS Disk storage system and across multiple ETERNUS Disk storage systems in the SAN or remotely located storage devices via high speed communications mediums.

These functions make AdvancedCopy Manager an effective and highly reliable disaster recovery solution, minimizing the risk of lost data and downtime.

### 1.1.2 Features of AdvancedCopy Manager

The advantages of data copy using AdvancedCopy Manager with ETERNUS Disk storage system include:

- The backup command finishes within seconds, allowing the physical copying to take place in the background, in parallel with normal operations.
- Backup is performed internally by the ETERNUS Disk storage system, minimizing the CPU usage on the host system.
- I/O is limited to within ETERNUS Disk storage system, where high-speed data copy can be maintained. Where Remote Equivalent Copy (REC) is used, there may be some additional overhead but the copy can still be maintained at a very high copy speed.
- Backup can be performed in a much shorter time frame using the differential copy capability of the One Point Copy (OPC) and Equivalent Copy (EC) methods.
- Restorations can be performed at high speeds using the same Advanced Copy functionality depending on the type of backups originally performed.

### 1.1.3 Main functions provided by AdvancedCopy Manager

The main functions provided by AdvancedCopy Manager are as follows:

- Advanced Copy functions
  - Snapshot high-speed copy
  - Synchronous high-speed copy
  - Other copy functions

- Backup management functions
  - Policy management function  
Manages data such as number of preservation generations and interval days as backup policy
  - Storage configuration management function  
Manages the configurations of copy source volumes (to be backed up) and copy destination volumes (where backup data are stored)
  - Backup/restore functions
  - Backup history management function  
Manages the data in a generation of data backed up in the past as a backup history
- Replication management functions
- Backup functions using the AdvancedCopy Manager Copy Control Module (hereafter referred to as "AdvancedCopy Manager CCM")
- Web Console function  
Allows for control of the AdvancedCopy Manager operating environment from a web browser, This GUI is called ETERNUS SF Web Console (hereafter referred to as "Web Console").

Below chart shows for each function of AdvancedCopy Manager, whether backup, replication, or backup utilizing the AdvancedCopy Manager CCM are available.

Table 1.1 Availability of backup, replication, and backup utilizing AdvancedCopy Manager CCM for each function of AdvancedCopy Manager

AdvancedCopy Manager function	Backup	Replication	Backup utilizing AdvancedCopy Manager CCM
Policy management function	Available	Not available	Not available
Storage configuration management function	Available	Available	Available
Backup history management function	Available	Not available	Not available
Selection of target volume in copying	Auto/Manual	Manual	Manual
Control by command lines	Available	Available	Available
Use of Web Console	Available	Available	Available ( <b>NOTE</b> )

**NOTE:** Available only in AdvancedCopy Manager CCM when bundled with ETERNUS SF Manager.

## 1.2 Product organization

AdvancedCopy Manager consists of the following programs.

Table 1.2 AdvancedCopy Manager programs and supported operating systems

No.	Program name	Function overview	Operating system (A= Available, N/A=Not Available)				
			Windows	Solaris	Linux	HP-UX	AIX
1	ETERNUS SF Manager	Data management of storage systems with Agent-based operation model	A	A	A	N/A	N/A
2	AdvancedCopy Manager's agent	Management of backup and replication	A	A	A	A	A
3	AdvancedCopy Manager CCM	Data Management of storage systems with Agent-less operation model	A	A	A	N/A	N/A

In this document, program names are abbreviated as follows:

- "ETERNUS SF Manager" as "Manager"
- "AdvancedCopy Manager's agent" as "Agent"

Furthermore, explanations use the following terminology:

Term	Meaning
Management Server	Server on which ETERNUS SF Manager is installed
CCM Server	Server on which AdvancedCopy Manager CCM is installed
Managed Server	Server controlled by a Management Server or CCM Server

### Information

After installation of ETERNUS SF Manager, if ETERNUS SF Manager is set up as the AdvancedCopy Manager's manager, it is possible to use AdvancedCopy Manager.

For details, refer to "Setup of ETERNUS SF Manager" in the "ETERNUS SF Installation and Setup Guide".

## 1.3 System configuration

The servers (including PCs) of which the operating environment of AdvancedCopy Manager consists may include the items described below.

### Management Server

The configuration of the operating environment for AdvancedCopy Manager requires a Management Server.

The Management Server's primary roles are as follows:

- Serve as centralized control center.
- Maintain a database of Management Servers and associated devices such as transaction volumes, backup volumes and replication pairs.
- Accept commands from the Web Console and execute the AdvancedCopy Manager functions.

The Manager is equipped with agent functions. If the Management Server is connected to an ETERNUS Disk storage system, the Management Server can additionally take up the role of a Managed Server.

### Managed Server

This server is a business server (where business applications are running), that is connected to ETERNUS Disk storage system and controlled by the Management Server or CCM Server. A single operating environment of AdvancedCopy Manager can be set up with multiple Managed Servers.

In order to execute the backup and replication commands on this server, agents must be installed.

In order to back up resources for ETERNUS Disk storage system connected to a server without any agents installed on it, use the AdvancedCopy Manager CCM.

### CCM Server

This server is a server that performs backup of the resources in the ETERNUS Disk storage system in that server without the need to install the AdvancedCopy Manager's agent on the business servers that are connected to ETERNUS Disk storage system.

Setting up this type of server is not necessary if you do not use AdvancedCopy Manager CCM for backup.



See

For details on AdvancedCopy Manager CCM, refer to the "ETERNUS SF Operation Guide for Copy Control Module".



Information

The programs of AdvancedCopy Manager CCM are included in ETERNUS SF Manager. Consequently, if you already have ETERNUS SF Manager installed, you have AdvancedCopy Manager CCM available for use without any need to install it separately.

For using AdvancedCopy Manager CCM as included in ETERNUS SF Manager, the Management Server must be assigned as a CCM Server.

### Web Console

AdvancedCopy Manager provides a function called "Web Console", which can be used to monitor and manage the AdvancedCopy Manager operating environment from a web browser.



See

For an explanation of the Web Console operating environment and its screens, refer to the "ETERNUS SF Web Console Guide".

## 1.4 Supported cluster software

AdvancedCopy Manager is supported in the following clustered systems.

However, the degree of support may vary according to the version level of the host operating system.

Table 1.3 Usable clustered systems

OS type	Usable clustered system
Solaris	SynfinityCLUSTER PRIMECLUSTER VERITAS Cluster Server Sun Cluster
Linux	PRIMECLUSTER VERITAS Cluster Server
Windows	Microsoft Cluster Service or Windows Server Failover Clustering
HP-UX	MC/ServiceGuard VERITAS Cluster Server
AIX	High Availability Cluster Multi-Processing VERITAS Cluster Server

Refer to "Support" in the "ETERNUS SF Cluster Environment Setup Guide" for details.

## 1.5 Supported devices

AdvancedCopy Manager supports backup at the device level, and supports partitions, volume groups, slices, and similar devices. Volume compatibility depends on the active system configuration.

For details, refer to "Managing a Device on AdvancedCopy Manager" in the "ETERNUS SF AdvancedCopy Manager Operation Guide" for the operating system of the Managed Server.

For details on AdvancedCopy Manager CCM, refer to "Supported functions" in the "ETERNUS SF Operation Guide for Copy Control Module".

## 1.6 Linkable applications

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AdvancedCopy Manager can be linked up with the applications listed below.

Application name	Linkable function	
	Backup / Restore	Replication
Oracle	A	A
SQL Server	A	A
Exchange Server	N/A	A
Symfoware	A	N/A
DB2	A	A
Hyper-V	N/A	A

(A=Available, N/A=Not Available)



See

.....  
For details, refer to the "ETERNUS SF AdvancedCopy Manager Operation Guide" for the operating system on which each application is running.  
.....

# Chapter 2 Operating Models

With AdvancedCopy Manager, the following 2 operating modes are available:

## Agent-based operating model

This operating model requires the installation of ETERNUS SF Manager and the AdvancedCopy Manager's agent.

Use of this operating model requires that the installed ETERNUS SF Manager be set up as the AdvancedCopy Manager's manager.

Application data copy is possible on a business server. As a function to trigger scripts before and after the copy operation is provided, scripts can be customized to conform to the administration policies and allow flexible and optimized operations.

## Agent-less operating model

This operating model requires the installation of AdvancedCopy Manager CCM.

There is no need to install either ETERNUS SF Manager or AdvancedCopy Manager's agent, therefore the time to get ready to start is shorter compared to Agent-based operating model. Moreover, as all the operations can be done directly on the server where the CCM has been installed, there are no requirements about the OS environment of the business server.

Unlike the copy operation with an agent, the copy is done per disk rather than per partition or slice. For this reason, the copy destination resource must be larger. Also, as copy is done without relation to the application running on the business server, the operator must ensure the integrity of the copied data. (for example, by performing the copy when the data are inactive).

Decide which operating model to use by considering the following criteria.

Operating model	Choice criteria
Agent-based	<ul style="list-style-type: none"> <li>- If you want to use some of the functions available when the AdvancedCopy Manager's agent is installed.</li> </ul> <p>For example, if you want to use advanced copy operations such as multiple generation backup/restore functions, interaction with a DBMS on a business server, volume shadow copy service (VSS Volume Shadow Copy Service function), etc.</p>
Agent-less	<ul style="list-style-type: none"> <li>- If there are many business servers and you want to reduce the cost of installation and start operation as soon as possible.</li> <li>- If the OS on the business server is not supported by the AdvancedCopy Manager's manager or the AdvancedCopy Manager's agent.</li> <li>- If the AdvancedCopy Manager's agent cannot be installed on the business server.</li> </ul> <p>For example, if installation of applications is not permitted on the business server outside a restricted set of applications, or if an exclusive software application is already installed on the server.</p> <ul style="list-style-type: none"> <li>- If you want to reduce the maintenance tasks on the business server.</li> </ul> <p>For example, if you want to avoid having to apply patches on the software.</p>

## Note

It is possible to have operating models with Agent-based and Agent-less at the same time, but when operated in parallel, the copy data of both operating models must not have common areas.

If the copy data of both operating models have common areas, there is a possibility of data loss when copy operations use the mutual areas.

## See

Refer to the following sections of the "ETERNUS SF Installation and Setup Guide" for details about incompatible software with AdvancedCopy Manager.

- Agent-based operating model:

"Operating environment of ETERNUS SF Manager" and "Operating environment of AdvancedCopy Manager's agent"



- Agent-less operating model:

"Operating environment of AdvancedCopy Manager CCM"

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## 2.1 Agent-based operation

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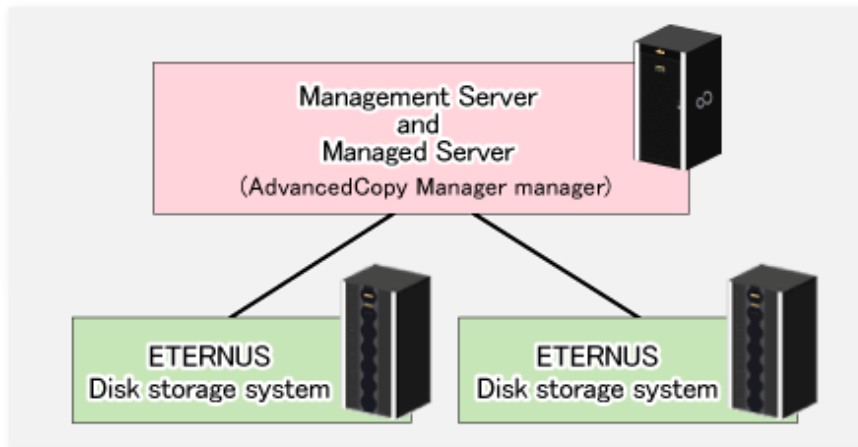
This section explains the operating model that is based on using agents.

### 2.1.1 Single server configuration

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If there is only one server connected to the ETERNUS Disk storage system, install the Manager on that server. Since the Manager also provides Agent functions, the Management Server role and the Managed Server role can be performed on one server.

Figure 2.1 Single Server configuration



### 2.1.2 Multiple servers configuration

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If two or more servers are connected to the ETERNUS Disk storage system, the following two configurations are possible:

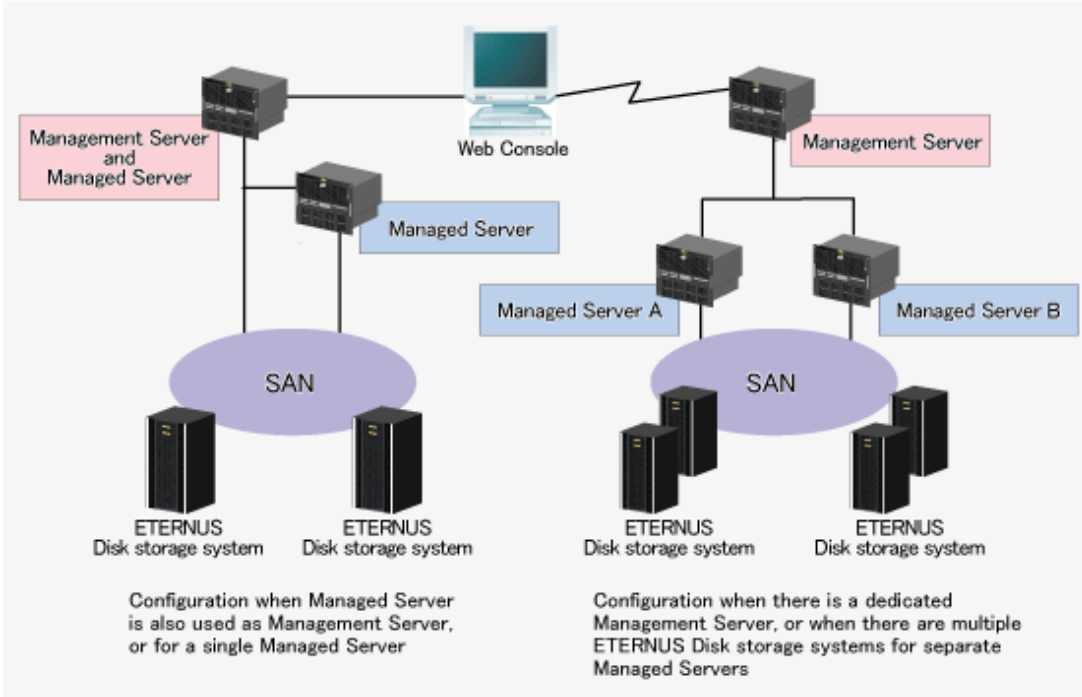
- A single server can perform the roles of both Management Server and Managed Server. The other servers are operated as Managed Servers.
- All servers are operated as Managed Servers. A server dedicated to the role of Management Server is set up separately.

The Web Console can be used to manage one or more AdvancedCopy Manager configurations.

The Manager uses some server resources, so the operational performance of agents and other applications installed on these servers may be adversely affected. For this reason, it is recommended that the Manager is installed on a dedicated server.

The following figure shows a configuration containing multiple servers connected to the ETERNUS Disk storage system.

Figure 2.2 Multiple Servers configuration



Backup can only function within a single ETERNUS Disk storage system connected to a single Managed Server, while Replication can be performed across multiple Managed Servers or ETERNUS Disk storage systems.

The following table shows the available copy modes.

Table 2.1 Copy Mode Availability

		Intra-ETERNUS	Inter-ETERNUS
Intra-Server (Managed Server)	Functionality	Backup and replication	Only replication
	Copy Mode	OPC/EC/QuickOPC/SnapOPC/SnapOPC+	REC
	Diagram		
Inter-Server (Managed Servers)	Functionality	Only replication	Only replication
	Copy Mode	OPC/EC/QuickOPC/SnapOPC/SnapOPC+	REC
	Diagram		

## 2.2 Agent-less operation

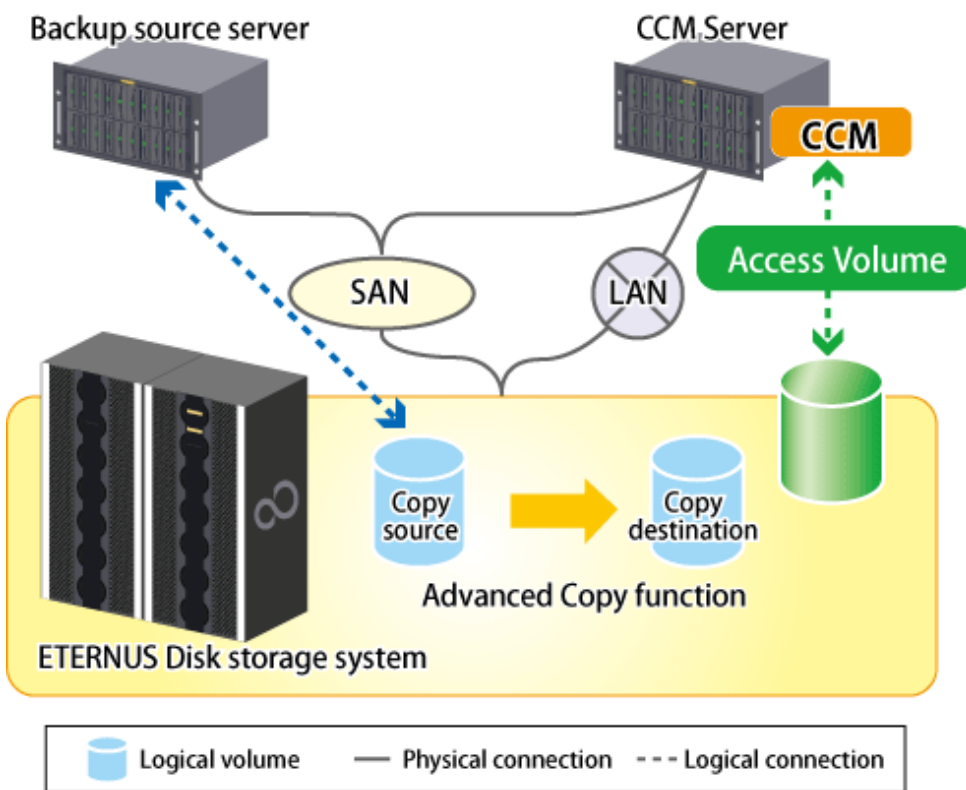
This section explains the Agent-less operating model.

 See

For further details, refer to "System configuration" in the "ETERNUS SF Operation Guide for Copy Control Module".

### 2.2.1 Using Copy command via SAN

This operating model serves to give Advanced Copy instructions from the CCM Server to the ETERNUS Disk storage system via SAN. The following figure shows a configuration in which intra-box copy is performed.



 See

For information on configurations in which inter-box copy is performed, refer to "System configuration" in the "ETERNUS SF Operation Guide for Copy Control Module".

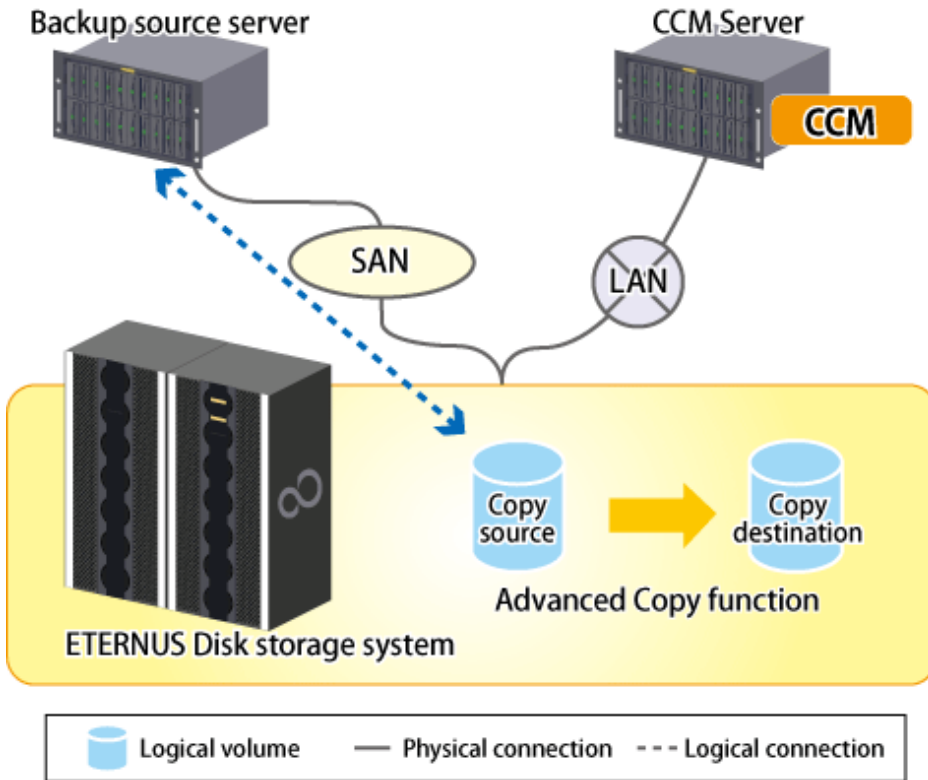
### 2.2.2 Using Copy command via LAN

This operating model serves to give Advanced Copy instructions from the CCM Server to the ETERNUS Disk storage system via LAN. This operating model is available only on the following ETERNUS Disk storage systems:

- ETERNUS DX80 S2/DX90 S2
- ETERNUS DX400 S2 series

- ETERNUS DX8000 S2 series

The following figure shows a configuration in which intra-box copy is performed.



 See

For information on configurations in which inter-box copy is performed, refer to "System configuration" in the "ETERNUS SF Operation Guide for Copy Control Module".

# Chapter 3 AdvancedCopy Manager Functions

This chapter describes the main functions of AdvancedCopy Manager.

## 3.1 Advanced Copy functions

AdvancedCopy Manager supports two distinct copy modes:

- Snapshot high-speed copy

This creates a snapshot of data. The copy types available with this function are:

- OPC
  - QuickOPC
  - SnapOPC
  - SnapOPC+
- Synchronous high-speed copy

This maintains the equivalent status for a transaction volume and backup volume. The copy types available with this function are:

- EC
- REC

With these copy functions (except the OPC), once an initial copy has been made, it is possible to perform differential copying, which copies only the modified portions.

With the REC, it is possible to perform synchronous high-speed copy from ETERNUS Disk storage system to other ETERNUS Disk storage system at remote locations.

### 3.1.1 Snapshot high-speed copy

AdvancedCopy Manager supports both Snapshot backup and differential copying. Point in Time recovery for high transaction database environments where roll-forward has been enabled is also available. These features are particularly effective in minimizing system downtime and server I/O load.

#### OPC

OPC executes a disk copy of the entire volume.

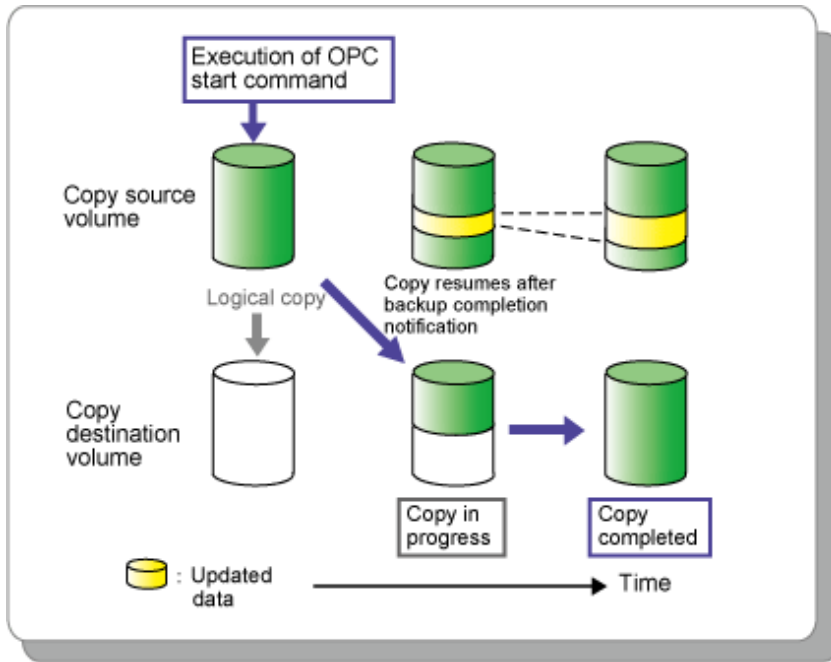
When OPC is executed, ETERNUS Disk storage system creates a point in time snapshot of the source volume and then immediately returns a notification to the operator that the copy is complete, before any physical copying has even occurred. This allows for access to be returned to the transaction or source volume with little or no interruption while the copy is performed as a background process at the hardware level in the ETERNUS Disk storage system.

OPC is highly effective for the following applications:

- Generation backups where continuous transactions are critical, such as in Internet business applications
- Data restoration from a backup volume
- Maintenance of data for archival purposes

The following diagram represents the process used in OPC.

Figure 3.1 Processing Flow of OPC



### QuickOPC

Differential copying using QuickOPC requires that an initial copy exists.

When QuickOPC is executed, it will determine if an initial copy exists, then will copy only updated blocks of data that have been tracked since the initial copy was created to the backup volume for that specific QuickOPC session.

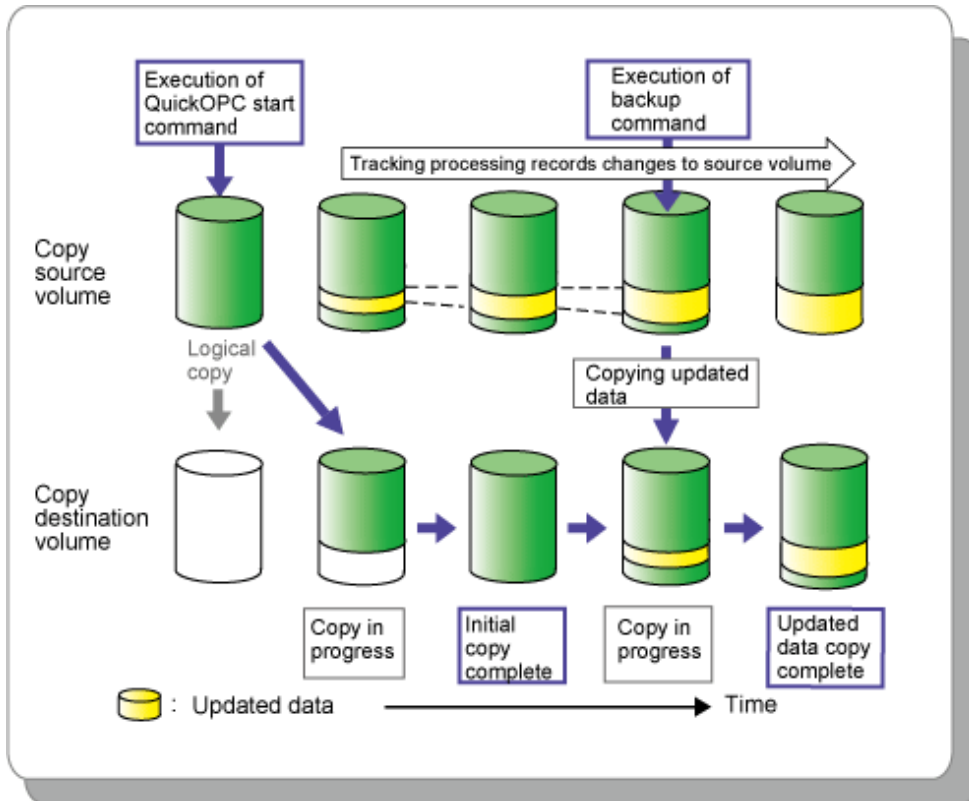
If QuickOPC detects that an initial copy does not exist, it will create the initial copy using OPC. The differential copy method used in QuickOPC significantly reduces the time required for physical data copying in order to create a Point in Time snapshot while minimizing the I/O load on the storage system host server.

QuickOPC is highly effective where:

- Backup to disk where uptime is critical
- Frequent creation of restore points or generation backups

The following diagram represents the processing flow of differential copying used in a QuickOPC copy after an initial copy has been created.

Figure 3.2 Processing Flow of QuickOPC



## SnapOPC

SnapOPC uses the Copy-on-Write method to create a copy of the source volume as it was before any updates are made. Only the replication function can use SnapOPC.

In a SnapOPC copy, the destination volume does not need to be of the same size as the source volume, using a Snap Data Volume instead as the copy destination. The Snap Data Volume is usually only a fraction of the size of a source volume.

When an update is required to be made to the source volume, the change is held in an internal table while the original data on the source volume is first copied to the Snap Data Volume. The change is then applied to the source volume. This method of backup copy is called Copy-on-Write.

The Snap Data Volume stores only original data that has been modified or updated on the source volume.

The size of the Snap Data Volume is relative to the rate of modification on the source volume and a utility is used to provide an accurate estimate of the size. If the source volume is relatively stable, only a relatively small Snap Data Volume is required.

Although the physical size of the Snap Data Volume maybe smaller, the logical size (that is, the size presented to the operating system) of the destination volume is in effect the same as the source volume. ACM achieves this by combining the original data copied to the Snap Data Volume with the unmodified data on the source volume to form a logical view of the destination volume.

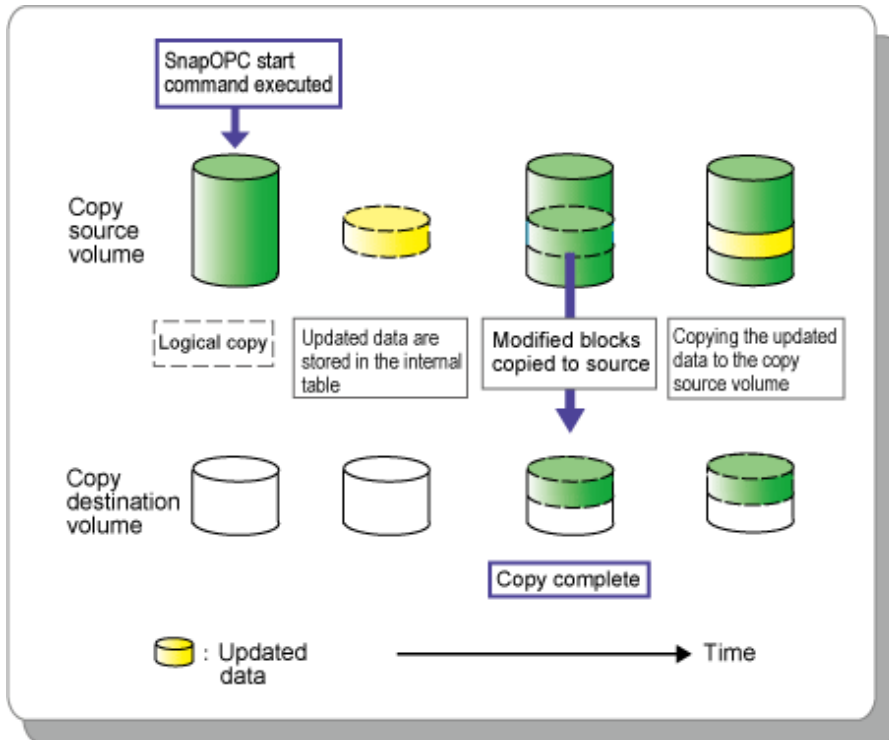
However, it should be understood that SnapOPC may be unsuitable for some purposes as the copy method can reduce access performance in the source volume, and any loss of data on the source volume would render the copied data unusable.

SnapOPC is typically used for:

- Temporary source for a cascade copy to alternate media such as tape
- Backup to disk for file servers and other data with low modification rates

The following diagram represents the processing flow of SnapOPC.

Figure 3.3 Processing Flow of SnapOPC



### SnapOPC+

Like SnapOPC, SnapOPC+ uses the Copy-on-Write method to create a copy of the source volume as it was before any updates. Only the replication function can use SnapOPC+.

SnapOPC+ can save the copy source volume data as it was before any updates are made in snap generation units (units in which replication volumes were created). Since copy is performed only to the new copy destination volume, the access load on the copy source volume and the physical size used on the copy destination volume can be smaller than with SnapOPC.

Due to the mechanism and features of SnapOPC+, it is assumed that it is used as a backup to enable recovery in case of soft faults (such as operator mistakes and software errors). If a copy source volume becomes inaccessible due to a hardware fault, then the relevant copy session also becomes inaccessible. As a result, the data on the copy destination volume cannot be read. In order to be prepared for such fatal hardware faults, it is recommended that, in conjunction with SnapOPC+, OPC/QuickOPC/EC/REC should be used to make a complete copy of data.

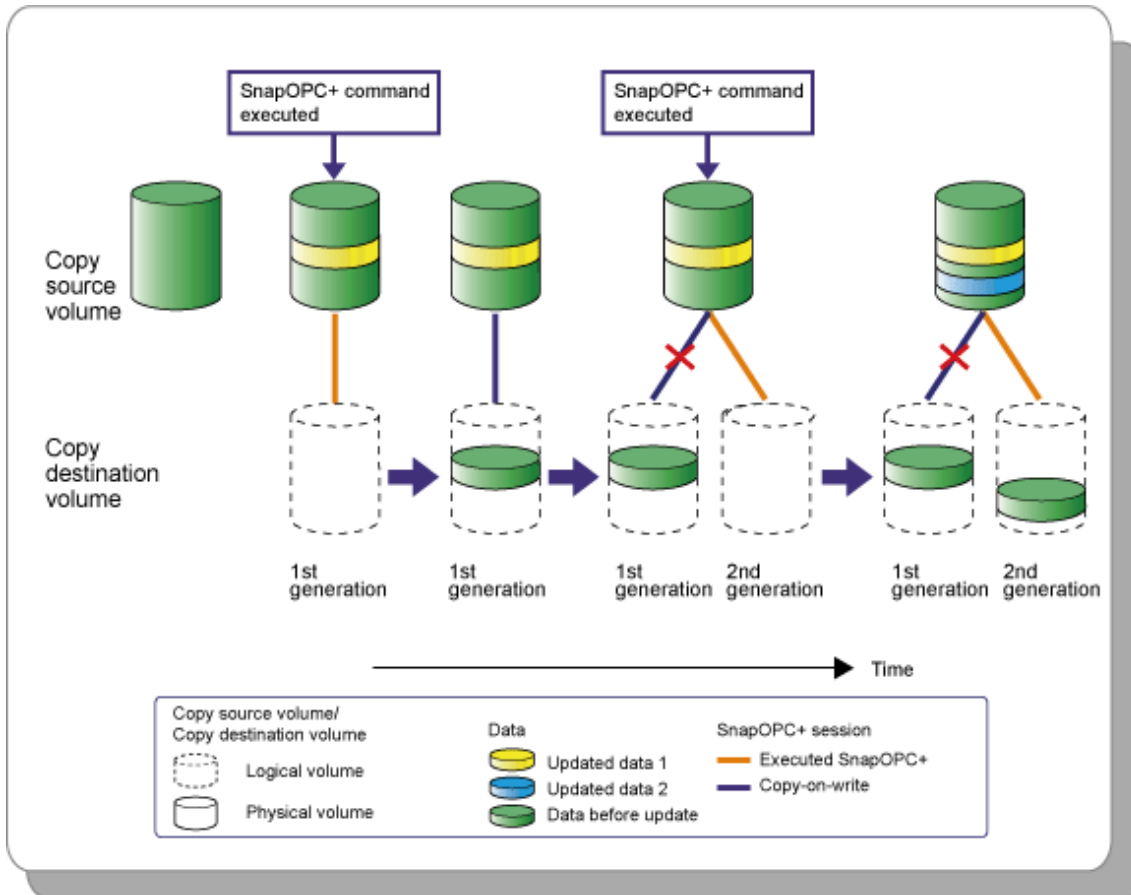
SnapOPC+ is typically used for:

- Temporary source for a cascade copy to alternate media such as tape
- Backup for file servers and other data with low modification rates

The following diagram represents the processing flow of SnapOPC+.



Figure 3.4 Processing Flow of SnapOPC+



### 3.1.2 Synchronous high-speed copy

#### EC

The EC feature of AdvancedCopy Manager invokes a process of synchronization between source and destination volumes to create a synchronized copy of the source volume. The purpose of the synchronization is to reach and maintain a state of equivalence with the source volume in order to create a temporary copy or archival backup.

The source volume remains available and accessible as there is no need to stop or suspend access to the source volume while the copy is built using the synchronization process.

When a state of equivalence with the source volume has been attained, the destination volume continues to be maintained as an image of the source volume.

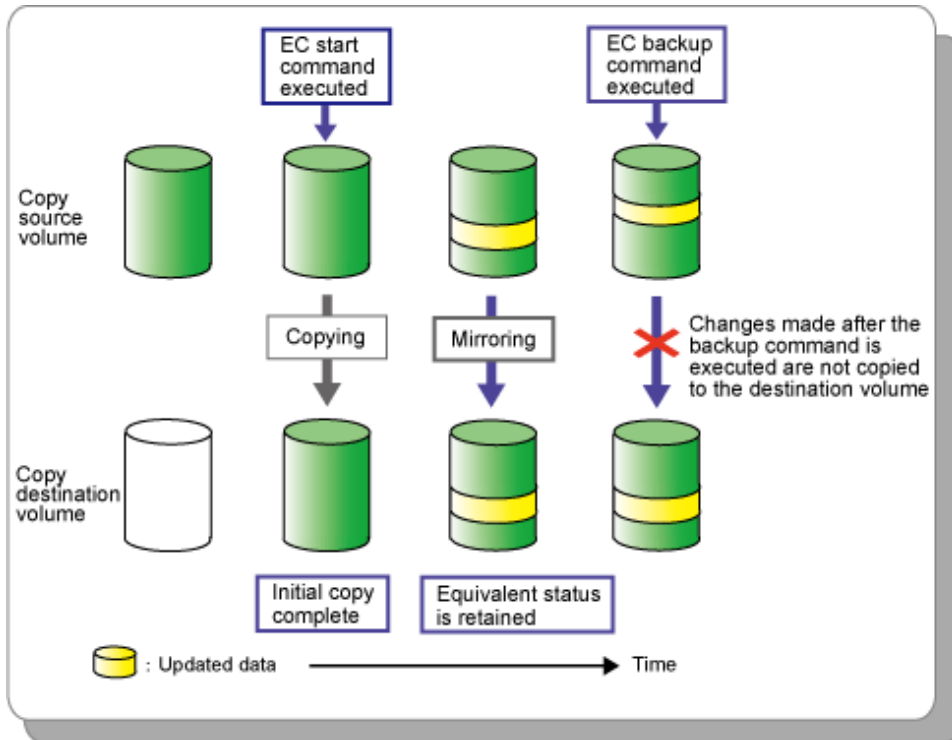
At any subsequent point while the copy source volume and destination volume are in this state of equivalence, the destination volume can be split from the source, thus creating a backup with history or a replica copy as at that point in time.

EC is highly effective for:

- Collection of backup data in parallel with ordinary transactions
- Distributed processing using copy data

The following diagram represents the processing flow of EC.

Figure 3.5 Processing Flow of EC



### Suspend/Resume Function provided by EC

The Suspend/Resume option of the EC function is used to create a backup after an initial copy has been built using the EC synchronization process. At this point, the copy source and copy destination volumes (Volume Pair) will have attained a state of equivalence.

The EC session is then suspended using the Suspend option, detaching the destination volume from the EC session to create a copy which can be used as a backup with history or as a source volume for a subsequent copy to an archive device. This copy could also be mounted and become available for use by other applications.

While the session is suspended all updates to the copy source volume continue to be tracked so that they can be applied to the destination volume should that EC session be subsequently resumed.

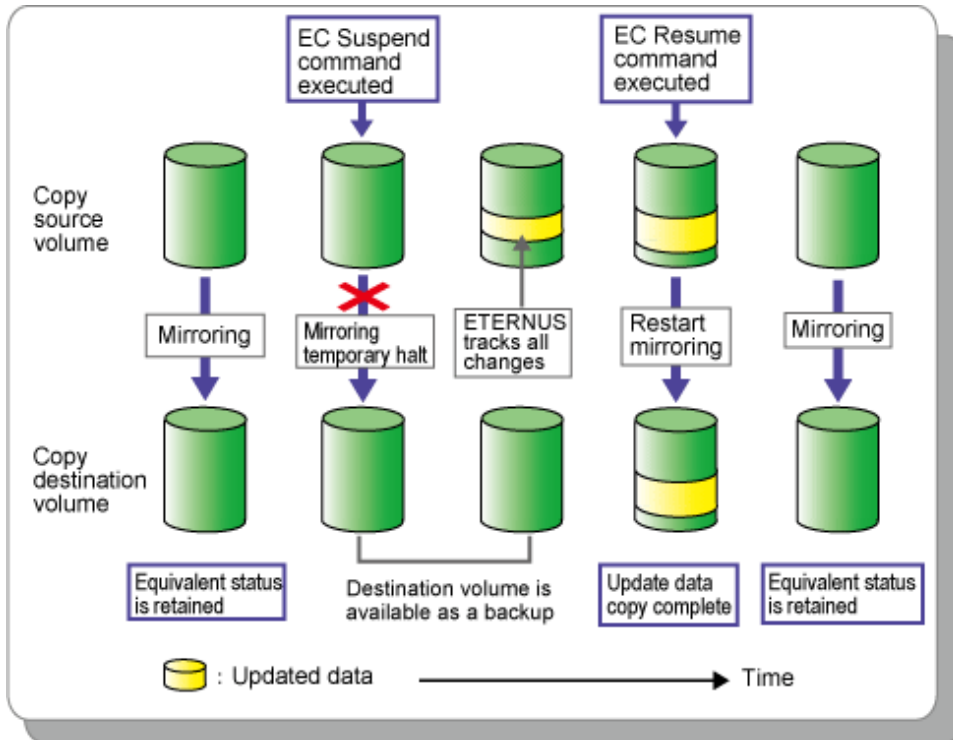
This allows the same destination volume to be reused as the base for a continuing backup, thus reducing the time required for backup.

The Resume option will invoke a re-synchronization process of the same source and destination volume pair where all of the tracked changes to the source volume will be applied to the destination volume to attain a state of equivalence again.

A suspend and resume process can be performed on the same volume pair as many times as required.

The following diagram represents the processing flow of the Suspend/Resume function.

Figure 3.6 Processing Flow of Suspend/Resume Function



## REC

REC is a method for copying data between different ETERNUS Disk storage systems, but only the replication function can use REC.

REC has two transmission modes; synchronous and asynchronous.

Synchronous mode guarantees that the copy destination will always match the copy source.

Asynchronous transfer mode is typically used in the following circumstances:

- Where there may be a significant communications lag between the devices
- Used to avoid adversely affecting server performance and write performance on the copy source.

Asynchronous mode has two primary sub-modes which provide greater control over data transmission according to transaction intensity and or data volume, or available bandwidth between copy source and copy destination.

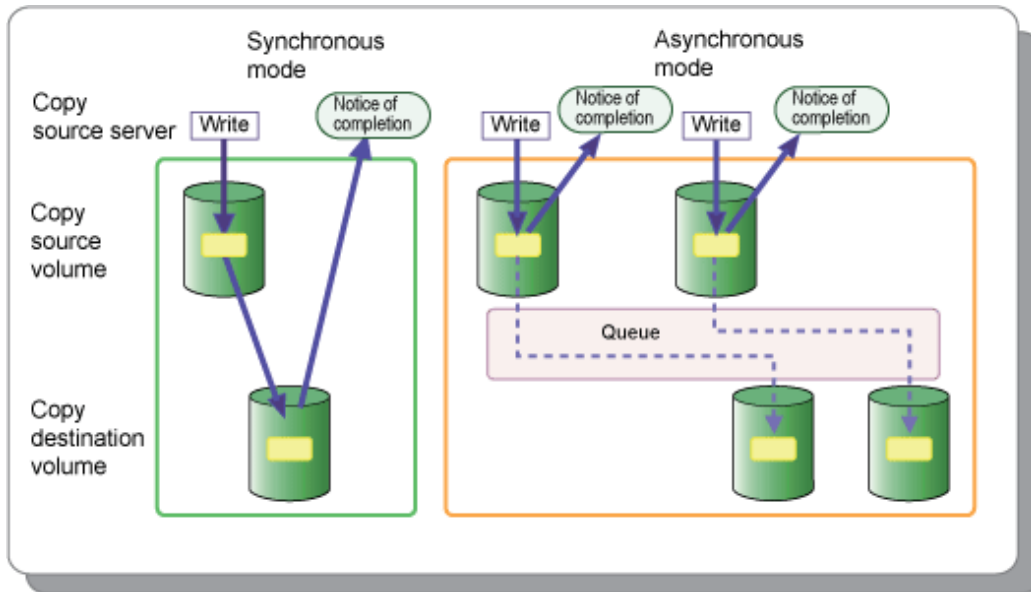
The default Asynchronous mode must however be selected to perform a split (create a backup or replica).

REC is highly effective for:

- Remote backup of a disaster countermeasure system or similar

The following diagram represents the processing flow of REC.

Figure 3.7 Processing Flow of REC



### 3.1.3 Additional copy functions

#### Concurrent Copy

The AdvancedCopy Manager multiple copy function allows concurrent copy from a single source volume to multiple destinations. Only one of these destinations can be in a different ETERNUS Disk storage system.

#### Cascade Copy

Cascade copy involves specifying the destination of one copy process as the source of a subsequent copy. One copy might be used as a nearby backup and another as a remote copy for disaster recovery or archive.

Possible copy combinations for cascade copy include:

- A copy destination made with OPC used as the source for REC
- A copy destination made with EC used as the source for REC
- A copy destination made with REC used as the source for OPC
- A copy destination made with REC used as the source for SnapOPC
- A copy destination made with REC used as the source for EC

## 3.2 Backup management functions

This section describes the backup and restore functions provided by AdvancedCopy Manager.

### 3.2.1 Backup

Features of backup using AdvancedCopy Manager include the following:

- High-speed backup between volumes regardless of volume capacities

- The Advanced Copy functions of ETERNUS Disk storage system are used to significantly reduce the operational impact of a backup or restoration.
- Online backup is supported in mainstream database environments.
- Faster backups can be made by performing updates of differential copies.
- AdvancedCopy Manager automatically selects destination volumes to be used for backup. Alternatively, you can define explicit relationships between source volumes and backup volumes manually.

### **3.2.2 Restore**

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The backup management information stored by AdvancedCopy Manager allows data to be restored from the most suitable backup volume to a transaction volume. This is performed using the OPC hardware function and the history management information saved by AdvancedCopy Manager to restore to a point in time.

By default, data will be restored to the transaction volume that was the backup source; however, it is possible to change the restore destination.

## **3.3 Replication management functions**

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Replication in AdvancedCopy Manager uses the Advanced Copy functions of the ETERNUS Disk storage system to perform high-speed copying. The copy data created using this function can be used as backup data.

For the purpose of this overview, replication is defined as copying that is intended for concurrent use by other applications. The destination volume in a replication remains accessible, unlike destination volumes in backup which are typically unmounted.

Replication is not limited to within a single Managed Server (Storage Server) or a single ETERNUS Disk storage system. Using REC, replication can also be performed across different ETERNUS Disk storage systems regardless of geographical locations.

The replication function of AdvancedCopy Manager has the following features:

- With the AdvancedCopy Manager replication function, replication can be configured in two directional modes:
  - Uni-directional: copying can only be performed from the source volume to the destination volume.
  - Bi-directional: copying can be performed in either direction between volumes.
- If the copy source and copy destination volumes are both in the same ETERNUS Disk storage system and hosted by the same Managed Server, data can be copied in real-time.

## **3.4 Backup using AdvancedCopy Manager CCM**

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Features of backup using AdvancedCopy Manager CCM include the following:

- It is not necessary to install an agent on the server that is the backup source, which, compared to Agent-based operation, allows for shorter times to start operation.
- Backup can be performed regardless of the OS that is running on the backup source server.
- By isolating the LAN connected to the backup source server from the CCM Server, security can be enhanced.

For details, refer to the "ETERNUS SF Operation Guide for Copy Control Module".