IBM TotalStorage™ Enterprise Storage Server™

Copy Services Command-Line Interface User's Guide

SC26-7434-01

IBM TotalStorage™ Enterprise Storage Server™

Copy Services Command-Line Interface User's Guide

SC26-7434-01

Note

Before using this information and the product it supports, read the information in “Notices” on page 145.

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About this book

This book introduces the IBM TotalStorage Enterprise Storage Server (ESS) Copy Services Command-Line Interface (CLI) and describes the CLI commands that you can use from the following host systems:

- Hewlett-Packard-UX
- IBM AIX®
- IBM NUMA-Q®
- Linux (Red Hat and SuSE, 32-bit, Intel-Based)
- Microsoft Windows 2000
- Microsoft Windows NT® 4.0
- Novell Netware
- Sun Solaris

You can use the CLI commands to write customized scripts for running tasks that you have already defined with the ESS Copy Services User Interface. You can also use these commands to monitor the ESS Peer-to-Peer Remote Copy (PPRC) and FlashCopy configuration tasks within a Copy Services server group.

This book is organized into ten chapters. Each of the first eight chapters provides detailed information about the Copy Services CLI for a specific host system. This information includes step-by-step procedures for you to install the Copy Services CLI and use the CLI commands. The ninth chapter helps you understand the CLI return codes and messages. The tenth chapter helps you troubleshoot connection problems that might occur between your host system and the ESS Copy Services server.

Summary of changes

This section summarizes technical and organizational changes to the first edition of this book.

Major technical changes to this book, marked with revision bars (|), include the following:

- Added the new CLI support for Linux host systems in “Chapter 3. Copy Services CLI for Linux host systems” on page 31.
- Added the new CLI support for Novell 4.x host systems in “Chapter 4. Copy Services CLI for Novell 4.x host systems” on page 47.
- Added the new CLI support for Novell 5.x host systems in “Chapter 5. Copy Services CLI for Novell 5.x host systems” on page 63.
- Updated “Chapter 8. Copy Services CLI for Windows NT or Windows 2000 host systems” on page 111 with the new file extension for all CLI commands for Windows NT or Windows 2000 host systems.
- Updated return code 26 in “Chapter 9. Return codes and messages” on page 127.
- Removed the CLI post-installation information previously required for AIX, HP, Sun, and NUMA-Q host systems.

This edition also includes a major organizational change. Each chapter is changed to focus on the CLI support information pertinent to a specific host system. This change is intended to help you find information faster.

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Who should use this book

This book is intended for system administrators or others who install and use the Copy Services CLI on all supported host systems.

Conventions used in this book

This section describes the notational conventions that are used in this book.

Emphasis

The following typefaces are used to show emphasis:

boldface Text in **boldface** represents menu items and command names.

italics Text in *italics* is used to emphasize a word. In command syntax, it is used for variables for which you supply actual values, such as, the default directory where you have installed the Copy Services CLI.

`monospace` Text in `monospace` identifies the data or commands that you type, samples of command output, or examples of program code or messages from the system.

Special characters

The following special characters are used in the CLI command syntax:

– (minus) or / (slash) sign
Flags are prefixed with a – (minus) or / (slash) sign. Flags define the action of a command or modify the operation of a command. You can use multiple flags, followed by parameters, when you issue a command.

[ ] square brackets
Optional values are enclosed in square brackets.

{ } braces Required values are enclosed in braces. Values that are not enclosed in either brackets or braces are also required.

| vertical bar A vertical bar signifies that you choose only one value.

For example, `[ a | b ]` indicates that you can choose a, b, or nothing. Similarly, `{ a | b }` indicates that you must choose either a or b.

... ellipses Ellipses signify the values that can be repeated on the command line.

Publications

The tables in this section list and describe the following publications:

- The publications that compose the IBM TotalStorage ESS library.
- Other IBM publications that relate to the ESS.
- non-IBM publications that relate to the ESS.

See “Ordering ESS publications” on page xiv for information about how to order publications in the IBM TotalStorage ESS publication library. See “How to send your comments” on page xix for information about how to send comments about the publications.

The IBM TotalStorage ESS library

Table 1 shows the customer publications that comprise the ESS library. See "The IBM publications center" on page xiv for information about ordering these and other IBM publications.

Table 1. Publications in the ESS library

Long title (short title)	Description	Order number
IBM TotalStorage Enterprise Storage Server Copy Services Command-Line Interface User's Guide (ESS CLI User's Guide)	This user's guide describes the commands you can use from the ESS Copy Services command-line interface (CLI). The CLI application provides a set of commands you can use to write customized scripts for a host system. The scripts initiate pre-defined tasks in an ESS Copy Services server application. You can use the CLI commands to indirectly control ESS Peer-to-Peer Remote Copy and FlashCopy configuration tasks within an ESS Copy Services server group. This book is not available in hardcopy. It is available in PDF format on the following Web site: www.storage.ibm.com/hardsoft/products/ess/refinfo.htm	SC26-7434
IBM TotalStorage Enterprise Storage Server Configuration Planner (ESS Configuration Planner)	This guide provides work sheets for planning the logical configuration of the ESS. This book is not available in hardcopy. This guide is available on the following Web site: www.storage.ibm.com/hardsoft/products/ess/refinfo.htm	SC26-7353
IBM TotalStorage Enterprise Storage Server Host Systems Attachment Guide (ESS Attachment Guide)	This book provides guidelines for attaching the ESS to your host system and for migrating from SCSI to fibre-channel attachment.	SC26-7296
IBM TotalStorage Enterprise Storage Server DFSMS Software Support Reference (ESS DFSMS Software Support)	This book gives an overview of the ESS and highlights its unique capabilities. It also describes Data Facility Storage Management Subsystems (DFSMS) software support for the ESS, including support for large volumes.	SC26-7440
IBM TotalStorage Enterprise Storage Server Introduction and Planning Guide (ESS Introduction and Planning Guide)	This guide introduces the ESS product and lists the features you can order. It also provides guidelines for planning the installation and configuration of the ESS.	GC26-7294
IBM TotalStorage Enterprise Storage Server Quick Configuration Guide (ESS Quick Configuration Guide)	This booklet provides flow charts for using the TotalStorage Enterprise Storage Server Specialist (ESS Specialist). The flow charts provide a high-level view of the tasks the IBM service support representative performs during initial logical configuration. You can also use the flow charts for tasks that you might perform when you are modifying the logical configuration. The hardcopy of this booklet is a 9-inch × 4-inch fanfold.	SC26-7354
IBM TotalStorage Enterprise Storage Server S/390 Command Reference (ESS S/390 Command Reference)	This book describes the functions of the ESS and provides reference information for S/390® and @server zSeries hosts, such as channel commands, sense bytes, and error recovery procedures.	SC26-7298
IBM TotalStorage Safety Notices (Safety Notices)	This book provides translations of the danger notices and caution notices that IBM uses in ESS publications.	GC26-7229

Table 1. Publications in the ESS library (continued)

Long title (short title)	Description	Order number
IBM TotalStorage Enterprise Storage Server SCSI Command Reference (ESS SCSI Command Reference)	This book describes the functions of the ESS. It provides reference information for UNIX®, Application System/400® (AS/400®), and @server iSeries 400 hosts, such as channel commands, sense bytes, and error recovery procedures.	SC26-7297
IBM TotalStorage Enterprise Storage Server User's Guide (ESS User's Guide)	This guide provides instructions for setting up and operating the ESS and for analyzing problems.	SC26-7295
IBM TotalStorage Enterprise Storage Server Web Interface User's Guide (ESS Web Interface User's Guide)	This guide provides instructions for using the two ESS Web interfaces, ESS Specialist and ESS Copy Services.	SC26-7346

Ordering ESS publications

All the customer publications that are listed in "The IBM TotalStorage ESS library" on page xiii are available on a compact disc that comes with the ESS, unless otherwise noted.

The customer documents are also available on the following ESS Web site in PDF format:

www.storage.ibm.com/hardsoft/products/ess/refinfo.htm

The IBM publications center

The publications center is a worldwide central repository for IBM product publications and marketing material.

The IBM publications center offers customized search functions to help you find the publications that you need. A number of publications are available for you to view or download free of charge. You can also order publications. The publications center displays prices in your local currency. You can access the IBM publications center through the following Web site:

www.ibm.com/shop/publications/order/

Publications notification system

The IBM publications center Web site offers you a notification system about IBM publications. Register and you can create your own profile of publications that interest you. The publications notification system sends you daily e-mail notes that contain information about new or revised publications based on your profile.

If you want to subscribe, you can access the publications notification system from the IBM publications center at the following Web site:

www.ibm.com/shop/publications/order/

Other IBM publications

Table 2 on page xv lists and describes other IBM publications that have information.

Table 2. Other IBM publications related to the ESS.

Title	Description	Order number
DFSMS/MVS® Version 1 Advanced Copy Services,	This publication helps you to understand and use IBM Advanced Copy Services functions on an S/390 or zSeries. It describes two dynamic-copy functions and several point-in-time copy functions. These functions provide backup and recovery of data if a disaster occurs to your data center. The dynamic-copy functions are Peer-to-Peer Remote Copy and Extended Remote Copy. Collectively, these functions are known as remote copy. FlashCopy™ and Concurrent Copy are the point-in-time copy functions.	SC35-0355
DFSMS/MVS Version 1 Remote Copy Guide and Reference	This publication provides guidelines for using remote copy functions with S/390 and zSeries hosts.	SC35-0169
Enterprise Storage Solutions Handbook	This book helps you understand what comprises enterprise storage management. The concepts include the key technologies that you need to know and the IBM subsystems, software, and solutions that are available today. It also provides guidelines for implementing various enterprise storage administration tasks, so that you can establish your own enterprise storage management environment.	SG24-5250
Enterprise Systems Architecture/390 ESCON I/O Interface	This publication provides a description of the physical and logical ESA/390 I/O interface and the protocols which govern information transfer over that interface. It is intended for designers of programs and equipment associated with the ESCON I/O interface and for service personnel maintaining that equipment. However, anyone concerned with the functional details of the ESCON I/O interface will find it useful.	SA22-7202
ESS Solutions for Open Systems Storage Compaq AlphaServer, HP, and Sun	This book helps you to install, tailor, and configure the ESS when you attach Compaq AlphaServer (running Tru64 UNIX), HP, and Sun hosts. This book does not cover Compaq AlphaServer running the Open VMS operating system. This book also focuses on the settings required to give optimal performance and on device driver levels. This book is for the experienced UNIX professional who has a broad understanding of storage concepts.	SG24-6119
Fibre Channel Connection (FICON) I/O Interface, Physical Layer	This publication provides information to the Fiber Channel I/O Interface. This book is also available in PDF format by accessing the following Web site: www.ibm.com/servers/resourcelink/	SA24-7172
Fibre-channel Subsystem Installation Guide	This publication tells you how to attach the xSeries 430 and NUMA-Q host system with fibre-channel adapters.	See note.
Fibre Transport Services (FTS) Direct Attach, Physical and Configuration Planning Guide	This publication provides information about fibre-optic and ESCON-trunking systems.	GA22-7234
IBM Enterprise Storage Server	This book, from the IBM International Technical Support Organization, introduces the ESS and provides an understanding of its benefits. It also describes in detail the architecture, hardware, and functions of the ESS.	SG24-5465
IBM Enterprise Storage Server Performance Monitoring and Tuning Guide	This book provides guidance on the best way to configure, monitor, and manage your ESS to ensure optimum performance.	SG24-5656

Table 2. Other IBM publications related to the ESS. (continued)

Title	Description	Order number
IBM OS/390 Hardware Configuration Definition User's Guide	This publication provides detailed information about the IODF. It also provides details about configuring parallel access volumes (PAVs). OS/390 uses the IODF.	SC28-1848
IBM SAN Fibre Channel Managed Hub 3534 Service Guide	The IBM SAN Fibre Channel Managed Hub can now be upgraded to switched fabric capabilities with this Entry Switch Activation Feature. As your fibre channel SAN requirements grow, and you need to migrate from the operational characteristics of the Fibre Channel arbitrated loop (FC-AL) configuration provided by the IBM Fibre Channel Managed Hub, 35341RU, to a fabric capable switched environment, the Entry Switch Activition feature is designed to provide this upgrade capability. This upgrade is designed to allow a cost-effective, and scalable approach to developing fabric based Storage Area Networks (SANs). The Entry Switch Activiation feature (P/N 19P3126) supplies the activation key necessary to convert the FC-AL based Managed Hub to fabric capability with eight fabric F_ports, one of which can be an interswitch link-capable port, an E_port, for attachment to the IBM SAN Fibre Channel Switch, or other supported switches.	GC26-7391
IBM SAN Fibre Channel Managed Hub 3534 User's Guide	The IBM SAN Fibre Channel Switch 3534 is an eight-port Fibre Channel Gigabit Hub that consists of a motherboard with connectors for supporting up to eight ports, including seven fixed short-wave optic ports and one GBIC port, and an operating system for building and managing a switched loop architecture.	SY27–7616
IBM SAN Fibre Channel Switch, 2109 Model S08 User's Guide	The IBM Fibre Channel Switch 2109 Model S08 User's Guide manual describes the switch and the IBM StorWatch Specialist. It provides information on the commands and how to manage the switch with Telnet and SNMP. To obtain a copy of this manual, see the Web site at: (www.ibm.com/storage/fcswitch) This manual will be softcopy only (not hardcopy).	SC26-7349
IBM SAN Fibre Channel Switch 2109 Model S16 Installation and Service Guide	This publication describes how to install and maintain the IBM SAN Fibre Channel Switch 2109 Model S16. It is intended for trained service representatives and service providers who act as the primary level of field hardware service support to help solve and diagnose hardware problems. To obtain a copy of this manual, see the Web site at: (www.ibm.com/storage/fcswitch). This manual will be softcopy only (not hardcopy).	SC26-7352
IBM StorWatch Expert Hands-On Usage Guide	This guide helps you to install, tailor, and configure ESS Expert, and it shows you how to use Expert.	SG24-6102
IBM TotalStorage Enterprise Storage Server Subsystem Device Driver Installation and User's Guide	This book describes how to use the IBM Subsystem Device Driver on open-systems hosts to enhance performance and availability on the ESS. The Subsystem Device Driver creates redundant paths for shared logical unit numbers. The Subsystem Device Driver permits applications to run without interruption when path errors occur. It balances the workload across paths, and it transparently integrates with applications. For information about the Subsystem Device Driver, see the following Web site: www.ibm.com/storage/support/techsup/swtechsup.nsf/support/sddupdates/	GC26-7442

Table 2. Other IBM publications related to the ESS. (continued)

Title	Description	Order number
Implementing ESS Copy Services on S/390	This publication tells you how to install, customize, and configure Copy Services on an ESS that is attached to an S/390 or zSeries host system. Copy Services functions include Peer-to-Peer Remote Copy, Extended Remote Copy, FlashCopy™ and, Concurrent Copy. This publication describes the functions, prerequisites, and corequisites and describes how to implement each of the functions into your environment.	SG24-5680
Implementing ESS Copy Services on UNIX and Windows NT/2000	This publication tells you how to install, customize, and configure ESS Copy Services on UNIX or Windows NT host systems. Copy Services functions include Peer-to-Peer Remote Copy, FlashCopy, Extended Remote Copy, and Concurrent Copy. Extended Remote Copy and Concurrent Copy are not available for UNIX and Windows NT host systems; they are only available on the S/390 or zSeries. This publication describes the functions and shows you how to implement each of the functions into your environment. It also shows you how to implement these solutions in an HACMP cluster.	SG24-5757
Implementing Fibre Channel Attachment on the ESS	This book helps you to install, tailor, and configure fibre-channel attachment of open-systems hosts to the ESS. It gives you a broad understanding of the procedures involved and describes the prerequisites and requirements. It also shows you how to implement fibre-channel attachment. This book also describes the steps required to migrate to direct fibre-channel attachment from native SCSI adapters and from fibre-channel attachment through the SAN Data Gateway (SDG).	SG24-6113
Implementing the IBM Enterprise Storage Server	This book can help you install, tailor, and configure the ESS in your environment.	SG24-5420
NUMA-Q ESS Integration Release Notes for NUMA Systems	This publication provides information about special procedures and limitations involved in running ESS with Copy Services on an IBM @server xSeries 430 and an IBM NUMA-Q® host system. It also provides information on how to: • Configure the ESS • Configure the IBM NUMA-Q and xSeries 430 host system • Manage the ESS from the IBM NUMA-Q and xSeries 430 host system with DYNIX/ptx tools	Part number 1003-80094.
OS/390 MVS System Messages Volume 1 (ABA - ASA)	This publication lists OS/390 and zSeries MVS system messages ABA to ASA.	GC28-1784
z/Architecture Principles of Operation	This publication provides, for reference purposes, a detailed definition of the z/Architecture. It is written as a reference for use primarily by assembler language programmers and describes each function at the level of detail needed to prepare an assembler language program that relies on that function; although anyone concerned with the functional details of z/Architecture will find it useful.	SA22-7832

Note: There is no order number for this publication. This publication is not available through IBM ordering systems. Contact your sales representative to obtain this publication.

Other non-IBM publications

Table 3 on page xviii lists and describes other related publications that are not available through IBM ordering systems. To order, contact the sales representative at the branch office in your locality.

Table 3. Other IBM publications without order numbers

Title	Description
Quick Start Guide: An Example with NFS	This publication tells you how to configure the Veritas Cluster Server. See also the companion document, *Veritas Cluster Server User's Guide*.
Veritas Cluster Server Installation Guide	This publication tells you how to install the Veritas Cluster Server. See also the companion document, *Veritas Cluster Server Release Notes*.
Veritas Cluster Server Release Notes	This publication tells you how to install the Veritas Cluster Server. See also the companion document, *Veritas Cluster Server Installation Guide*.
Veritas Cluster Server User's Guide	This publication tells you how to configure the Veritas Cluster Server. See also the companion document, *Quick Start Guide: An Example with NFS*.
Veritas Volume Manager Hardware Notes	This publication tells you how to implement dynamic multipathing.
Veritas Volume Manager Installation Guide	This publication tells you how to install VxVM. It is not available through IBM ordering systems. Contact your sales representative to obtain this document.
Veritas Volume Manager Storage Administrator's Guide	This publication tells you how to administer and configure the disk volume groups.

Web sites

Table 4 shows Web sites that have information about the ESS and other IBM storage products.

Table 4. ESS Web sites and descriptions

Web site	Description
www.storage.ibm.com/	This Web site has general information about IBM storage products.
www.storage.ibm.com/hardsoft/products/ess/ess.htm	This Web site has information about the IBM Enterprise Storage Server (ESS).
ssddom02.storage.ibm.com/disk/ess/documentation.html	This Web site allows you to view and print the ESS publications.
www.storage.ibm.com/hardsoft/products/ess/supserver.htm	This Web site provides current information about the host system models, operating systems, and adapters that the ESS supports.
ssddom01.storage.ibm.com/techsup/swtechsup.nsf/support/sddupdates/	This Web site provides information about the IBM Subsystem Device Driver.
www.storage.ibm.com/hardsoft/products/sangateway/sangateway.htm	This Web site provides information about attaching Storage Area Network or host system that uses an industry-standard, fibre-channel arbitrated loop (FC-AL) topology through the IBM 2108 Storage Area Network Data Gateway Model G07.
www.storage.ibm.com/software/sms/sdm/sdmtech.htm	This Web site provides information about the latest updates to Copy Services components including XRC, PPRC, Concurrent Copy, and FlashCopy for S/390 and zSeries.

Table 4. ESS Web sites and descriptions (continued)

Web site	Description
ssddom01.storage.ibm.com/techsup/swtechsup.nsf/support/sddcliupdates	This Web site provides information about the IBM ESS Copy Services Command-Line Interface (CLI).

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Chapter 1. Copy Services CLI for AIX host systems

This chapter contains step-by-step procedures for you to install and use the Copy Services CLI on an AIX host system. It also describes the commands and parameters of the Copy Services CLI. Specifically, it helps you perform the following tasks:

- Installing the Copy Services CLI
- Verifying server connections and ESS volume allocations
- Managing the CLI userid and password
- Using CLI commands

Installing the Copy Services CLI

This section describes the procedures for planning and performing the installation of the Copy Services CLI on an AIX host system.

Planning the installation

Before you install the Copy Services CLI, perform the following steps to check the IBM Enterprise Storage Server List of Supported Servers Web site for updates to the CLI support for your host system environments:

- From your Web browser, type and enter the following Web address:

  www.storage.ibm.com/hardsoft/products/ess/supserver.htm
- Click to open the PDF version of the ESS Support Servers document.
- From the Table of Contents, click **ESS and Software Applications**.
- Review the Copy Services Interface section for CLI support updates.

Performing the installation

The installation process installs the Copy Services CLI in the default /usr/opt/ibm2105cli directory. You can accept the default directory or choose a different directory as the installation destination.

Perform these steps to install the Copy Services CLI on an AIX host system:

1. Log onto your host system as the root user.
2. Insert the IBM Enterprise Storage Server compact disc (CD) into the CD-ROM drive.

   A window might pop up for the CD-ROM drive. Close the window and proceed to the next step.
3. At the command prompt, type `smitty install_update` and press Enter to invoke the Install and Update Software menu.
4. Click **Install and Update from the latest Available Software** and press Enter.
5. Press F4 to display the Input Device / Directory for Software panel.
6. Select the CD-ROM drive that you are using for the installation. Press Enter to open the Install and Update from Latest Available Software panel.
7. Click **Software to Install** and press F4 to display the Software to Install panel.
8. Select the ibm2105cli installation code for your AIX host system and press Enter.

   The Install and Update from Latest Available Software panel displays with the name of the software you have selected to install.
9. Check the default option settings to ensure that they are what you want.

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10. Press Enter to start the installation process.

    The following message is displayed:

```
ARE YOU SURE?
Continuing may delete information you may want to keep.
This is your last chance to stop before continuing.
```

11. Press Enter to continue.

    The CLI installation begins. The installation process can take several minutes to complete.

12. When the installation completes, press F10 to exit `smitty` and remove the CD.
13. If you have installed the Copy Services CLI in a directory of your own choice, edit each shell script and update the following line:

    `export INSTALL=/usr/opt/ibm2105cli`

    to read like this:

    `export INSTALL=`*`/your_installation_directory`*

    where */your_installation_directory* is the name of the directory in which you have installed the Copy Services CLI.

Do not remove any files from the directory where you have installed the Copy Services CLI. The shell scripts, with a file extension of .sh, will not run correctly if the directory structure is changed.

Verifying the installation

Type the following command to verify that the Copy Services CLI is installed on your AIX host system:

```
lslpp -l | grep ibm2105cli
```

You will see a message similar to the following if you have successfully installed the Copy Services CLI on your AIX host system:

```
ibm2105cli.rte            1.1.0.0  COMMITTED  IBM 2105 Command Line
```

If nothing is returned from the command, it means that the Copy Services CLI is *not* currently installed on your AIX host system. In this case, follow the instructions in “Installing the Copy Services CLI” on page 1 to install the Copy Services CLI.

Verifying server connections and ESS volume allocations

This section describes the verification tasks that you need to complete before you use the Copy Services CLI:

- Testing the server connection
- Checking the communication link
- Verifying the allocation of ESS volumes

Testing the server connection

Before using the Copy Services CLI, you need to ensure that the connection between the ESS Copy Services server and your host system is correctly established.

Issue the **rsTestConnection.sh** command to verify the connection. See “rsTestConnection.sh” on page 14 for more information about using the **rsTestConnection.sh** command.

If the **rsTestConnection.sh** command can establish a connection between the ESS Copy Services server and your host system, proceed to “Checking the communication link”.

If the **rsTestConnection.sh** command cannot establish a connection between the ESS Copy Services server and your host system, see “Chapter 10. Troubleshooting” on page 133 for detailed instructions to diagnose and correct the problems.

Checking the communication link

Before using the Copy Services CLI, you need to verify that the communication link between the ESS Copy Services server and your host system is established. Communication links are initially configured when the ESS is installed. Use the ESS Specialist to display and modify the ESS communications configuration. See *IBM TotalStorage Enterprise Storage Server Web Interface User's Guide* for information about the ESS Specialist.

If the communication link between the ESS Copy Services server and your host system is working, proceed to “Verifying the allocation of ESS volumes”.

If the communication link between the ESS Copy Services server and your host system is not established, see “Chapter 10. Troubleshooting” on page 133 for detailed instructions to diagnose and correct the problems.

Verifying the allocation of ESS volumes

Before using the Copy Services CLI, you need to verify that ESS volumes are allocated for your host system. Issue the **rsList2105s.sh** command to generate a list of ESS volumes that are currently allocated for your host system. See “rsList2105s.sh” on page 7 for more information about the **rsList2105s.sh** command.

You can use the Copy Services CLI if the **rsList2105s.sh** command determines that there are ESS volumes allocated for your host system.

If the **rsList2105s.sh** command determines that there are no ESS volumes allocated for your host system or that ESS volumes are incorrectly allocated for your host system, see “Chapter 10. Troubleshooting” on page 133 for detailed instructions to diagnose and correct the problems.

Managing the CLI userid and password

You can use the ESS Copy Services Administration panel to manage the userid and password for an AIX host system that uses the Copy Services CLI. When you define the userid and password, all hosts that issue CLI commands must provide this userid and password as part of the command string.

See “Flags and parameters for password-protection-enabled host systems” on page 4 for detailed instructions about issuing the CLI commands for open-systems hosts with password protection.

See the *IBM TotalStorage Enterprise Storage Server Web Interface User's Guide* for detailed instructions on how to define and remove the CLI userid and password.

Using CLI commands

This section describes the CLI commands that you can use from an AIX host system. It presents the full syntax and describes the flags and parameters of each command.

Overview of CLI commands

Table 5 provides an alphabetical list of CLI commands and a brief description of each command.

Table 5. Summary of CLI commands for AIX host systems

Command	Description	Page
rsExecuteTask.sh	Executes one or more ESS Copy services tasks (as defined and saved using the ESS Copy Services interface) and waits for the given tasks to complete execution.	5
rsList2105s.sh	Displays the mapping of a host disk name to a 2105 volume serial number.	7
rsPrimeServer.sh	Notifies the ESS Copy Services server about the hostname (from which this command has been executed) so that the hostname is displayed in the source and target list on the ESS Copy Services Volumes panel. This command is useful when you use the ESS Copy Services Volumes panel to perform FlashCopy, PPRC, or both functions because it shows the host names for all the volumes that are connected to the selected host in one view.	7
rsQuery.sh	Queries the status of one or more volumes.	9
rsQueryComplete.sh	Accepts the ESS Copy Services server tasks (as defined and saved from the ESS Copy Services interface) and determines whether all volumes that are defined in the given tasks have completed initial PPRC synchronization.	12
rsTestConnection.sh	Determines whether you can successfully connect to the ESS Copy Services server.	14

Flags and parameters for password-protection-enabled host systems

If the password-protection option is enabled, you must specify *one* of the following flags and parameters when you use any of the CLI commands from your AIX host system:

- Both the -u flag, followed by the username parameter, and the -p flag, followed by the password parameter
- The -a flag with the securityfilepath parameter

  You can use this option for additional security. The file specified in the securityfilepath parameter contains the username and password.

Flags and parameters for primary and backup servers

When using CLI commands other than **rsList2105s.sh** and **rsTestConnection.sh**, you must specify *either* the -s flag with the primaryserver parameter *or* the -b flag with the backupserver parameter. You can also specify *both* flags if necessary.

Use the following guidelines for specifying the -s and -b flags:

- Specify only the -s flag with the primaryserver parameter to check the connection to the primary server. If the command can establish a connection, it is sent to the primary server for processing. The command fails if it cannot establish a connection.
- Specify only the -b flag with the backupserver parameter to check the connection to the backup server. If the command can establish a connection, it is sent to the backup server for processing. If the command cannot establish a connection, it fails.
- Specify both the -s flag with the primaryserver parameter and the -b flag with the backupserver parameter to check the connection to the primary server and then, if the primary server is down, to the backup server.

  If the command can establish a connection to the primary server, it is sent to the primary server for processing. If the command cannot establish a connection to the primary server, the connection to the backup server is checked. If the command can establish a connection to the backup server, it is sent to the backup server for processing. If the command cannot establish a connection to the backup server, it fails.

Return codes and messages

See “Chapter 9. Return codes and messages” on page 127 for a complete list and descriptions of CLI return codes and messages.

rsExecuteTask.sh

The **rsExecuteTask.sh** command executes one or more ESS Copy Services tasks as defined and saved using the ESS Copy Services interface, and it waits for the given tasks to complete execution.

Successful completion of the tasks means that the volumes are in the relationship (PPRC or FlashCopy) specified in the given tasks. It does not mean that the volumes have completed the specified relationship.

For established PPRC tasks, use the **rsQueryComplete.sh** command to determine if PPRC pairs have completed copying. For established FlashCopy tasks, use **rsQuery.sh** command to determine if FlashCopy with background copy pairs have completed copying.

Syntax

The syntax for the **rsExecuteTask.sh** command is:

```
rsExecuteTask.sh [-v] {-u username -p password | -a securityfilepath} -s
primaryserver [-b backupserver] tasknames
```

See “Flags and parameters for password-protection-enabled host systems” on page 4 for detailed information about how to use CLI commands if the host password-protection option is enabled.

Flags and parameters

Table 6 lists and describes the flags and the corresponding parameters for the **rsExecuteTask.sh** command. It also explains the required or optional flags and parameters.

Note: All flags and parameters are case-sensitive.

Table 6. rsExecuteTask.sh command flags and parameters for AIX host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command will display all responses from the server. This flag is optional.
-u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for the host system and if the -a flag and the securityfilepath parameter are not used.
-p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for ESS Copy Services server has enabled password protection for the host system and if the -a flag and the securityfilepath parameter are not used.
-a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for using CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for the host system and if the -u username and -p password flags and parameters are not used. The format of this file is as follows: `username password`
-s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
-b	backupserver	The -b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.
None	tasknames	The tasknames parameter specifies the name of one or more previously saved ESS Copy Services tasks. To specify more than one task, separate the task names with a space.

Output samples

The following is an example of the output you see when you invoke the **rsExecuteTask.sh** command on an AIX host system:

```
# ./rsExecuteTask.sh -v -u yourusername -p yourpassword -s primaryservername es_pair_12
rsExecuteTask: Got task manager reference
rsExecuteTask: *************Finding the tasks****************
rsExecuteTask: Task es_pair_12 found by task manager
rsExecuteTask: *************Scheduling the tasks*****************
rsExecuteTask: Task es_pair_12 scheduled with copy services server
rsExecuteTask: *************Monitoring the tasks*****************
rsExecuteTask: Waiting on server...
rsExecuteTask: Task es_pair_12 completed successfully
rsExecuteTask: Command successful
```

rsList2105s.sh

The **rsList2105s.sh** command displays the mapping of a host disk name to a 2105 volume serial number.

If you have the IBM Subsystem Device Driver (SDD) running on your host system and you change the configuration for the host (such as adding or removing volume), you must restart the host so that the SDD can recognize, add, or remove the paths.

Syntax

The syntax for the **rsList2105s.sh** command is simply:

```
rsList2105s.sh
```

Flags and parameters

There are no flags and parameters for the **rsList2105s.sh** command.

Output samples

If you have SDD installed, you see output similar to the following when you invoke the **rsList2105s.sh** command on an AIX host system:

```
>./rsList2105s.sh

VpathName     Serial     VolumeNames
-----------    ------     -----------
 vpath10      40EFC102    hdisk14
 vpath11      40FFC102    hdisk15
 vpath13      40CFC102    hdisk17
 vpath14      40DFC102    hdisk18
```

If you do not have SDD installed, you might see output similar to the following when you invoke the **rsList2105s.sh** command on an AIX host system:

```
>./rsList2105s.sh

disk name       2105 serial number
---------       ------------------
 hdisk14           40EFC102
 hdisk15           40FFC102
 hdisk17           40CFC102
 hdisk18           40DFC102
```

rsPrimeServer.sh

The **rsPrimeServer.sh** command notifies the ESS Copy Services server to display the hostname in the source and target list on the ESS Copy Services Volumes panel.

This command is useful when you use the ESS Copy Services Volumes panel to perform FlashCopy, PPRC, or both functions because it shows the host names for all the volumes that are connected to the selected host in one view.

If you have the SDD installed on your host system and you change the configuration for the host (such as adding or removing volumes), you must perform the following steps:

- Restart your host system so that SDD can recognize, add, or remove the paths.
- Run the **rsPrimeServer.sh** command to generate the current mapping for the host volumes.

If you do not have SDD installed on your host system and you change the configuration for the host (such as adding or removing volumes), you must run the **rsPrimeServer.sh** command to generate the current mapping for the host volumes.

Syntax

The syntax for the **rsPrimeServer.sh** command is:

```
rsPrimeServer.sh [-v] {-u username -p password | -a securityfilepath} -d
hostname -s primaryserver [-b backupserver]
```

Flags and parameters

Table 7 lists and describes the flags and parameters for the **rsPrimeServer.sh** command. It also explains the required or optional flags and parameters.

Table 7. rsPrimeServer.sh command flags and parameters for AIX host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command will display all responses from the server. This flag is optional.
-u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server administrator has enabled password protection for host CLI commands and if the -a flag and the securityfilepath parameter are not used.
-p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands and if the -a flag and the securityfilepath parameter are not used.
-a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password that are defined at the ESS Copy Services server for using CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands and if the -u username and -p password flags and parameters are not used. The format of this file is as follows: `username password`

Table 7. rsPrimeServer.sh command flags and parameters for AIX host systems (continued)

Flag	Parameter	Description
-d	hostname	The -d flag and hostname parameter are required when you are removing the hostname. The hostname parameter specifies the IP address or hostname to be removed. The hostname needs to match exactly one of the entries that is displayed in the list on the Volumes panels of the ESS Copy Services.
-s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
-b	backupserver	The -b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.

Output samples

The following is an example of the output you see when you invoke the **rsPrimeServer.sh** command to add a host name on an AIX host system:

```
# ./rsPrimeServer.sh -v -u yourusername -p yourpassword -s primaryservername
rsPrimeServer: Local host is abc.def.ghi.com
rsPrimeServer: Got task manager reference
rsPrimeServer: Host abc.def.ghi.com registered
rsPrimeServer: Configuration change requested made to primaryserver
rsPrimeServer: Command successful
```

The following is an example of the output you see when you invoke the **rsPrimeServer.sh** command to delete a host name on an AIX host system:

```
# ./rsPrimeServer.sh -v -u yourusername -p yourpassword -d abc.def.ghi.com
   -s primaryservername
rsPrimeServer: host to unregister is abc.def.ghi.com
rsPrimeServer: Got task manager reference
rsPrimeServer: Host abc.def.ghi.com unregistered
rsPrimeServer: Configuration change requested made to primaryserver
rsPrimeServer: Command successful
```

rsQuery.sh

The **rsQuery.sh** command queries the status of one or more volumes.

You can invoke the **rsQuery.sh** command for the vpath name, the host volume name, or the volume serial number under various conditions.

Syntax

The syntax for the **rsQuery.sh** command is:

```
rsQuery.sh [-v] -m {-u username -p password | -a securityfilepath} {-q
volumename | -f filename} -s primaryserver [-b backupserver]
```

Flags and parameters

Table 8 lists and describes the flags and parameters for the **rsQuery.sh** command line. It also explains the required or optional flags and parameters, and it explains the flags that must take a parameter.

Table 8. rsQuery.sh command flags and parameters for AIX host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command will display all responses from the server. This flag is optional.
-m	None	-m is the map flag. The -m flag maps host volume names to 2105 volume serial numbers. This flag permits host volumes names to be used as a volume flag. If you use the **rsQuery.sh** command for the vpath name or host volume name, you must use the -m flag. If you use the **rsQuery.sh** command for a serial number, you do not need to use the -m flag.
-u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands and if the -a flag and the securityfilepath parameter are not used.
-p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands and if the -a flag and the securityfilepath parameter are not used.
-a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password that are defined at the ESS Copy Services server for the use of host CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands and if the {-u username and -p password} flags and parameters are not used. The format of this file is as follows: `username password`
-q	volumename	The volume parameter specifies the vpath name, host volume name, or volume serial number. Use the **rsQuery.sh** command for the vpath name, host volume name, or volume serial number under the following conditions: • If SDD is installed, use the **rsQuery.sh** command only for the vpath name or volume serial number. • If SDD is not installed, use the **rsQuery.sh** command only on a host volume name or volume serial number. • If you use the **rsQuery.sh** command for the vpath name or the host volume name, you must use the -m flag. • If you use the **rsQuery.sh** command for a serial number, you do not need to use the -m flag. You need to use the -q flag with the volume parameter if the -f flag and the filename parameter are not used.

Table 8. rsQuery.sh command flags and parameters for AIX host systems (continued)

Flag	Parameter	Description

-f	filename	The filename parameter specifies the name of a file containing vpath names, host volume names or volume serial numbers, all of which are to be queried.
		
		You need to use the -f flag with the filename parameter if the -q flag and the volume parameter are not used.
		
		The format of this file may be either:
		`sourceVolume1 targetVolume1`
		`sourceVolume2 targetVolume2`
		`...`
		`sourceVolumeN targetVolumeN`
		or
		`volume1`
		`volume2`
		`volume3`
		`...`
		`volumeN`

-s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
-b	backupserver	The -b flag takes the backupserver parameter. The -b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.

Output samples

The following is an example of the output you see when you invoke the **rsQuery.sh** command to query a serial number on an AIX host system:

```
# ./rsQuery.sh -v -u yourusername -p yourpassword -q 40EFC102 -s primaryservername
************************Volume Information************************
Volume 40EFC102 found on FC102:14 as volume number 014
PPRC State=simplex, status=none, FlashCopy_state=none, Size=0.5_GB
******************************************************************
rsQuery: Command successful
```

The following is an example of the output you see when you invoke the **rsQuery.sh** command to query a vpath name on an AIX host system:

```
# ./rsQuery.sh -v -u yourusername -p yourpassword -m -q vpath10 -s primaryservername
************************Volume Information************************
Volume 40EFC102 found on FC102:14 as volume number 014
PPRC State=simplex, status=none, FlashCopy_state=none, Size=0.5_GB
******************************************************************
rsQuery: Command successful
```

rsQueryComplete.sh

The **rsQueryComplete.sh** command accepts ESS Copy Services server tasks as defined and saved from the ESS Copy Services interface and determines whether all volumes defined in the given tasks have completed the initial PPRC synchronization.

When the **rsQueryComplete.sh** command is executed on grouped tasks, the output displays the first subtask until it has reached the completion threshold; and then it displays the next subtask until it has reached the completion threshold. It repeats this process until all the subtasks are queried.

You can invoke the **rsQueryComplete.sh** command only on tasks that create PPRC pairs. You cannot invoke the **rsQueryComplete.sh** command on tasks that create FlashCopy pairs.

Syntax

The syntax for the **rsQueryComplete.sh** command is:

```
rsQueryComplete.sh [-v] {-u username -p password| -a securityfilepath} [-m
minutes] [-t threshold] -s primaryserver [-b backupserver] tasknames
```

Flags and parameters

Table 9 lists and describes the flags and parameters for the **rsQueryComplete.sh** commands. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Table 9. rsQueryComplete.sh command flags and parameters for AIX host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command will display all responses from the server. This flag is optional.
-u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services has enabled password protection for host CLI commands and if the -a flag and the securityfilepath parameter are not used.
-p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services has enabled password protection for host CLI commands and if the -a flag and the securityfilepath parameter are not used.
-a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password that are defined at the ESS Copy Services server for the use of host CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands and if the -u username and -p password flags and parameters are not used. The format of this file is as follows: `username password`
-m	minutes	The -m flag and the minutes parameter are optional. The minutes parameter specifies the number of minute intervals between queries for verifying when the PPRC initialization has completed. The default is 1 minute.

Table 9. rsQueryComplete.sh command flags and parameters for AIX host systems (continued)

Flag	Parameter	Description
-t	threshold	The -t flag and the threshold parameter are optional. The threshold parameter specifies the threshold percentage that defines completion. The default is 100%.
-s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
-b	backupserver	The -b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.
None	tasknames	The tasknames parameter specifies the name of one or more previously saved ESS Copy Services- established PPRC tasks for which you want to query the initial copy completion of the volumes in those tasks. To specify more than one task, separate the task names with a space.

Output samples

The following is an example of the output you see when you invoke the **rsQueryComplete.sh** command with default settings for the minutes (-m) and threshold (-t) parameters on an AIX host system:

```
# ./rsQueryComplete.sh -v -u yourusername -p yourpassword -s primaryservername es_pair_12
rsQueryComplete: Got task manager reference
rsQueryComplete: --------- Task Name: es_pair_12 ---------
rsQueryComplete: Task es_pair_12 found by TaskManager
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 1
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 17
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 35
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 63
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 82
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 100
rsQueryComplete: ------------------------------------------------
rsQueryComplete: Command successful
```

The following is an example of the output you see when you invoke the **rsQueryComplete.sh** command and specify the minutes (-m) parameter with a value of 2 and the threshold (-t) parameter with a value of 80% on an AIX host system:

```
# ./rsQueryComplete.sh -v -u yourusername -p yourpassword -m 2 -t 80
-s primaryservername es_pair_12

rsQueryComplete: Got task manager reference
rsQueryComplete: --------- Task Name: es_pair_12 ---------
rsQueryComplete: Task es_pair_12 found by TaskManager
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 1
rsQueryComplete: waiting 120 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 35
rsQueryComplete: waiting 120 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 82
rsQueryComplete: ------------------------------------------
rsQueryComplete: Command successful
```

rsTestConnection.sh

The **rsTestConnection.sh** command determines whether you can successfully connect to the ESS Copy Services server.

Syntax

The syntax for the **rsTestConnection.sh** command is:

```
rsTestConnection.sh [-v] -s servername
```

Flags and parameters

Table 10 lists and describes the flags and parameters for the **rsTestConnection.sh** command. It also explains the required or optional flags and parameters and it explains the flags that use a parameter.

Table 10. rsTestConnection.sh command flags and parameters for AIX host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command will display all responses from the server. This flag is optional.
-s	servername	The servername parameter specifies the IP address or the complete host name of the ESS Copy Services server for which you want to test the connection.

Output samples

The following is an example of the output you see when you invoke the **rsTestConnection.sh** command on an AIX host system:

```
#./rsTestConnection.sh -v -s primaryservername
rsWebTest: Using yourhostname as server name
sWebTest: rsVSServer reference obtained successfully
rsWebTest: rsVSServer reference narrowed successfully
rsWebTest: HeartBeat to the server was successful.
rsWebTest: command successful
```

Chapter 2. Copy Services CLI for HP-UX host systems

This chapter contains step-by-step procedures for you to install and use the Copy Services CLI on an HP-UX host system. It also describes the commands and parameters of the Copy Services CLI. Specifically, it helps you perform the following tasks:

- Installing the Copy Services CLI
- Verifying server connections and ESS volume allocations
- Managing the CLI userid and password
- Using CLI commands

Installing the Copy Services CLI

This section describes the procedures for planning and performing the installation of the Copy Services CLI on an HP-UX host system.

Planning the installation

Perform the following steps before you install the Copy Services CLI for an HP-UX host system:

1. Check the IBM Enterprise Storage Server List of Supported Servers Web site for updates to the CLI support for your host system environments:
   - From your Web browser, type and enter the following Web address:
     www.storage.ibm.com/hardsoft/products/ess/supserver.htm
   - Click to open the PDF version of the ESS Support Servers document.
   - From the Table of Contents, click **ESS and Software Applications**.
   - Review the Copy Services Interface section for CLI support updates.
2. Install JDK 1.1.8 on your HP-UX host system.

   The Copy Services CLI requires JDK 1.1.8 on a HP-UX host system. You must install JDK on your system to use the Copy Services CLI.

   If you already have JDK installed on your host system, verify that it is the required version by typing the following command at the command prompt:

   ```
   java -version
   ```

   You will see a message similar to the following if you have JDK 1.1.8 on your host system:

   ```
   java version "HP-UX Java C.01.18.02 02/28/2000 23:22:46 pasd02"
   ```

Performing the installation

The installation process installs the Copy Services CLI in the default /opt/ibm2105cli directory. You can accept the default directory or choose a different directory as the installation destination.

Perform the following steps to install the Copy Services CLI on an HP-UX host system

1. Log onto your host system as the root user.
2. Insert the IBM Enterprise Storage Server compact disc (CD) into the CD-ROM drive.

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A window might pop up for the CD-ROM drive. Close the window and proceed to the next step.

3. Mount the CD-ROM drive using the mount command. Mount the CD to SD_CDROM using the path name for your environment.

   Type the following command to see the true device path to the CD-ROM drive: **ioscan -fnkC disk | more**

   ```
   mount  /dev/dsk/c?t?d?  /SD_CDROM
   ```

4. At the command prompt, type the following command to invoke the graphical interface.

   ```
   swinstall -s /SD_CDROM/hp-common/IBMcli.depot
   ```

5. On the top menu bar, click **Option** —> **Change Option**.
6. Click **OK** to close the Note window.

   An Options window displays a list of software installation options.
7. From the option list, select **Reinstall files even if same one already there** and click **OK** to close the Options window.
8. Click **IBMcli_tag**.
9. On the top menu bar, click **Actions** —> **Install**.
10. Follow the installation instructions to complete the CLI installation.
11. If you have installed the Copy Services CLI in a directory of your own choice, edit each shell script and change the following line:

    ```
    export INSTALL=/opt/ibm2105cli
    ```

    to read like this:

    ```
    export INSTALL=/your_installation_directory
    ```

    where */your_installation_directory* is the name of the directory in which you have installed the Copy Services CLI.
12. If you installed `JDK 1.1.8` in a directory other than the `/opt/java` directory, change the following shell script line:

    ```
    export JAVA_HOME=/opt/java
    ```

    to read like this:

    ```
    export JAVA_HOME=/your_java_directory
    ```

    where */your_java_directory* is the name of the directory where you have installed `JDK 1.1.8`.

Do not remove any files from the directory where you have installed the Copy Services CLI. The shell scripts, with a file extension of .sh, and the executable files, with a file extension of .exe, will not run correctly if the directory structure is changed.

Verifying the installation

Type the following command to verify that the Copy Services CLI is installed on your HP-UX host system:

```
swlist -l product IBMcli_tag
```

You will see a message similar to the following if you have successfully installed the Copy Services CLI on your HP-UX host system:

```
IBMcli_tag            1.4.0.10  IBMcli software for HP-UX
```

You will see a message similar to the following if the Copy Services CLI is currently not installed on an HP-UX host system:

```
ERROR:   Software "IBMcli_tag" was not found on host "hostname:/"
```

In this case, follow the instructions in “Installing the Copy Services CLI” on page 15 to install the Copy Services CLI.

Verifying server connections and ESS volume allocations

This section describes the following verification tasks that you need to complete before you use the Copy Services CLI:

- Testing the server connection
- Checking the communication link
- Verifying the allocation of ESS volumes for an HP-UX host system

Testing the server connection

Before using the Copy Services CLI, you need to ensure that the connection between the ESS Copy Services server and your host system is correctly established.

Issue the **rsTestConnection.sh** command to verify the connection between the ESS Copy Services server and your host system. See “rsTestConnection.sh” on page 28 for more information about using the **rsTestConnection.sh** command.

If the **rsTestConnection.sh** command can establish a connection between the ESS Copy Services server and your host system, proceed to “Checking the communication link”.

If the **rsTestConnection.sh** command cannot establish a connection between the ESS Copy Services server and your host system, see “Chapter 10. Troubleshooting” on page 133 for detailed instructions to diagnose and correct the problems.

Checking the communication link

Before using the Copy Services CLI, you need to verify that the communication link between the ESS Copy Services server and your host system is established. Communication links are initially configured when the ESS is installed. Use the ESS Specialist to display and modify the ESS communications configuration. See *IBM TotalStorage Enterprise Storage Server Web Interface User's Guide* for information about using the ESS Specialist to modify the communications configuration.

If the communication link between the ESS Copy Services server and your host system is working, proceed to “Verifying the allocation of ESS volumes for an HP-UX host system”.

If the communication link between the ESS Copy Services server and your host system is not established, see “Chapter 10. Troubleshooting” on page 133 for detailed instructions to diagnose and correct the problems.

Verifying the allocation of ESS volumes for an HP-UX host system

Before using the Copy Services CLI, you need to verify that ESS volumes are allocated for your host system. Issue the **rsList2105s.sh** command to generate a

list of ESS volumes that are currently allocated for your host system. See “rsList2105s.sh” on page 21 for more information about the **rsList2105s.sh** command.

You can use the Copy Services CLI if the **rsList2105s.sh** command determines that there are ESS volumes allocated for your host system.

If the **rsList2105s.sh** command determines that there are *no* ESS volumes allocated for your host system or that ESS volumes are incorrectly allocated for your host system, see “Chapter 10. Troubleshooting” on page 133 for detailed instructions to diagnose and correct the problems.

Managing the CLI userid and password

You can use the ESS Copy Services Administration panel to manage the userid and password for an HP-UX host system that uses the Copy Services CLI. When you define the userid and password, all hosts that issue CLI commands must provide this userid and password as part of the command string.

See “Flags and parameters for password-protection-enabled host systems” on page 19 for detailed instructions about issuing the CLI commands for open-systems hosts with password protection.

See the *IBM TotalStorage Enterprise Storage Server Web Interface User's Guide* for detailed instructions on how to define and remove the CLI userid and password.

Using CLI commands

This section describes the CLI commands that you can use from an HP-UX host system. It presents the full syntax and describes the flags and parameters of each command.

Overview of CLI commands

Table 11 provides an alphabetical list of the CLI commands and a brief description of each command.

Table 11. Summary of CLI commands for HP-UX host systems

Command	Description	Page
rsExecuteTask.sh	Executes one or more ESS Copy services tasks (as defined and saved using the ESS Copy Services Interface) and waits for the given tasks to complete execution.	19
rsList2105s.sh	Displays the mapping of a host disk name to a 2105 volume serial number.	21
rsPrimeServer.sh	Notifies the ESS Copy Services server about the hostname (from which this command has been executed) so that the hostname is displayed in the ESS Copy Services Volumes panel. This command is useful when you use the ESS Copy Services Volumes panel to perform FlashCopy, PPRC, or both functions because it shows the host names for all the volumes that are connected to the selected host in one view.	22
rsQuery.sh	Queries the status of one or more volumes.	24

Table 11. Summary of CLI commands for HP-UX host systems (continued)

Command	Description	Page
rsQueryComplete.sh	Accepts the ESS Copy Services server tasks (as defined and saved from the ESS Copy Services interface) and determines whether all volumes that are defined in the given tasks have completed initial PPRC synchronization.	26
rsTestConnection.sh	Determines whether you can successfully connect to the ESS Copy Services server.	28

Flags and parameters for password-protection-enabled host systems

If the password-protection option is enabled, you must specify *one* of the following flags and parameters when you use any of the CLI commands from your HP-UX host system:

- Both the -u flag, followed by the username parameter, and the -p flag, followed by the password parameter
- The -a flag with the securityfilepath parameter

  You can use this option for additional security. The file specified in the securityfilepath parameter contains the username and password.

Flags and parameters for primary and backup servers

When using CLI commands other than **rsList2105s.sh** and **rsTestConnection.sh**, you must specify *either* the -s flag with the primaryserver parameter *or* the -b flag with the backupserver parameter. You can also specify *both* flags if necessary.

Use the following guidelines for specifying the -s and -b flags:

- Specify only the -s flag with the primaryserver parameter to check the connection to the primary server. If the command can establish a connection, it is sent to the primary server for processing. The command fails if it cannot establish a connection.
- Specify only the -b flag with the backupserver parameter to check the connection to the backup server. If the command can establish a connection, it is sent to the backup server for processing. If the command cannot establish a connection, it fails.
- Specify both the -s flag with the primaryserver parameter and the -b flag with the backupserver parameter to check the connection to the primary server and then, if the primary server is down, to the backup server.

  If the command can establish a connection to the primary server, it is sent to the primary server for processing. If the command cannot establish a connection to the primary server, the connection to the backup server is checked. If the command can establish a connection to the backup server, it is sent to the backup server for processing. If the command cannot establish a connection to the backup server, it fails.

Return codes and messages

See “Chapter 9. Return codes and messages” on page 127 for a complete list and descriptions of CLI return codes and messages.

rsExecuteTask.sh

The **rsExecuteTask.sh** command executes one or more ESS Copy services tasks as defined and saved using the ESS Copy Services Interface and waits for the given tasks to complete execution.

Successful completion of the tasks means that the volumes are in the relationship (PPRC or FlashCopy) specified in the given tasks. It does not mean that the volumes have completed the specified relationship.

For established PPRC tasks, use the **rsQueryComplete.sh** command to determine if PPRC pairs have completed copying. For established FlashCopy tasks, use **rsQuery.sh** command to determine if FlashCopy with background copy pairs have completed copying.

Syntax

The syntax for the **rsExecuteTask.sh** command is:

```
rsExecuteTask.sh [-v] {-u username -p password | -a securityfilepath} -s
primaryserver [-b backupserver] tasknames
```

See “Flags and parameters for password-protection-enabled host systems” on page 19 for detailed information about how to use CLI commands if the host password-protection option is enabled.

Flags and parameters

Table 12 lists and describes the flags and parameters for the **rsExecuteTask.sh** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Note: All flags and parameters are case-sensitive.

Table 12. rsExecuteTask.sh command flags and parameters for HP-UX host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command will display all responses from the server. This flag is optional.
-u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for the host system and if the -a flag and the securityfilepath parameter are not used.
-p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for the host system and if the -a flag and the securityfilepath parameter are not used.
-a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password that are defined at the ESS Copy Services server for using CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for the host system and if the -u username and -p password flags and parameters are not used. The format of this file is as follows: `username password`
-s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.

Table 12. rsExecuteTask.sh command flags and parameters for HP-UX host systems (continued)

Flag	Parameter	Description
-b	backupserver	The -b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.
None	tasknames	The tasknames parameter specifies the name of one or more previously saved ESS Copy Services established PPRC tasks for which you want to query the initial copy completion. To specify more than one task, separate the task names with a space.

Output samples

The following is an example of the output you see when you invoke the **rsExecuteTask.sh** command on an HP-UX host system:

```
# ./rsExecuteTask.sh -v -u yourusername -p yourpassword -s primaryservername es_pair_12
rsExecuteTask: Got task manager reference
rsExecuteTask: *************Finding the tasks****************
rsExecuteTask: Task es_pair_12 found by task manager
rsExecuteTask: *************Scheduling the tasks*****************
rsExecuteTask: Task es_pair_12 scheduled with copy services server
rsExecuteTask: *************Monitoring the tasks*****************
rsExecuteTask: Waiting on server...
rsExecuteTask: Task es_pair_12 completed successfully
rsExecuteTask: Command successful
```

rsList2105s.sh

The **rsList2105s.sh** command displays the mapping of a host disk name to a 2105 volume serial number.

If you have the IBM Subsystem Device Driver (SDD) running on your host system and you change the configuration for the host (such as adding or removing volumes) you must restart the host so that SDD can recognize, add, or remove the paths.

Syntax

The syntax for the **rsList2105s.sh** command is simply:

```
rsList2105s.sh
```

Flags and parameters

There are no flags and parameters for the **rsList2105s.sh** command.

Output samples

If you have SDD installed, you see output similar to the following when you invoke the **rsList2105s.sh** command on an HP-UX host system:

```
>./rsList2105s.sh
VpathName     Serial     VolumeNames
-----------    ------     -----------
 vpath0       00816302    c6t6d4
 vpath1       00716302    c6t6d3
 vpath2       00616302    c6t6d2
 vpath3       00516302    c6t6d1
 vpath4       00416302    c6t6d0
 vpath5       10816302    c6t5d4
 vpath6       10716302    c6t5d3
 vpath7       10616302    c6t5d2
 vpath8       10516302    c6t5d1
 vpath9       10416302    c6t5d0
```

If you *do not* have SDD installed, you might see an output similar to the following when you invoke the **rsList2105s.sh** command on an HP-UX host system:

```
>./rsList2105s.sh
disk name       2105 serial number
---------       ------------------
 c6t5d0            10416302
 c6t5d1            10516302
 c6t5d2            10616302
 c6t5d3            10716302
 c6t5d4            10816302
 c6t6d0            00416302
 c6t6d1            00516302
 c6t6d2            00616302
 c6t6d3            00716302
 c6t6d4            00816302
```

rsPrimeServer.sh

The **rsPrimeServer.sh** command notifies the ESS Copy Services server to display the hostname (from which this command has been executed) source and target list in the ESS Copy Services Volumes panel.

This command is useful when you use the ESS Copy Services Volumes panel to perform FlashCopy, PPRC, or both functions because it shows the host names for all the volumes that are connected to the selected host in one view.

If you have SDD installed on your host system and you change the configuration for the host (such as adding or removing volumes), you must perform the following steps:

- Restart your host system so that SDD can recognize, add, or remove the paths.
- Run the **rsPrimeServer.sh** command to generate the current mapping for the host volumes.

If you do not have SDD installed on your host system and you change the configuration for the host (such as adding or removing volumes), you must run the **rsPrimeServer.sh** command to generate the current mapping for the host volumes.

Syntax

The syntax for the **rsPrimeServer.sh** command is:

```
rsPrimeServer.sh [-v] {-u username -p password | -a securityfilepath} -d
hostname -s primaryserver [-b backupserver]
```

Flags and parameters

Table 13 lists and describes the flags and parameters for the **rsPrimeServer.sh** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Table 13. rsPrimeServer.sh command flags and parameters for HP-UX host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command will display all responses from the server. This flag is optional.
-u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the -a flag and the securityfilepath parameter are not used.
-p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the -a flag and the securityfilepath parameter are not used.
-a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for using the CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the -u username and -p password flags and parameters are not used. The format of this file is as follows- `username password`
-d	hostname	The -d flag and hostname parameter are required when you are removing the hostname. The hostname parameter specifies the IP address or hostname to be removed. The hostname needs to match exactly one of the entries that is displayed in the list on the Volumes panels of the ESS Copy Services.
-s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
-b	backupserver	The -b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.

Output samples

The following is an example of the output you see when you invoke the **rsPrimeServer.sh** command to add a host name on an HP-UX host system:

```
# ./rsPrimeServer.sh -v -u yourusername -p yourpassword -s primaryservername
rsPrimeServer: Local host is abc.def.ghi.com
rsPrimeServer: Got task manager reference
rsPrimeServer: Host abc.def.ghi.com registered
rsPrimeServer: Configuration change requested made to primaryserver
rsPrimeServer: Command successful
```

The following is an example of the output you see when you invoke the **rsPrimeServer.sh** command to delete a host name on an HP-UX host system:

```
# ./rsPrimeServer.sh -v -u yourusername -p yourpassword -d abc.def.ghi.com
   -s primaryservername
rsPrimeServer: host to unregister is abc.def.ghi.com
rsPrimeServer: Got task manager reference
rsPrimeServer: Host abc.def.ghi.com unregistered
rsPrimeServer: Configuration change requested made to primaryserver
rsPrimeServer: Command successful
```

rsQuery.sh

The **rsQuery.sh** command queries the status of one or more volumes.

You can invoke the **rsQuery.sh** command for the vpath name, the host volume name, or the volume serial number under various conditions.

Syntax

The syntax for the **rsQuery.sh** command is:

```
rsQuery.sh [-v] -m {-u username -p password | -a securityfilepath} {-q
volumename | -f filename} -s primaryserver [-b backupserver]
```

Flags and parameters

Table 14 lists and describes the flags and parameters for the **rsQuery.sh** command line. It also explains the required or optional flags and parameters and the flags that must take a parameter.

Table 14. rsQuery.sh command flags and parameters for HP-UX host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command will display all responses from the server. This flag is optional.
-m	None	-m is the map flag. The -m flag maps host volume names to a 2105 volume serial numbers. This flag permits host volumes names to be used as a volume flag. If you use the **rsQuery.sh** command for the vpath name or host volume name, you must use the -m flag. If you use the rsQuery.sh command for a serial number, you do not need to use the -m flag.
-u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the -a flag and the securityfilepath parameter are not used.

Table 14. rsQuery.sh command flags and parameters for HP-UX host systems (continued)

Flag	Parameter	Description
-p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the -a flag and the securityfilepath parameter are not used.
-a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for the use of host CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands and if the {-u username and -p password} flags and parameters are not used. The format of this file is the following: `username password`
-q	volumename	The volume parameter specifies the vpath name, host volume name, or volume serial number. Use the **rsQuery.sh** command for the vpath name, host volume name, or volume serial number under the following conditions: • If SDD is installed, use the **rsQuery.sh** command only for the vpath name or volume serial number. • If SDD is not installed, use the **rsQuery.sh** command only on a host volume name or volume serial number. • If you use the **rsQuery.sh** command for the vpath name or the host volume name, you must use the -m flag. • If you use the rsQuery.sh command for a serial number, you do not need to use the -m flag. You need to use the -q flag with the volume parameter if the -f flag and the filename parameter are not used.

-f	filename	The filename parameter specifies the name of a file containing vpath names, host volume names or volume serial numbers, all of which are to be queried.
		
		You need to use the -f flag with the filename parameter if the -q flag and the volume parameter are not used.
		
		The format of this file may be either:
		`sourceVolume1 targetVolume1`
		`sourceVolume2 targetVolume2`
		`...`
		sourceVolume`N` targetVolume`N`
		or
		`volume1`
		`volume2`
		`volume3`
		`...`
		`volumeN`

-s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.

Table 14. rsQuery.sh command flags and parameters for HP-UX host systems (continued)

Flag	Parameter	Description
-b	backupserver	The -b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.

Output samples

The following is an example of the output you see when you invoke the **rsQuery.sh** command to query a serial number on an HP-UX host system:

```
# ./rsQuery.sh -v -u cli -p yourpassword -q 40EFC102 -s primaryservername
************************Volume Information************************
Volume 40EFC102 found on FC102:14 as volume number 014
PPRC State=simplex, status=none, FlashCopy_state=none, Size=0.5_GB
******************************************************************
rsQuery: Command successful
```

The following is an example of the output you see when you invoke the **rsQuery.sh** command to query a `vpath` name on an HP-UX host system:

```
# ./rsQuery.sh -v -u cli -p yourpassword -m -q vpath10 -s primaryservername
************************Volume Information************************
Volume 40EFC102 found on FC102:14 as volume number 014
PPRC State=simplex, status=none, FlashCopy_state=none, Size=0.5_GB
******************************************************************
rsQuery: Command successful
```

rsQueryComplete.sh

The **rsQueryComplete.sh** command accepts ESS Copy Services server tasks as defined and saved from the ESS Copy Services interface and determines whether all volumes defined in the given tasks have completed the initial PPRC synchronization.

When the **rsQueryComplete.sh** command is executed on grouped tasks, the output will display the first subtask until it has reached the completion threshold, and then it will display the next subtask until it has reached the completion threshold. It will repeat this process until all the subtasks are queried.

You can invoke the **rsQueryComplete.sh** command only on tasks that create PPRC pairs. You cannot invoke the **rsQueryComplete.sh** command on tasks that create FlashCopy pairs.

Syntax

The syntax for the **rsQueryComplete.sh** command is:

`rsQueryComplete.sh [-v] {-u` *`username`* `-p` *`password`*`| -a` *`securityfilepath`*`} [-m` *`minutes`*`] [-t` *`threshold`*`] -s` *`primaryserver`* `[-b` *`backupserver`*`]` *`tasknames`*

Flags and parameters

Table 15 on page 27 lists and describes the flags and parameters for the **rsQueryComplete.sh** command. It also explains the required or optional flags and parameters and it explains the flags that use a parameter.

Table 15. rsQueryComplete.sh command flags and parameters for HP-UX host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command will display all responses from the server. This flag is optional.
-u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services has enabled password protection for host CLI commands, and if the -a flag and the securityfilepath parameter are not used.
-p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services has enabled password protection for host CLI commands, and if the -a flag and the securityfilepath parameter are not used.
-a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for the use of host CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the -u username and -p password flags and parameters are not used. The format of this file is as follows: `username password`
-m	minutes	The -m flag and the minutes parameter are optional. The minutes parameter specifies the number of minute intervals between queries for verifying when the PPRC initialization has completed. The default is 1 minute.
-t	threshold	The -t flag and the threshold parameter are optional. The threshold parameter specifies the threshold percentage that defines completion. The default is 100%.
-s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
-b	backupserver	The -b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.
None	tasknames	The tasknames parameter specifies the name of one or more previously saved ESS Copy Services established PPRC tasks, for which you want to query the initial copy completion of the volumes in those tasks. To specify more than one task, separate the task names with a space.

Output samples

The following is an example of the output you see when you invoke the **rsQueryComplete.sh** command with default settings for the minutes (-m) and threshold (-t) parameters on an HP-UX host system:

```
# ./rsQueryComplete.sh -v -u yourusername -p yourpassword -s primaryservername es_pair_12
rsQueryComplete: Got task manager reference
rsQueryComplete: --------- Task Name: es_pair_12 ---------
rsQueryComplete: Task es_pair_12 found by TaskManager
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 1
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 17
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 35
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 63
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 82
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 100
rsQueryComplete: ------------------------------------------------
rsQueryComplete: Command successful
```

The following is an example of the output when you invoke the **rsQueryComplete.sh** command and specify the minutes (-m) parameter with a value of 2 and the threshold (-t) parameter with a value of 80% on an HP-UX host system:

```
# ./rsQueryComplete.sh -v -u yourusername -p yourpassword -m 2 -t 80
-s primaryservername es_pair_12

rsQueryComplete: Got task manager reference
rsQueryComplete: --------- Task Name: es_pair_12 ---------
rsQueryComplete: Task es_pair_12 found by TaskManager
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 1
rsQueryComplete: waiting 120 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 35
rsQueryComplete: waiting 120 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 82
rsQueryComplete: ------------------------------------------------
rsQueryComplete: Command successful
```

rsTestConnection.sh

The **rsTestConnection.sh** command determines whether you can successfully connect to the ESS Copy Services server.

Syntax

The syntax for the **rsTestConnection.sh** command is:

```
rsTestConnection.sh [-v] -s servername
```

Flags and parameters

Table 16 on page 29 lists and describes the flags and parameters for the **rsTestConnection.sh** command line. It also explains the required or optional flags and parameters and the flags that use a parameter.

Table 16. rsTestConnection.sh command flags and parameters for HP-UX host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command will display all responses from the server. This flag is optional.
-s	servername	The servername parameter specifies the IP address or the complete host name of the ESS Copy Services server for which you want to test the connection.

Output samples

The following is an example of the output you see when you invoke the **rsTestConnection.sh** command on an HP-UX host system:

```
#./rsTestConnection.sh -v -s primaryservername
rsWebTest: Using yourhostname as server name
rsWebTest: rsVSServer reference obtained successfully
rsWebTest: rsVSServer reference narrowed successfully
rsWebTest: HeartBeat to the server was successful.
rsWebTest: command successful
```

Chapter 3. Copy Services CLI for Linux host systems

This chapter contains step-by-step procedures for you to install and use the Copy Services CLI on an Intel-based Red Hat or SuSE Linux host system. It also describes the commands and parameters of the Copy Services CLI. Specifically, it helps you perform the following tasks:

- Installing the Copy Services CLI
- Verifying server connections and ESS volume allocations
- Managing the CLI userid and password
- Using CLI commands

Installing the Copy Services CLI

This section describes the procedures for planning and performing the installation of the Copy Services CLI on a Red Hat or SuSE Linux host system.

Planning the installation

Perform the following steps before you install the Copy Services CLI for a Linux host system:

1. Check the IBM Enterprise Storage Server List of Supported Servers Web site for updates to the CLI support for your host system environments.
   - From your Web browser, type and enter the following Web address:
     www.storage.ibm.com/hardsoft/products/ess/supserver.htm
   - Click to open the PDF version of the ESS Support Servers document.
   - From the Table of Contents, click **ESS and Software Applications**.
   - Review the Copy Services Interface section for support updates.
2. Remove an existing version of the Copy Services CLI if you have one on your host system.

   Perform the following steps to remove an existing version of the Copy Services CLI:

   a. Log onto your Linux host system as the root user.
   b. Type `rpm -qa | grep IBMcli` or `rpm -qa IBMcli-V.R.M.F-X` and press Enter.

      In this command, *V* represents the CLI version number, *R* represents the release number, *M* represents the maintenance level, *F* represents the fix level, and *X* represents the number of times that the release package was built.

      If you have previously installed the Copy Services CLI, you will see a message similar to the following:

      ```
      IBMcli-V.R.M.F-X
      ```

   c. Type `rpm -e IBMcli` or `rpm -e IBMcli-V.R.M.F-X` to remove the existing version of the Copy Services CLI.
3. Install IBM Runtime Environment Package for Linux with Java 2 Technology Edition 1.3.0 on your host system.

   The Copy Services CLI requires `JRE` 1.3.0 on a Linux system. You must download and install `JRE` on your system to use the Copy Services CLI.

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The installation process installs JRE 1.3.0 in the default /opt/IBMJava2-13/jre directory. If you choose to install it in a different directory, you must edit each shell script and change the following line:

```
export JAVA_HOME=/opt/IBMJava2-13/jre
```

to read like this:

```
export JAVA_HOME=/your_installation_directory
```

where */your_installation_directory* is the name of the directory in which you have installed JRE 1.3.0.

If you already have JRE installed on your host system, verify that it is the required version by typing the following command at the command prompt:

```
/opt/IBMJava2-13/jre/bin/java -version
```

You will see an output similar to the following:

```
Java version "1.3.0"
Java(TM) 2 Runtime Environment, Standard Edition (build 1.3.0)
```

Performing the installation

The installation process installs the Copy Services CLI in the default /opt/ibm2105cli directory. Perform these steps to install the Copy Services CLI on a Linux host system:

1. Log onto your host system as the root user.
2. Insert the IBM Enterprise Storage Server compact disc (CD) into the CD-ROM drive.

   A window might pop up for the CD-ROM drive. Close the window and proceed to the next step.
3. Type `mount /mnt/cdrom` at the command prompt to mount the CD-ROM.
4. For Red Hat Linux, type `cd /mnt/cdrom/RedHat` to change to the `/mnt/cdrom/RedHat` directory.

   For SuSE Linux, type `cd /mnt/cdrom/SuSE` to change to the `/mnt/cdrom/SuSE` directory.
5. Type `rpm -i IBMcli-`*`V.R.M.F-X`*`.i386.rpm` to install the CLI code.

   In this command, *V* represents the CLI version number, *R* represents the release number, *M* represents the maintenance level, *F* represents the fix level, and *X* represents the number of times that the release package was built.
6. Type `cd` to return to the root directory.
7. Type `umount /mnt/cdrom` to unmount the CD-ROM.
8. Type `eject` to remove the installation CD from the CD-ROM drive.

Do not remove any files from the directory where you have installed the Copy Services CLI. The shell scripts, with a file extension of .sh, and the executable files, with a file extension of .exe , will not run correctly if the directory structure is changed.

Verifying the installation

Type the following command to verify that the Copy Services CLI is installed on your Linux host system:

`rpm -q ibm2105cli` or `rpm -q IBMcli-`*`V.R.M.F-X`*

where *V* represents the CLI version number, *R* represents the release number, *M* represents the maintenance level, *F* represents the fix level, and *X* represents the number of times that the release package was built.

If you have successfully installed the Copy Services CLI, you will see a message similar to the following:

```
IBMcli-V.R.M.F-X
```

If you have not successfully installed the Copy Services CLI, you will see a message similar to one of the following:

```
package IBMcli is not installed
```

```
package IBMcli-V.R.M.F-X is not installed
```

In this case, follow the instructions in "Installing the Copy Services CLI" on page 31 to install the Copy Services CLI.

Verifying server connections and ESS volume allocations

This section describes the verification tasks that you need to complete before you use the Copy Services CLI:

- Testing the server connection
- Checking the communication link
- Verifying the allocation of ESS volumes.

Testing the server connection

Before using the Copy Services CLI, you need to ensure that the connection between the ESS Copy Services server and your host system is correctly established.

Issue the **rsTestConnection.sh** command to verify the connection. See "rsTestConnection.sh" on page 44 for more information about using the **rsTestConnection.sh** command.

If the **rsTestConnection.sh** command can establish a connection between the ESS Copy Services server and your host system, proceed to "Checking the communication link".

If the **rsTestConnection.sh** command cannot establish a connection between the ESS Copy Services server and your host system, see "Chapter 10. Troubleshooting" on page 133 for detailed instructions to diagnose and correct the problems.

Checking the communication link

Before using the Copy Services CLI, you need to verify that the communication link between the ESS Copy Services server and your host system is established. Communication links are initially configured when the ESS is installed. Use the ESS Specialist to display and modify the ESS communications configuration. See *IBM TotalStorage Enterprise Storage Server Web Interface User's Guide* for information about using the ESS Specialist to modify the communications configuration.

If the communication link between the ESS Copy Services server and your host system is working, proceed to "Verifying the allocation of ESS volumes".

If the communication link between the ESS Copy Services server and your host system is not established, see "Chapter 10. Troubleshooting" on page 133 for detailed instructions to diagnose and correct the problems.

Verifying the allocation of ESS volumes

Before using the Copy Services CLI, you need to verify that ESS volumes are allocated for your host system. Issue the **rsList2105s.sh** command to generate a list of ESS volumes that are currently allocated for your host system. See "rsList2105s.sh" on page 37 for more information about the **rsList2105s.sh** command.

You can use the Copy Services CLI if the **rsList2105s.sh** command determines that there are ESS volumes allocated for your host system.

If the **rsList2105s.sh** command determines that there are no ESS volumes allocated for your host system or that ESS volumes are incorrectly allocated for your host system, see "Chapter 10. Troubleshooting" on page 133 for detailed instructions to diagnose and correct the problems.

Managing the CLI userid and password

You can use the ESS Copy Services Administration panel to manage the userid and password for a Linux host system that uses the Copy Services CLI. After you define the userid and password, all hosts that issue CLI commands must provide this userid and password as part of the command string.

See "Flags and parameters for password-protection-enabled host systems" on page 35 for detailed instructions about issuing the CLI commands for open-systems hosts with password protection.

See the *IBM TotalStorage Enterprise Storage Server Web Interface User's Guide* for detailed instructions on how to define and remove the CLI userid and password.

Using CLI commands

This section describes the CLI commands that you can use from a Linux host system. It presents the full syntax and describes the flags and parameters of each command.

Overview of CLI commands

Table 17 provides an alphabetical list of CLI commands and a brief description of each command.

Table 17. Summary of CLI commands for Linux host systems

Command	Description	Page
rsExecuteTask.sh	Executes one or more ESS Copy services tasks (as defined and saved using the ESS Copy Services interface) and waits for the given tasks to complete execution.	36
rsList2105s.sh	Displays the mapping of a host disk name to a 2105 volume serial number.	37

Table 17. Summary of CLI commands for Linux host systems (continued)

Command	Description	Page
rsPrimeServer.sh	Notifies the ESS Copy Services server about the hostname (from which this command has been executed) so that the hostname is displayed in the source and target list on the ESS Copy Services Volumes panel. This command is useful when you use the ESS Copy Services Volumes panel to perform FlashCopy, PPRC, or both functions because it shows the host names for all the volumes that are connected to the selected host in one view.	38
rsQuery.sh	Queries the status of one or more volumes.	40
rsQueryComplete.sh	Accepts the ESS Copy Services server tasks (as defined and saved from the ESS Copy Services interface) and determines whether all volumes that are defined in the given tasks have completed initial PPRC synchronization.	42
rsTestConnection.sh	Determines whether you can successfully connect to the ESS Copy Services server.	44

Flags and parameters for password-protection-enabled host systems

If the password-protection option is enabled, you must specify one of the following flags and parameters when you use any of the CLI commands from your Linux host system:

- Both the -u flag, followed by the username parameter, and the -p flag, followed by the password parameter
- The -a flag with the securityfilepath parameter

  You can use this option for additional security. The file specified in the securityfilepath parameter contains the username and password.

Flags and parameters for primary and backup servers

When using CLI commands other than **rsList2105s.sh** and **rsTestConnection.sh**, you must specify *either* the -s flag with the primaryserver parameter *or* the -b flag with the backupserver parameter. You can also specify *both* flags if necessary.

Use the following guidelines for specifying the -s and -b flags:

- Specify only the -s flag with the primaryserver parameter to check the connection to the primary server. If the command can establish a connection, it is sent to the primary server for processing. The command fails if it cannot establish a connection.
- Specify only the -b flag with the backupserver parameter to check the connection to the backup server. If the command can establish a connection, it is sent to the backup server for processing. If the command cannot establish a connection, it fails.
- Specify both the -s flag with the primaryserver parameter and the -b flag with the backupserver parameter to check the connection to the primary server and then, if the primary server is down, to the backup server.

  If the command can establish a connection to the primary server, it is sent to the primary server for processing. If the command cannot establish a connection to the primary server, the connection to the backup server is checked. If the

command can establish a connection to the backup server, it is sent to the backup server for processing. If the command cannot establish a connection to the backup server, it fails.

Return codes and messages

See “Chapter 9. Return codes and messages” on page 127 for a complete list and descriptions of CLI return codes and messages.

rsExecuteTask.sh

The **rsExecuteTask.sh** command executes one or more ESS Copy services tasks as defined and saved using the ESS Copy Services Interface and waits for the given tasks to complete execution.

Successful completion of the tasks means that the volumes are in the relationship (PPRC or FlashCopy) specified in the given tasks. It does not mean that the volumes have completed the specified relationship.

For established PPRC tasks, use the **rsQueryComplete.sh** command to determine if PPRC pairs have completed copying. For established FlashCopy tasks, use the **rsQuery.sh** command to determine if FlashCopy with background copy pairs have completed copying.

Syntax

The syntax for the **rsExecuteTask.sh** command is:

```
rsExecuteTask.sh [-v] {-u username -p password | -a securityfilepath} -s
primaryserver [-b backupserver] tasknames
```

See “Flags and parameters for password-protection-enabled host systems” on page 35 for detailed information about how to use CLI commands if the host password-protection option is enabled.

Flags and parameters

Table 18 lists and describes the flags and parameters for the **rsExecuteTask.sh** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Note: All flags and parameters are case-sensitive.

Table 18. rsExecuteTask.sh command flags and parameters for Linux host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command will display all responses from the server. This flag is optional.
-u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for the host system and if the -a flag and the securityfilepath parameter are not used.
-p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for the host system and if the -a flag and the securityfilepath parameter are not used.

Table 18. rsExecuteTask.sh command flags and parameters for Linux host systems (continued)

Flag	Parameter	Description
-a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password that are defined at the ESS Copy Services server for using CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for the host system and if the -u username and -p password flags and parameters are not used. The format of this file is as follows: `username password`
-s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
-b	backupserver	The -b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.
None	tasknames	The tasknames parameter specifies the name of one or more previously saved ESS Copy Services established PPRC tasks for which you want to query the initial copy completion. To specify more than one task, separate the task names with a space.

Output samples

The following is an example of the output you see when you invoke the **rsExecuteTask.sh** command on a Linux host system:

```
#./rsExecuteTask.sh -v -u yourusername -p yourpassword -s yourhostname es_pair_12
rsExecuteTask:Got task manager reference
rsExecuteTask:*************Finding the tasks****************
rsExecuteTask:Task es_pair_12 found by task manager
rsExecuteTask:*************Scheduling the tasks****************
rsExecuteTask:Task es_pair_12 scheduled with copy services server
rsExecuteTask:*************Monitoring the tasks****************
rsExecuteTask:Waiting on server...
rsExecuteTask:Task es_pair_12 completed successfully
rsExecuteTask:Command successful
```

rsList2105s.sh

The **rsList2105s.sh** command displays the mapping of a host disk name to a 2105 volume serial number.

If you have the IBM Subsystem Device Driver (SDD) running on your host system and you change the configuration for the host such as adding or removing volumes, you must restart the host so that SDD can recognize, add, or remove the paths.

Syntax

The syntax for the **rsList2105s.sh** command is simply:

```
rsList2105s.sh
```

Flags and parameters

There are no flags and parameters for the **rsList2105s.sh** command.

Output samples

The following is an example of the output you see when you invoke the **rsList2105s.sh** command on a Linux host system:

```
# ./rsList2105s.sh
disk name 2105 serial number
--------- ------------------
 sdb             60813550
 sdc             60A13550
 sdd             60113550
 sde             60613550
 sdf             00013550
 sdg             20013550
 sdh             40013550
 sdi             40113550
 sdj             20613550
 sdk             20713550
 sdl             40213550
 sdm             40313550
 sdn             10013550
 sdo             30013550
 sdp             50413550
 sdq             50513550
 sdr             30313550
 sds             30413550
 sdt             50213550
 sdu             50313550
```

rsPrimeServer.sh

The **rsPrimeServer.sh** command notifies the ESS Copy Services server about the hostname (from which this command has been executed) to display the hostname in the ESS Copy Services Volumes panel source and target list.

This command is useful when you use the ESS Copy Services Volumes panel to perform FlashCopy, PPRC, or both functions as it shows the host names for all the volumes that are connected to the selected host in one view.

If you have SDD installed on your host system and you change the configuration for the host (such as adding or removing volumes), you must perform the following steps:

- Restart your host system so that SDD can recognize, add, or remove the paths.
- Run the **rsPrimeServer.sh** command to generate the current mapping for the host volumes.

If you do not have SDD installed on your host system and you change the configuration for the host (such as adding or removing volumes), you must run the **rsPrimeServer.sh** command to generate the current mapping for the host volumes.

Syntax

The syntax for the **rsPrimeServer.sh** command is:

```
rsPrimeServer.sh [-v] {-u username -p password | -a securityfilepath} -d
hostname -s primaryserver [-b backupserver]
```

Flags and parameters

Table 19 on page 39 lists and describes the flags and parameters for the **rsPrimeServer.sh** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Table 19. rsPrimeServer.sh command flags and parameters for Linux host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command displays all responses from the server. This flag is optional.
-u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the -a flag and the securityfilepath parameter are not used.
-p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the -a flag and the securityfilepath parameter are not used.
-a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for using CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the -u username and -p password flags and parameters are not used. The format of this file is as follows: `username password`
-d	hostname	The -d flag and hostname parameter are required when you are removing the hostname. The hostname parameter specifies the IP address or hostname to be removed. The hostname needs to match exactly one of the entries that is displayed in the list on the Volumes panels of the ESS Copy Services.
-s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
-b	backupserver	The -b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.

Output samples

The following is an example of the output you see when you invoke the **rsPrimeServer.sh** command to add a host name on a Linux host system:

```
#./rsPrimeServer.sh -v -u yourusername -p yourpassword -s yourhostname
sPrimeServer:Local host is abc.def.ghi.com
rsPrimeServer:Got task manager reference
rsPrimeServer:Host abc.def.ghi.com registered
rsPrimeServer:Configuration change requested made to primaryserver
rsPrimeServer:Command successful
```

The following is an example of the output you see when you invoke the **rsPrimeServer.sh** command to delete a host name on a Linux host system:

```
#./rsPrimeServer.sh -v -u yourusername -p yourpassword -d abc.def.ghi.com -s yourhostname
rsPrimeServer:host to unregister is abc.def.ghi.com
rsPrimeServer:Got task manager reference
rsPrimeServer:Host abc.def.ghi.com unregistered
rsPrimeServer:Configuration change requested made to primaryserver
rsPrimeServer:Command successful
```

rsQuery.sh

The **rsQuery.sh** command queries the status of one or more volumes.

You can invoke the **rsQuery.sh** command for the vpath name, the host volume name, or the volume serial number under various conditions.

Syntax

The syntax for the **rsQuery.sh** command is:

```
rsQuery.sh [-v] -m {-u username -p password | -a securityfilepath} {-q
volumename | -f filename} -s primaryserver [-b backupserver]
```

Flags and parameters

Table 20 lists and describes the flags and parameters for the **rsQuery.sh** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Table 20. rsQuery.sh command flags and parameters for Linux host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command will display all responses from the server. This flag is optional.
-m	None	-m is the map flag. The -m flag maps host volume names to a 2105 volume serial numbers. This flag permits host volumes names to be used as a volume flag. If you use the **rsQuery.sh** command for the vpath name or host volume name, you must use the -m flag. If you use the **rsQuery.sh** command for a serial number, you do not need to use the -m flag.
-u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the -a flag and the securityfilepath parameter are not used.
-p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the -a flag and the securityfilepath parameter are not used.

Table 20. rsQuery.sh command flags and parameters for Linux host systems (continued)

Flag	Parameter	Description
-a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for the use of host CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands and if the {-u username and -p password} flags and parameters are not used. The format of this file as follows: `username password`
-q	volumename	The volume parameter specifies the vpath name, host volume name, or volume serial number. Use the **rsQuery.sh** command for the vpath name, host volume name, or volume serial number under the following conditions: • If SDD is installed, use the **rsQuery.sh** command only for the vpath name or volume serial number. • If SDD is not installed, use the **rsQuery.sh** command only on a host volume name or volume serial number. • If you use the **rsQuery.sh** command for the vpath name or the host volume name, you must use the -m flag. • If you use the **rsQuery.sh** command for a serial number, you do not need to use the -m flag. You need to use the -q flag with the volume parameter if the -f flag and the filename parameter are not used.

-f	filename	The filename parameter specifies the name of a file containing vpath names, host volume names or volume serial numbers, all of which are to be queried.
		
		You need to use the -f flag with the filename parameter if the -q flag and the volume parameter are not used.
		
		The format of this file may be either:
		`sourceVolume1 targetVolume1`
		`sourceVolume2 targetVolume2`
		`...`
		sourceVolume`N` targetVolume`N`
		or
		`volume1`
		`volume2`
		`volume3`
		`...`
		`volumeN`

-s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.

Table 20. rsQuery.sh command flags and parameters for Linux host systems (continued)

Flag	Parameter	Description
-b	backupserver	The -b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.

Output samples

The following is an example of the output you see when you invoke the **rsQuery.sh** command to query a serial number on a Linux host system:

```
#./rsQuery.sh -v -u yourusername  -p yourpassword  -q 60113550  -s yourhostname
************************Volume Information************************
Volume 60113550 found on 13550:16 as volume number 001
PPRC State=simplex, status=none, FlashCopy_state=none, Size=4.2_GB
******************************************************************
rsQuery: Command successful
```

rsQueryComplete.sh

The **rsQueryComplete.sh** command accepts ESS Copy Services server tasks as defined and saved from the ESS Copy Services interface and determines whether all volumes defined in the given tasks have completed the initial PPRC synchronization.

When the **rsQueryComplete.sh** command is executed on grouped tasks, the output displays the first subtask until it has reached the completion threshold; and then it displays the next subtask until it has reached the completion threshold. It repeats this process until all the subtasks are queried.

You can invoke the **rsQueryComplete.sh** command only on tasks that create PPRC pairs. You cannot invoke the **rsQueryComplete.sh** command on tasks that create FlashCopy pairs.

Syntax

The syntax for the **rsQueryComplete.sh** command is:

```
rsQueryComplete.sh [-v] {-u username -p password| -a securityfilepath} [-m
minutes] [-t threshold] -s primaryserver [-b backupserver] tasknames
```

Flags and parameters

Table 21 lists and describes the flags and parameters for the **rsQueryComplete.sh** command. It also explains the required or optional flags and parameters, and it explains and the flags that use a parameter.

Table 21. rsQueryComplete.sh command flags and parameters for Linux host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command will display all responses from the server. This flag is optional.
-u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services has enabled password protection for host CLI commands, and if the -a flag and the securityfilepath parameter are not used.

Table 21. rsQueryComplete.sh command flags and parameters for Linux host systems (continued)

Flag	Parameter	Description
-p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services has enabled password protection for host CLI commands, and if the -a flag and the securityfilepath parameter are not used.
-a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for the use of host CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the -u username and -p password flags and parameters are not used. The format of this file is as follows: `username password`
-m	minutes	The minutes parameter specifies the number of minute intervals between queries for verifying when the PPRC initialization has completed. The default is 1 minute.
-t	threshold	The -t flag and the threshold parameter are optional. The threshold parameter specifies the threshold percentage that defines completion. The default is 100%.
-s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
-b	backupserver	The -b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.
None	tasknames	The tasknames parameter specifies the name of one or more previously saved ESS Copy Services established PPRC tasks for which you want to query the initial copy completion of the volumes in those tasks. To specify more than one task, separate the task names with a space.

Output samples

The following is an example of the output when you invoke the **rsQueryComplete.sh** command with default settings for the minutes (-m) and threshold (-t) parameters on a Linux host system:

```
#./rsQueryComplete.sh -v -u yourusername -p yourpassword -s yourhostname es_pair_12
rsQueryComplete:Got task manager reference
rsQueryComplete:---------Task Name:es_pair_12 ---------
rsQueryComplete:Task es_pair_12 found by TaskManager
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =1
rsQueryComplete:waiting 60 seconds...
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =17
rsQueryComplete:waiting 60 seconds...
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =35
rsQueryComplete:waiting 60 seconds...
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =63
rsQueryComplete:waiting 60 seconds...
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =82
rsQueryComplete:waiting 60 seconds...
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =100
rsQueryComplete:------------------------------------------------
rsQueryComplete:Command successful
```

The following is an example of the output when you invoke the **rsQueryComplete.sh** command and specify the minutes (-m) parameter with a value of 2 and the threshold (-t) parameter with a value of 80% on a Linux host system:

```
#./rsQueryComplete.sh -v -u yourusername -p yourpassword -m 2 -t 80
  -s yourhostname es_pair_12
rsQueryComplete:Got task manager reference
rsQueryComplete:---------Task Name:es_pair_12 ---------
rsQueryComplete:Task es_pair_12 found by TaskManager
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =1
rsQueryComplete:waiting 120 seconds...
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =35
rsQueryComplete:waiting 120 seconds...
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =82
rsQueryComplete:------------------------------------------------
rsQueryComplete:Command successful
```

rsTestConnection.sh

The **rsTestConnection.sh** command determines whether you can successfully connect to the ESS Copy Services server.

Syntax

The syntax for the **rsTestConnection.sh** command is:

```
rsTestConnection.sh [-v] -s servername
```

Flags and parameters

Table 22 on page 45 lists and describes the flags and parameters for the **rsTestConnection.sh** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Table 22. rsTestConnection.sh command flags and parameters for Linux host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command displays all responses from the server. This flag is optional.
-s	servername	The servername parameter specifies the IP address or the complete host name of the ESS Copy Services server for which you want to test the connection.

Output samples

The following is an example of the output you see when you invoke the **rsTestConnection.sh** command on a Linux host system:

```
#./rsTestConnection.sh -v -s yourhostname
rsWebTest: Using yourhostname as server name
rsWebTest: rsVSServer reference obtained successfully
rsWebTest: rsVSServer reference narrowed successfully
rsWebTest: HeartBeat to the server was successful.
rsWebTest: command successful
```

Chapter 4. Copy Services CLI for Novell 4.x host systems

This chapter contains step-by-step procedures for you to install and use the Copy Services CLI on a Novell 4.x host system. It also describes the commands and parameters of the Copy Services CLI. Specifically, it helps you perform the following tasks:

- Installing the Copy Services CLI
- Verifying server connections and ESS volume allocations
- Managing the CLI userid and password
- Using CLI commands

Installing the Copy Services CLI

This section describes the procedures for planning and performing the installation of the Copy Services CLI on a Novell 4.x host system.

Planning the installation

Perform the following steps before you install the Copy Services CLI for a Novell 4.x host system:

1. Check the IBM Enterprise Storage Server List of Supported Servers Web site for updates to the CLI support for your host system environments:
   - From your Web browser, type and enter the following Web address: www.storage.ibm.com/hardsoft/products/ess/supserver.htm
   - Click to open the PDF version of the ESS Support Servers document.
   - From the Table of Contents, click **ESS and Software Applications**.
   - Review the Copy Services Interface section for support updates.
2. Install Novell client on your system.
3. Install Support Pack 9 for your Novell 4.x host system.
4. Install JDK 1.1.7B on your host system.

Performing the installation

The installation process installs the Copy Services CLI in the default sys:\ibm2105 directory. Perform the following steps to install the Copy Services CLI on a Novell 4.x host:

1. Log onto your Novell client as the root user.
2. Insert the IBM Enterprise Storage Server compact disc (CD) into the CD-ROM drive.

   A window might pop up for the CD-ROM drive. Close the window and proceed to the next step.
3. Click **Start** —> **Run**.
4. In the Run window, click **Browse**.
5. From the **Look in** list in the Browse window, select the drive letter for the CD-ROM drive.
6. Select **Novell4xCli\IBMcli\Setup.exe**.
7. Click **Open**.
8. Click **OK**.
9. Follow the instructions of the installation wizard to install the Copy Services CLI (ibm2105 cli code).

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10. Restart your host system to complete the installation process.

Do not remove any files from the directory where you have installed the Copy Services CLI. The executable files, with a file extension of .nlm, will not run correctly if the directory structure is changed.

Verifying the installation

Perform the following steps to verify that the Copy Services CLI is installed on your Novell 4.x host system:

1. Type `load edit` at the command prompt and press Enter to display the edit screen
2. Press the Insert button and then select the `etc` directory.
3. Select and open the `java.cfg` file.
4. Make sure that the `java.cfg` file contains the following lines:

```
IBMCLICLASSPATH=$CLASSPATH
INSTALL=SYS:\IBM2105
```

If you do not see the above lines in the `java.cfg` file or if you cannot locate the `java.cfg` file, it means that the Copy Services CLI is currently *not* installed on your Novell 4.x host system. In this case, follow the instructions in "Installing the Copy Services CLI" on page 47 to install the Copy Services CLI.

Verifying server connections and ESS volume allocations

This section describes the verification tasks that you need to complete before you use the Copy Services CLI:

- Testing the server connection
- Checking the communication link
- Verifying the allocation of ESS volumes.

Testing the server connection

Before using the Copy Services CLI, you need to ensure that the connection between the ESS Copy Services server and your host system is correctly established.

Issue the **rsTConn.nlm** command to verify the connection between the ESS Copy Services server and your host system. See "rsTConn.nlm" on page 60 for more information about using the **rsTConn.nlm** command.

If the **rsTConn.nlm** command can establish a connection between the ESS Copy Services server and your host system, proceed to "Checking the communication link".

If the **rsTConn.nlm** command cannot establish a connection between the ESS Copy Services server and your host system, see "Chapter 10. Troubleshooting" on page 133 for detailed instructions to diagnose and correct the problems.

Checking the communication link

Before using the Copy Services CLI, you need to verify that the communication link between the ESS Copy Services server and your host system is established. Communication links are initially configured when the ESS is installed. Use the ESS Specialist to display and modify the ESS communications configuration. See *IBM*

TotalStorage Enterprise Storage Server Web Interface User's Guide for information about using the ESS Specialist to modify the communications configuration.

If the communication link between the ESS Copy Services server and your host system is working, proceed to "Verifying the allocation of ESS volumes".

If the communication link between the ESS Copy Services server and your host system is not established, see "Chapter 10. Troubleshooting" on page 133 for detailed instructions to diagnose and correct the problems.

Verifying the allocation of ESS volumes

Before using the Copy Services CLI, you need to verify that ESS volumes are allocated for your host system. Issue the **rsL2105s.nlm** command to generate a list of ESS volumes that are currently allocated for your host system. See "rsL2105s.nlm" on page 52 for more information about the **rsL2105s.nlm** command.

You can use the Copy Services CLI if the **rsL2105s.nlm** command determines that there are ESS volumes allocated for your host system.

If the **rsL2105s.nlm** command determines that there are no ESS volumes allocated for your host system or that ESS volumes are incorrectly allocated for your host system, see "Chapter 10. Troubleshooting" on page 133 for detailed instructions to diagnose and correct the problems.

Managing the CLI userid and password

You can use the ESS Copy Services Administration panel to manage the userid and password for a Novell 4.x host system that uses the Copy Services CLI. When you define the userid and password, all hosts that issue CLI commands must provide this userid and password as part of the command string.

See "Flags and parameters for password-protection-enabled host systems" on page 50 for detailed instructions about issuing the CLI commands for open-systems hosts with password protection.

See the *IBM TotalStorage Enterprise Storage Server Web Interface User's Guide* for detailed instructions on how to define and remove the CLI userid and password.

Using CLI commands

This section describes the CLI commands that you can use from a Novell 4.x host system. It presents the full syntax and describes the flags and parameters of each command.

Overview of CLI commands

Table 23 provides an alphabetical list of CLI commands and a brief description of each command.

Table 23. Summary of CLI commands for Novell 4.x host systems

Command	Description	Page
rsExTask.nlm	Executes one or more ESS Copy services tasks (as defined and saved using the ESS Copy Services interface) and waits for the given tasks to complete execution.	51

Table 23. Summary of CLI commands for Novell 4.x host systems (continued)

Command	Description	Page
rsL2105s.nlm	Displays the mapping of a host disk name to a 2105 volume serial number.	52
rsPSrv.nlm	Notifies the ESS Copy Services server about the hostname (from which this command has been executed) so that the hostname is displayed in the source and target list on the ESS Copy Services Volumes panel. This command is useful when you use the ESS Copy Services Volumes panel to perform FlashCopy, PPRC, or both functions because it shows the host names for all the volumes that are connected to the selected host in one view.	53
rsQ.nlm	Queries the status of one or more volumes.	55
rsQComp.nlm	Accepts the ESS Copy Services server tasks (as defined and saved from the ESS Copy Services interface) and determines whether all volumes that are defined in the given tasks have completed initial PPRC synchronization.	58
rsTConn.nlm	Determines whether you can successfully connect to the ESS Copy Services server.	60

Flags and parameters for password-protection-enabled host systems

If the password-protection option is enabled, you must specify *one* of the following flags and parameters when you use any of the CLI commands from your Novell 4.x host system:

- Both the /u flag, followed by the username parameter, and the /p flag, followed by the password parameter
- The /a flag with the securityfilepath parameter.

  You can use this option for additional security. The file specified in the securityfilepath parameter contains the username and password.

Flags and parameters for primary and backup servers

When using CLI commands other than **rsL2105s.nlm** and **rsTConn.nlm**, you must specify *either* the /s flag with the primaryserver parameter *or* the /b flag with the backupserver parameter. You can also specify *both* flags if necessary.

Use the following guidelines for specifying the /s and /b flags:

- Specify only the /s flag with the primaryserver parameter to check the connection to the primary server. If the command can establish a connection, it is sent to the primary server for processing. The command fails if it cannot establish a connection.
- Specify only the /b flag with the backupserver parameter to check the connection to the backup server. If the command can establish a connection, it is sent to the backup server for processing. If the command cannot establish a connection, it fails.
- Specify both the /s flag with the primaryserver parameter and the /b flag with the backupserver parameter to check the connection to the primary server and then, if the primary server is down, to the backup server.

  If the command can establish a connection to the primary server, it is sent to the primary server for processing. If the command cannot establish a connection to the primary server, the connection to the backup server is checked. If the

command can establish a connection to the backup server, it is sent to the backup server for processing. If the command cannot establish a connection to the backup server, it fails.

Return codes and messages

See “Chapter 9. Return codes and messages” on page 127 for a complete list and descriptions of CLI return codes and messages.

rsExTask.nlm

The **rsExTask.nlm** command executes one or more ESS Copy services tasks as defined and saved using the ESS Copy Services interface, and it waits for the given tasks to complete execution.

Successful completion of the tasks means that the volumes are in the relationship (PPRC or FlashCopy) specified in the given tasks. It does not mean that the volumes have completed the specified relationship.

For established PPRC tasks, use the **rsQComp.nlm** command to determine if PPRC pairs have completed copying. For established FlashCopy tasks, use the **rsQ.nlm** command to determine if FlashCopy with background copy pairs have completed copying.

Syntax

The syntax for the **rsExTask.nlm** command is:

```
rsExTask.nlm [/v] {/u username /p password | /a securityfilepath} /s
primaryserver [/b backupserver] tasknames
```

See “Flags and parameters for password-protection-enabled host systems” on page 50 for detailed information about how to use CLI commands if the host password-protection option is enabled.

Flags and parameters

Table 24 lists and describes the flags and parameters for the **rsExTask.nlm** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Note: All flags and parameters are case-sensitive.

Table 24. rsExTask.nlm command flags and parameters for Novell 4.x host systems

Flag	Parameter	Description
/v	None	/v is the verbose flag. When you use the /v flag, the command will display all responses from the server. This flag is optional.
/u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /a flag and the securityfilepath parameter are not used.
/p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /a flag and the securityfilepath parameter are not used.

Table 24. rsExTask.nlm command flags and parameters for Novell 4.x host systems (continued)

Flag	Parameter	Description
/a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for the use of host CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /u username and /p password flags and parameters are not used. The format of this file is as follows: `username password`
/s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server
/b	backupserver	The /b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.
None	tasknames	The tasknames parameter specifies the name of one or more previously saved ESS Copy Services tasks. To specify more than one task, separate the task names with a space.

Output samples

The following is an example of the output you see when you invoke the **rsExTask.nlm** command on a Novell 4.x host system:

```
rsExTask /v /u yourusername /p yourpassword /s primaryservername es_pair_12
Loading module RSEXTASK.NLM
  NLM Stationery
  Version 1.02    31 July 2001
  (C) Copyright IBM Corp. 1998, 1999 All Rights Reserved
  Debug symbol information for RSEXTASK.NLM loaded
>
NW_42:
NW_42:  rsCopyServices.rsExecuteTask -v -u yourusername -p yourpassword
-s primaryservername es_pair_12

rsExecuteTask:Got task manager reference
rsExecuteTask:*************Finding the tasks****************
rsExecuteTask:Task es_pair_12 found by task manager
rsExecuteTask:*************Scheduling the tasks****************
rsExecuteTask:Task es_pair_12 scheduled with copy services server
rsExecuteTask:*************Monitoring the tasks****************
rsExecuteTask:Waiting on server...
rsExecuteTask:Task es_pair_12 completed successfully
rsExecuteTask:Command successful
```

rsL2105s.nlm

The **rsL2105s.nlm** command displays the mapping of a host disk name to a 2105 volume serial number.

Syntax
The syntax for the **rsL2105s.nlm** command is simply:

```
rsL2105s.nlm
```

Flags and parameters
There are no flags and parameters for the **rsL2105s.nlm** command.

Output samples
You will see an output similar to the following when you invoke the **rsL2105s.nlm** command:

```
rsL2105s
Loading module RSL2105S.NLM
  NLM Stationery
  Version 1.02     7 August 2001
  (C) Copyright IBM Corp. 1998, 1999 All Rights Reserved
  Debug symbol information for RSL2105S.NLM loaded

>

disk name     2105 serial number
------------  ------------------
V596-A2-D0:0     30714146
V596-A2-D0:1     30A14146
V596-A2-D0:3     31114146
V596-A2-D0:4     31214146
```

rsPSrv.nlm

The **rsPSrv.nlm** command notifies the ESS Copy Services server to display the hostname (from which this command has been executed) to display the hostname in the source and target list on the ESS Copy Services Volumes panel.

This command is useful when you use the ESS Copy Services Volumes panel to perform FlashCopy, PPRC, or both functions because it shows the host names for all the volumes that are connected to the selected host in one view.

If you have the IBM Subsystem Device Driver (SDD) installed on your host system and you change the configuration for the host (such as adding or removing volumes), you must perform the following steps:

- Restart your host system so that SDD can recognize, add, or remove the paths.
- Run the **rsPSrv.nlm** command to generate the current mapping for the host volumes.

If you do not have SDD installed on your host system and you change the configuration for the host (such as adding or removing volumes), you must run the **rsPSrv.nlm** command to generate the current mapping for the host volumes.

Syntax
The syntax for the **rsPSrv.nlm** command is:

```
rsPSrv.nlm [/v] {/u username /p password | /a securityfilepath} /d hostname
/s primaryserver [/b backupserver]
```

Flags and parameters
Table 25 on page 54 lists and describes the flags and parameters for the **rsPSrv.nlm** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Table 25. rsPSrv.nlm command flags and parameters for Novell 4.x host systems

Flag	Parameter	Description
/v	None	/v is the verbose flag. When you use the /v flag, the command will display all responses from the server. This flag is optional.
/u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /a flag and the securityfilepath parameter are not used.
/p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /a flag and the securityfilepath parameter are not used.
/a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for the use of host CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /u username and /p password flags and parameters are not used. The format of this file is as follows: `username password`
/d	hostname	The /d flag and hostname parameter are required when you are removing the hostname. The hostname parameter specifies the IP address or hostname to be removed. The hostname needs to match exactly one of the entries that is displayed in the list on the Volumes panels of the ESS Copy Services.
/s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
/b	backupserver	The /b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.

Output samples

The following is an example of the output you see when you invoke the **rsPSrv.nlm** command to add a host name on a Novell 4.x host system:

```
rsPSrv /v /u yourusername /p yourpassword /s primaryservername
Loading module RSPSRV.NLM
  NLM Stationery
  Version 1.02     7 August 2001
  (C) Copyright IBM Corp. 1998, 1999 All Rights Reserved
  Debug symbol information for RSPSRV.NLM loaded

>
NW_42:
NW_42:es.rsPrimeServer -v -u yourusername -p yourpassword -s primaryservername
-l "NW_51/SYS:\COMMAND"

rsPrimeServer:Local host is abc.def.ghi.com
rsPrimeServer:Got task manager reference
rsPrimeServer:Host abc.def.ghi.com registered
rsPrimeServer:Configuration change requested made to primaryserver
rsPrimeServer:Command successful
```

The following is an example of the output you see when you invoke the **rsPSrv.nlm** command to delete a host name on a Novell 4.x host system:

```
rsPSrv /v /u yourusername /p yourpassword /d abc.def.ghi.com /s primaryservername
Loading module RSPSRV.NLM
  NLM Stationery
  Version 1.02     7 August 2001
  (C) Copyright IBM Corp. 1998, 1999 All Rights Reserved
  Debug symbol information for RSPSRV.NLM loaded

>
NW_42:
NW_42:es.rsPrimeServer -v -u yourusername -p yourpassword -s primaryservername
  -d abc.def.ghi.com

rsPrimeServer:host to unregister is abc.def.ghi.com
rsPrimeServer:Got task manager reference
rsPrimeServer:Host abc.def.ghi.com unregistered
rsPrimeServer:Configuration change requested made to primaryserver
rsPrimeServer:Command successful
```

rsQ.nlm

The **rsQ.nlm** command queries the status of one or more volumes.

You can invoke the **rsQ.nlm** command for the vpath name, the host volume name, or the volume serial number under various conditions.

Syntax

The syntax for the **rsQ.nlm** command is:

```
rsQ.nlm [/v] /m {/u username /p password | /a securityfilepath} {/q
volumename | /f filename} /s primaryserver [/b backupserver]
```

Flags and parameters

Table 26 lists and describes the flags and parameters for the **rsQ.nlm** command line. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Table 26. rsQ.nlm command flags and parameters for Novell 4.x host systems

Flag	Parameter	Description
/v	None	/v is the verbose flag. When you use the /v flag, the command will display all responses from the server. This flag is optional.

Table 26. rsQ.nlm command flags and parameters for Novell 4.x host systems (continued)

Flag	Parameter	Description
/m	None	/m is the map flag. The /m flag maps host volume names to a 2105 volume serial numbers. This flag permits host volume names to be used as a volume flag. If you use the **rsQ.nlm** command for the vpath name or host volume name, you must use the /m flag. If you use the **rsQ.nlm** command for a serial number, you do not need to use the /m flag.
/u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /a flag and the securityfilepath parameter are not used.
/p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /a flag and the securityfilepath parameter are not used.
/a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for the use of host CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands and if the {/u username and /p password} flags and parameters are not used. The format of this file is as follows: `username password`
/q	volumename	The volume parameter specifies the vpathname, host volume name, or volume serial number. Use the **rsQ.nlm** command for the vpath name, host volume name, or volume serial number under the following conditions: • If SDD is installed, use the **rsQ.nlm** command only for the vpath name or volume serial number. • If SDD is not installed, use the **rsQ.nlm** command only on a host volume name or volume serial number. • If you use the **rsQ.nlm** command for the vpath name or host volume name, you must use the /m flag. • If you use the **rsQ.nlm** command for a serial number, you do not need to use the /m flag. You need to use the /q flag with the volume parameter if the /f flag and the filename parameter are not used.

Table 26. rsQ.nlm command flags and parameters for Novell 4.x host systems (continued)

Flag	Parameter	Description

/f	filename	The filename parameter specifies the name of a file containing vpath names, host volume names or volume serial numbers, all of which are to be queried.
		
		You need to use the /f flag with the filename parameter if the /q flag and the volume parameter are not used.
		
		The format of this file may be either:
		`sourceVolume1 targetVolume1`
		`sourceVolume2 targetVolume2`
		`...`
		sourceVolumeN targetVolumeN
		or
		`volume1`
		`volume2`
		`volume3`
		`...`
		`volumeN`

/s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
/b	backupserver	The /b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.

Output samples

The following is an example of the output you see when you invoke the **rsQ.nlm** command to query a serial number on a Novell 4.x host system:

```
rsQ /v /u yourusername /p yourpassword /q 30714146 /s primaryservername
Loading module RSQ.NLM
  NLM Stationery
  Version 1.02     7 August 2001
  (C) Copyright IBM Corp. 1998, 1999 All Rights Reserved
  Debug symbol information for RSQ.NLM loaded

NW_42:
NW_42:es.jar;  rsCopyServices.rsQuery -v -u yourusername -p yourpassword
-s primaryservername 30714146

**********Volume Information**********
Volume 30714146 found on FC102:12 as volume number 012
PPRC State=simplex,status=none,FlashCopy_state=none,Size=0.5_GB
************************************************************
rsQuery:Command successful
```

rsQComp.nlm

The **rsQComp.nlm** command accepts ESS Copy Services server tasks as defined and saved from the ESS Copy Services interface and determines whether all volumes defined in the given tasks have completed the initial PPRC synchronization.

When the **rsQComp.nlm** command is executed on grouped tasks, the output displays the first subtask until it has reached the completion threshold; and then it displays the next subtask until it has reached the completion threshold. It repeats this process until all the subtasks are queried.

You can invoke the **rsQComp.nlm** command only on tasks that create PPRC pairs. You cannot invoke the **rsQComp.nlm** command on tasks that create FlashCopy pairs.

Syntax

The syntax for the **rsQComp.nlm** command is:

```
rsQComp.nlm [/v] {/u username /p password| /a securityfilepath} [/m
minutes] [/t threshold] /s primaryserver [/b backupserver] tasknames
```

Flags and parameters

Table 27 lists and describes the flags and parameters for the **rsQComp.nlm** command. It also explains the required or optional flags and parameters, and it describes the flags that use a parameter.

Table 27. rsQComp.nlm command flags and parameters for Novell 4.x host systems

Flag	Parameter	Description
/v	None	/v is the verbose flag. When you use the /v flag, the command will display all responses from the server. This flag is optional.
/u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services has enabled password protection for host CLI commands, and if the /a flag and the securityfilepath parameter are not used.
/p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the ESS Copy Services administrator has enabled password protection for host CLI commands, and if the /a flag and the securityfilepath parameter are not used.
/a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for the use of host CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /u username and /p password flags and parameters are not used. The format of this file is as follows: `username password`
/m	minutes	The /m flag and the minutes parameter are optional. The minutes parameter specifies the number of minute intervals between queries for verifying when the PPRC initialization has completed. The default is 1 minute.

Table 27. rsQComp.nlm command flags and parameters for Novell 4.x host systems (continued)

Flag	Parameter	Description
/t	threshold	The /t flag and the threshold parameter are optional. The threshold parameter specifies the threshold percentage that defines completion. The default is 100%.
/s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
/b	backupserver	The /b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.
None	tasknames	The tasknames parameter specifies the name of one or more previously saved ESS Copy Services established PPRC tasks, for which you want to query the initial copy completion of the volumes in those tasks. To specify more than one task, separate the task names with a space.

Output samples

The following is an example of the output you see when you invoke the **rsQComp.nlm** command with default settings for the minutes (/m) and threshold (/t) parameters on a Novell 4.x host system:

```
rsQComp /v /u yourusername /p yourpassword /s primaryservername es_pair_12
Loading module RSQCOMP.NLM
  NLM Stationery
  Version 1.02    31 July 2001
  (C) Copyright IBM Corp. 1998, 1999 All Rights Reserved
  Debug symbol information for RSQCOMP.NLM loaded
>
NW_42:
NW_42:ces.rsQueryComplete -v -u yourusername -p yourpassword -m 2 -t 60
-s primaryservername es_pair_12

rsQueryComplete:Got task manager reference
rsQueryComplete:---------Task Name:es_pair_12 ---------
rsQueryComplete:Task es_pair_12 found by TaskManager
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =1
rsQueryComplete:waiting 60 seconds...
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =17
rsQueryComplete:waiting 60 seconds...
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =35
rsQueryComplete:waiting 60 seconds...
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =63
rsQueryComplete:waiting 60 seconds...
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =82
rsQueryComplete:waiting 60 seconds...
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =100
rsQueryComplete:-----------------------------------------------
rsQueryComplete:Command successful
```

The following is an example of the output when you invoke the **rsQComp.nlm** command and specify the minutes (/m) parameter with a value of 2 and the threshold (/t) parameter with a value of 80% on a Novell 4.x host system:

```
rsQComp /v /u yourusername /p yourpassword /m 2 /t 80 /s primaryservername es_pair_12
Loading module RSQCOMP.NLM
  NLM Stationery
  Version 1.02    31 July 2001
  (C) Copyright IBM Corp. 1998, 1999 All Rights Reserved
  Debug symbol information for RSQCOMP.NLM loaded
>
NW_42:
NW_42:ces.rsQueryComplete -v -u yourusername -p yourpassword -m 2 -t 80 -s primaryservername
es_pair_12

rsQueryComplete:Got task manager reference
rsQueryComplete:---------Task Name:es_pair_12 ---------
rsQueryComplete:Task es_pair_12 found by TaskManager
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =1
rsQueryComplete:waiting 120 seconds...
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =35
rsQueryComplete:waiting 120 seconds...
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =82
rsQueryComplete:-----------------------------------------------
rsQueryComplete:Command successful
```

rsTConn.nlm

The **rsTConn.nlm** command determines whether you can successfully connect to the ESS Copy Services server.

Syntax

The syntax for the **rsTConn.nlm** command is:

```
rsTConn.nlm [/v] /s servername
```

Flags and parameters

Table 28 lists and describes the flags and parameters for the **rsTConn.nlm** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Table 28. rsTConn.nlm command flags and parameters for Novell 4.x host systems

Flag	Parameter	Description
/v	None	/v is the verbose flag. When you use the /v flag, the command will display all responses from the server. This flag is optional.
/s	servername	The servername parameter specifies the IP address or the complete host name of the ESS Copy Services server for which you want to test the connection.

Output samples

The following is an example of the output you see when you invoke the **rsTConn.nlm** command on a Novell 4.x host system:

```
rsTConn /v /s primaryservername
Loading module RSTCONN.NLM
  NLM Stationery
  Version 1.02    31 July 2001
  (C) Copyright IBM Corp. 1998, 1999 All Rights Reserved
  Debug symbol information for RSTCONN.NLM loaded
>
NW_42:
NW_42:105CLI\rsCopyServices.jar;  rsCopyServices.rsWebTest -Verbose -Server=yourhostname

rsWebTest:Using yourhostname as server name
rsWebTest:rsVSServer reference obtained successfully
rsWebTest:rsVSServer reference narrowed successfully
rsWebTest:HeartBeat to the server was successful.
rsWebTest:command successful
```

Chapter 5. Copy Services CLI for Novell 5.x host systems

This chapter contains step-by-step procedure for you to install and use the Copy Services CLI on a Novell 5.x host system. It also describes the commands and parameters of the Copy Services CLI. Specifically, it helps you perform the following tasks:

- Installing the Copy Services CLI
- Verifying server connections and ESS volume allocations
- Managing the CLI userid and password
- Using CLI commands

Installing the Copy Services CLI

This section describes the procedures for planning and performing the installation of the Copy Services CLI on a Novell 5.x host system.

Planning the installation

Perform the following steps before you install the Copy Services CLI for a Novell 5.x host system:

1. Check the IBM Enterprise Storage Server List of Supported Servers Web site for updates to the CLI support for your host system environments:
   - From your Web browser, type and enter the following Web address:
     www.storage.ibm.com/hardsoft/products/ess/supserver.htm
   - Click to open the PDF version of the ESS Support Servers document.
   - From the Table of Contents, click **ESS and Software Applications**.
   - Review the Copy Services Interface section for support updates.
2. Install Novell client on your system.
3. Install Support Pack 2A for your Novell 5.x host system.
4. Install JDK 1.1.7B on your host system.

Performing the installation

The installation process installs the Copy Services CLI in the default sys:\ibm2105cli directory. Perform the following steps to install the Copy Services CLI on a Novell 5.x host system:

1. Log onto your Novell client as the root user.
2. Insert the IBM Enterprise Storage Server compact disc (CD) into the CD-ROM drive.

   A window might pop up for the CD-ROM drive. Close the window and proceed to the next step.
3. Click **Start** —> **Run**.
4. In the Run window, click **Browse**.
5. From the **Look in** list in the Browse window, select the drive letter for the CD-ROM drive.
6. Select **Novell5xCli\IBMcli\Setup.exe**.
7. Click **Open**.
8. Click **OK**.
9. Follow the instructions of the installation wizard to install the Copy Services CLI (ibm2105 cli code).

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10. Restart your host system to complete the installation process.

Do not remove any files from the directory where you have installed the Copy Services CLI. The executable files, with a file extension of .nlm, will not run correctly if the directory structure is changed.

Verifying the installation

Perform the following steps to verify that the Copy Services CLI is installed on your Novell 5.x host system:

1. Type `load edit` at the command prompt and press Enter to display the edit screen.
2. Press the Insert button and then select the `etc` directory.
3. Select and open the `java.cfg` file.
4. Make sure that the `java.cfg` file contains the following lines:

```
IBMCLICLASSPATH=$CLASSPATH
INSTALL=SYS:\IBM2105CLI
```

If you do not see the above lines in the `java.cfg` file or if you cannot locate the `java.cfg` file, it means that the Copy Services CLI is currently not installed on your Novell 5.x host system. In this case, follow the instructions in "Installing the Copy Services CLI" on page 63 to install the Copy Services CLI.

Verifying server connections and ESS volume allocations

This section describes the following verification tasks that you need to complete before you use the Copy Services CLI:

- Testing the server connection
- Checking the communication link
- Verifying the allocation of ESS volumes.

Testing the server connection

Before using the Copy Services CLI, you need to ensure that the connection between the ESS Copy Services server and your host system is correctly established.

Issue the **rsTestConnection.nlm** command to verify the connection between the ESS Copy Services server and your host system. See "rsTestConnection.nlm" on page 77 for more information about using the **rsTestConnection.nlm** command.

If the **rsTestConnection.nlm** command can establish a connection between the ESS Copy Services server and your host system, proceed to check the communication link between the ESS Copy Services server and your host system.

If the **rsTestConnection.nlm** command cannot establish a connection between the ESS Copy Services server and your host system, see "Chapter 10. Troubleshooting" on page 133 for detailed instructions to diagnose and correct the problems.

Checking the communication link

Before using the Copy Services CLI, you need to verify that the communication link between the ESS Copy Services server and your host system is established. Communication links are initially configured when the ESS is installed. Use the ESS Specialist to display and modify the ESS communications configuration. See *IBM*

TotalStorage Enterprise Storage Server Web Interface User's Guide for information about using the ESS Specialist to modify the communications configuration.

If the communication link between the ESS Copy Services server and your host system is working, proceed to "Verifying the allocation of ESS volumes".

If the communication link between the ESS Copy Services server and your host system is not established, see "Chapter 10. Troubleshooting" on page 133 for detailed instructions to diagnose and correct the problems.

Verifying the allocation of ESS volumes

Before using the Copy Services CLI, you need to verify that ESS volumes are allocated for your host system. Issue the **rsList2105s.nlm** command to generate a list of ESS volumes that are currently allocated for your host system. See "rsList2105s.nlm" on page 69 for more information about the **rsList2105s.nlm** command.

You can use the Copy Services CLI if the **rsList2105s.nlm** command determines that there are ESS volumes allocated for your host system.

If the **rsList2105s.nlm** command determines that there are no ESS volumes allocated for your host system or that ESS volumes are incorrectly allocated for your host system, see "Chapter 10. Troubleshooting" on page 133 for detailed instructions to diagnose and correct the problems.

Managing the CLI userid and password

You can use the ESS Copy Services Administration panel to manage the userid and password for a Novell 5.x host system that uses the Copy Services CLI. When you define the userid and password, all hosts that issue CLI commands must provide this userid and password as part of the command string.

See "Flags and parameters for password-protection-enabled host systems" on page 66 for detailed instructions about issuing the CLI commands for the open-systems hosts with password protection.

See the *IBM TotalStorage Enterprise Storage Server Web Interface User's Guide* for detailed instructions on how to define and remove the CLI userid and password.

Using CLI commands

This section describes the CLI commands that you can use from a Novell 5.x host system. It presents the full syntax and describes the flags and parameters of each command.

Overview of CLI commands

Table 29 on page 66 provides an alphabetical list of CLI commands and a brief description of each command.

Table 29. Summary of CLI commands for Novell 5.x host systems

Command	Description	Page
rsExecuteTask.nlm	Executes one or more ESS Copy services tasks (as defined and saved using the ESS Copy Services interface) and waits for the given tasks to complete execution.	67
rsList2105s.nlm	Displays the mapping of a host disk name to a 2105 volume serial number.	69
rsPrimeServer.nlm	Notifies the ESS Copy Services server about the hostname (from which this command has been executed) so that the hostname is displayed in the source and target list on the ESS Copy Services Volumes. This command is useful when you use the ESS Copy Services Volumes panel to perform FlashCopy, PPRC, or both functions because it shows the host names for all the volumes that are connected to the selected host in one view.	69
rsQuery.nlm	Queries the status of one or more volumes.	72
rsQueryComplete.nlm	Accepts the ESS Copy Services server tasks (as defined and saved from the ESS Copy Services interface) and determines whether all volumes that are defined in the given tasks have completed initial PPRC synchronization.	74
rsTestConnection.nlm	Determines whether you can successfully connect to the ESS Copy Services server.	77

Flags and parameters for password-protection-enabled host systems

If the password-protection option is enabled, you must specify *one* of the following flags and parameters when you use any of the CLI commands from your Novell 5.x host system:

- Both the /u flag, followed by the username parameter, and the /p flag, followed by the password parameter
- The /a flag with the securityfilepath parameter

  You can use this option for additional security. The file specified in the securityfilepath parameter contains the username and password.

Flags and parameters for primary and backup servers

When using CLI commands other than **rsList2105s.nlm** and **rsTestConnection.nlm**, you must specify *either* the /s flag with the primaryserver parameter *or* the /b flag with the backupserver parameter. You can also specify *both* flags if necessary.

Use the following guidelines for specifying the /s and /b flags:

- Specify only the /s flag with the primaryserver parameter to check the connection to the primary server. If the command can establish a connection, it is sent to the primary server for processing. The command fails if it cannot establish a connection.
- Specify only the /b flag with the backupserver parameter to check the connection to the backup server. If the command can establish a connection, it is sent to the backup server for processing. If the command cannot establish a connection, it fails.

- Specify both the /s flag with the primaryserver parameter and the /b flag with the backupserver parameter to check the connection to the primary server and then, if the primary server is down, to the backup server.

  If the command can establish a connection to the primary server, it is sent to the primary server for processing. If the command cannot establish a connection to the primary server, the connection to the backup server is checked. If the command can establish a connection to the backup server, it is sent to the backup server for processing. If the command cannot establish a connection to the backup server, it fails.

Return codes and messages

See “Chapter 9. Return codes and messages” on page 127 for a complete list and descriptions of CLI return codes and messages.

rsExecuteTask.nlm

The **rsExecuteTask.nlm** command executes one or more ESS Copy services tasks as defined and saved using the ESS Copy Services Interface and waits for the given tasks to complete execution.

Successful completion of the tasks means that the volumes are in the relationship (PPRC or FlashCopy) specified in the given tasks. It does not mean that the volumes have completed the specified relationship.

For established PPRC tasks, use the **rsQueryComplete.nlm** command to determine if PPRC pairs have completed copying. For established FlashCopy tasks, use the **rsQuery.nlm** command to determine if FlashCopy with background copy pairs have completed copying.

Syntax

The syntax for the **rsExecuteTask.nlm** command is:

```
rsExecuteTask.nlm [/v] {/u username /p password | /a securityfilepath} /s
primaryserver [/b backupserver] tasknames
```

See “Flags and parameters for password-protection-enabled host systems” on page 66 for detailed information about how to use CLI commands if the host password-protection option is enabled.

Flags and parameters

Table 30 lists and describes the flags and parameters for the **rsExecuteTask.nlm** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Note: All flags and parameters are case-sensitive.

Table 30. rsExecuteTask.nlm command flags and parameters for Novell 5.x host systems

Flag	Parameter	Description
/v	None	/v is the verbose flag. When you use the /v flag, the command will display all responses from the server. This flag is optional.
/u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /a flag and the securityfilepath parameter are not used.

Table 30. rsExecuteTask.nlm command flags and parameters for Novell 5.x host systems (continued)

Flag	Parameter	Description
/p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /a flag and the securityfilepath parameter are not used.
/a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for the use of host CLI commands. This parameter is required if the ESS Copy Services server administrator has enabled password-protection for host CLI commands, and if the /u username and /p password flags and parameters are not used. The format of this file is as follows: `username password`
/s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
/b	backupserver	The /b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.
None	tasknames	The tasknames parameter specifies the name of one or more previously saved ESS Copy Services established PPRC tasks, for which you want to query the initial copy completion of the volumes in those tasks. To specify more than one task, separate the task names with a space.

Output samples

The following is a sample output when you invoke the **rsExecuteTask.nlm** command on a Novell 5.x host system:

```
rsExecuteTask /v /u yourusername /p yourpassword /s primaryservername es_pair_12
Loading module RSEXECUTETASK.NLM
SERVER-5.00-1956:   Module name is RSEXECUT.NLM not RSEXECUTETASK.NLM
  NLM Stationery
  Version 1.02     1 August 2001
  (C) Copyright IBM Corp. 1998, 1999 All Rights Reserved
>
NW_51:
NW_51:  rsCopyServices.rsExecuteTask -v -u yourusername -p yourpassword
-s primaryservername es_pair_12

rsExecuteTask:Got task manager reference
rsExecuteTask:*************Finding the tasks****************
rsExecuteTask:Task es_pair_12 found by task manager
rsExecuteTask:*************Scheduling the tasks****************
rsExecuteTask:Task es_pair_12 scheduled with copy services server
rsExecuteTask:*************Monitoring the tasks****************
rsExecuteTask:Waiting on server...
rsExecuteTask:Task es_pair_12 completed successfully
rsExecuteTask:Command successful
```

rsList2105s.nlm

The **rsList2105s.nlm** command displays the mapping of a host disk name to a 2105 volume serial number.

Syntax

The syntax for the **rsList2105s.nlm** command is simply:

```
rsList2105s.nlm
```

Flags and parameters

There are no flags and parameters for the **rsList2105s.nlm** command.

Output samples

You will see an output similar to the following when you invoke the **rsList2105s.nlm** command:

```
rsList2105s
Loading module RSLIST2105S.NLM
SERVER-5.00-1956:   Module name is RSLIST21.NLM not RSLIST2105S.NLM
  NLM Stationery
  Version 1.02     1 August 2001
  (C) Copyright IBM Corp. 1998, 1999 All Rights Reserved
>


disk name     2105 serial number
------------  ------------------
V596-A2-D0:0     30714146
V596-A2-D0:1     30A14146
V596-A2-D0:3     31114146
V596-A2-D0:4     31214146
```

rsPrimeServer.nlm

The **rsPrimeServer.nlm** command notifies the ESS Copy Services server about the hostname (from which this command has been executed) to display the hostname in the source and target list on the ESS Copy Services Volumes panel.

This command is useful when you use the ESS Copy Services Volumes panel to perform FlashCopy, PPRC, or both functions as it shows the host names for all the volumes that are connected to the selected host in one view.

If you have the IBM Subsystem Device Driver (SDD) installed on your host system and you change the configuration for the host (such as adding or removing volumes), you must perform the following steps:

- Restart your host system so that SDD can recognize, add, or remove the paths.
- Run the **rsPrimeServer.nlm** command to generate the current mapping for the host volumes.

If you do not have SDD installed on your host system and you change the configuration for the host (such as adding or removing volumes), you must run the **rsPrimeServer.nlm** command to generate the current mapping for the host volumes.

Syntax

The syntax for the **rsPrimeServer.nlm** command is:

```
rsPrimeServer.nlm [/v] {/u username /p password | /a securityfilepath} /d
hostname /s primaryserver [/b backupserver]
```

Flags and parameters

Table 31 lists and describes the flags and parameters for the **rsPrimeServer.nlm** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Table 31. rsPrimeServer.nlm command flags and parameters for Novell 5.x host systems

Flag	Parameter	Description
/v	None	/v is the verbose flag. When you use the /v flag, the command will display all responses from the server. This flag is optional.
/u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /a flag and the securityfilepath parameter are not used.
/p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /a flag and the securityfilepath parameter are not used.
/a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for the use of host CLI commands. This parameter is required if the administrator ESS Copy Services server has enabled password protection for host CLI commands, and if the /u username and /p password flags and parameters are not used. The format of this file is as follows: `username password`

Table 31. rsPrimeServer.nlm command flags and parameters for Novell 5.x host systems (continued)

Flag	Parameter	Description
/d	hostname	The /d flag and hostname parameter are required when you are removing the hostname. The hostname parameter specifies the IP address or hostname to be removed. The hostname needs to match exactly one of the entries that is displayed in the list on the Volumes panels of the ESS Copy Services.
/s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
/b	backupserver	The /b flag takes the backupserver parameter. The /b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.

Output samples

The following is an example of the output you see when you invoke the **rsPrimeServer.nlm** command to add a host name on a Novell 5.x host system:

```
rsPrimeServer /v /u yourusername /p yourpassword /s primaryservername
Loading module RSPRIMESERVER.NLM
SERVER-5.00-1956:   Module name is RSPRIMES.NLM not RSPRIMESERVER.NLM
  NLM Stationery
  Version 1.02     1 August 2001
  (C) Copyright IBM Corp. 1998, 1999 All Rights Reserved
>

NW_51:
NW_51:es.rsPrimeServer -v -u yourusername -p yourpassword -s primaryservername
-l "NW_51/SYS:\COMMAND"

rsPrimeServer:Local host is abc.def.ghi.com
rsPrimeServer:Got task manager reference
rsPrimeServer:Host abc.def.ghi.com registered
rsPrimeServer:Configuration change requested made to primaryserver
rsPrimeServer:Command successful
```

The following is an example of the output you see when you invoke the **rsPrimeServer.nlm** command to delete a host name on a Novell 5.x host system:

```
rsPrimeServer /v /u yourusername /p yourpassword /d abc.def.ghi.com /s primaryservername
Loading module RSPRIMESERVER.NLM
SERVER-5.00-1956:   Module name is RSPRIMES.NLM not RSPRIMESERVER.NLM
  NLM Stationery
  Version 1.02     1 August 2001
  (C) Copyright IBM Corp. 1998, 1999 All Rights Reserved
>

NW_51:
NW_51:es.rsPrimeServer -v -u yourusername -p yourpassword -s primaryservername -d abc.def.ghi.com

rsPrimeServer:host to unregister is abc.def.ghi.com
rsPrimeServer:Got task manager reference
rsPrimeServer:Host abc.def.ghi.com unregistered
rsPrimeServer:Configuration change requested made to primaryserver
rsPrimeServer:Command successful
```

rsQuery.nlm

The **rsQuery.nlm** command queries the status of one or more volumes.

You can invoke the **rsQuery.nlm** command for the vpath name, the host volume name, or the volume serial number under various conditions.

Syntax

The syntax for the **rsQuery.nlm** command is:

```
rsQuery.nlm [/v] /m {/u username /p password | /a securityfilepath} {/q
volumename | /f filename} /s primaryserver [/b backupserver]
```

Flags and parameters

Table 32 lists and describes the flags and parameters for the **rsQuery.nlm** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Table 32. rsQuery.nlm command flags and parameters for Novell 5.x host systems

Flag	Parameter	Description
/v	None	/v is the verbose flag. When you use the /v flag, the command will display all responses from the server. This flag is optional.
/m	None	/m is the map flag. The /m flag maps host volume names to a 2105 volume serial numbers. This flag permits host volumes names to be used as a volume flag. If you use the **rsQuery.nlm** command for the vpath name or host volume name, you must use the /m flag. If you use the **rsQuery.nlm** command for a serial number, you do not need to use the /m flag.
/u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /a flag and the securityfilepath parameter are not used.

Table 32. rsQuery.nlm command flags and parameters for Novell 5.x host systems (continued)

Flag	Parameter	Description
/p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /a flag and the securityfilepath parameter are not used.
/a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for the use of host CLI commands. This parameter is required if the ESS Copy Services server administrator has enabled password protection for host CLI commands and if the {/u username and /p password}flags and parameters are not used. The format of this file is as follows: `username password`
/q	volumename	The volume parameter specifies the vpathname, host volume name, or volume serial number. Use the **rsQuery.nlm** command for the vpath name, host volume name, or volume serial number under the following conditions: • If SDD is installed, use the **rsQuery.nlm** command only for the `vpath` name or volume serial number. • If SDD is not installed, use the **rsQuery.nlm** command only on a host volume name or volume serial number. • If you use the **rsQuery.nlm** command for the vpath name or host volume name, you must use the /m flag. • If you use the **rsQuery.nlm** command for a serial number, you do not need to use the `/m` flag. You need to use the /q flag with the volume parameter if the /f flag and the filename parameter are not used.

/f	filename	The filename parameter specifies the name of a file containing vpath names, host volume names or volume serial numbers, all of which are to be queried.
		
		You need to use the /f flag with the filename parameter if the /q flag and the volume parameter are not used.
		
		The format of this file may be either:
		`sourceVolume1 targetVolume1`
		`sourceVolume2 targetVolume2`
		`...`
		sourceVolume`N` targetVolume`N`
		or
		`volume1`
		`volume2`
		`volume3`
		`...`
		`volumeN`

Table 32. rsQuery.nlm command flags and parameters for Novell 5.x host systems (continued)

Flag	Parameter	Description
/s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
/b	backupserver	The /b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.

Output samples

The following is an example of the output you see when you invoke the **rsQuery.nlm** command to query a serial number on a Novell 5.x host system:

```
rsQuery /v /u yourusername /p yourpassword /q 30714146 /s primaryservername
Loading module RSQUERY.NLM
  NLM Stationery
  Version 1.02     1 August 2001
  (C) Copyright IBM Corp. 1998, 1999 All Rights Reserved
>
NW_51:
NW_51:es.jar;  rsCopyServices.rsQuery -v -u yourusername -p yourpassword
-s primaryservername 30714146

************************Volume Information************************
Volume 30714146 found on FC102:12 as volume number 012
PPRC State=simplex,status=none,FlashCopy_state=none,Size=0.5_GB
******************************************************************
rsQuery:Command successful
```

rsQueryComplete.nlm

The **rsQueryComplete.nlm** command accepts ESS Copy Services server tasks as defined and saved from the ESS Copy Services interface and determines whether all volumes defined in the given tasks have completed the initial PPRC synchronization.

When the **rsQueryComplete.nlm** command is executed on grouped tasks, the output will display the first subtask until it has reached the completion threshold, and then it will display the next subtask until it has reached the completion threshold. It will repeat this process until all the subtasks are queried.

You can invoke the **rsQueryComplete.nlm** command only on tasks that create PPRC pairs. You cannot invoke the **rsQueryComplete.nlm** command on tasks that create FlashCopy pairs.

Syntax

The syntax for the **rsQueryComplete.nlm** command is:

```
rsQueryComplete.nlm [/v] {/u username /p password| /a securityfilepath} [/m
minutes] [/t threshold] /s primaryserver [/b backupserver] tasknames
```

Flags and parameters

Table 33 lists and describes the flags and parameters for the **rsQueryComplete.nlm** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Table 33. rsQueryComplete.nlm command flags and parameters for Novell 5.x host systems

Flag	Parameter	Description
/v	None	/v is the verbose flag. When you use the /v flag, the command will display all responses from the server. This flag is optional.
/u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services has enabled password protection for host CLI commands, and if the /a flag and the securityfilepath parameter are not used.
/p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the ESS Copy Services administrator has enabled password-protection for host CLI commands, and if the /a flag and the securityfilepath parameter are not used.
/a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for the use of host CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /u username and /p password flags and parameters are not used. The format of this file is as follows: `username password`
/m	minutes	The /m flag and the minutes parameter are optional. The minutes parameter specifies the number of minute intervals between queries for verifying when the PPRC initialization has completed. The default is 1 minute.
/t	threshold	The /t flag and the threshold parameter are optional. The threshold parameter specifies the threshold percentage that defines completion. The default is 100%.
/s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
/b	backupserver	The /b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.
None	tasknames	The tasknames parameter specifies the name of one or more previously saved ESS Copy Services established PPRC tasks, for which you want to query the initial copy completion of the volumes in those tasks. To specify more than one task, separate the task names with a space.

Output samples

The following is an example of the output you see when you invoke the **rsQueryComplete.nlm** command with default settings for the minutes (/m) and threshold (/t) parameters on a Novell 5.x host system:

```
rsQueryComplete /v /u yourusername /p yourpassword /s primaryservername es_pair_12
Loading module RSQUERYCOMPLETE.NLM
SERVER-5.00-1956:   Module name is RSQUERYC.NLM not RSQUERYCOMPLETE.NLM
  NLM Stationery
  Version 1.02     1 August 2001
  (C) Copyright IBM Corp. 1998, 1999 All Rights Reserved
>
NW_51:
NW_51:ces.rsQueryComplete -v -u yourusername -p yourpassword -m 2 -t 60
-s primaryservername es_pair_12

rsQueryComplete:Got task manager reference
rsQueryComplete:---------Task Name:es_pair_12 ---------
rsQueryComplete:Task es_pair_12 found by TaskManager
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =1
rsQueryComplete:waiting 60 seconds...
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =17
rsQueryComplete:waiting 60 seconds...
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =35
rsQueryComplete:waiting 60 seconds...
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =63
rsQueryComplete:waiting 60 seconds...
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =82
rsQueryComplete:waiting 60 seconds...
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =100
rsQueryComplete:-----------------------------------------------
rsQueryComplete:Command successful
```

The following is an example of the output when you invoke the **rsQueryComplete.nlm** command and specify the minutes (/m) parameter with a value of 2 and the threshold (/t) parameter with a value of 80% on a Novell 5.x host system:

```
rsQueryComplete /v /u yourusername /p yourpassword /m 2 /t 80 /s primaryservername es_pair_12
Loading module RSQUERYCOMPLETE.NLM
SERVER-5.00-1956:   Module name is RSQUERYC.NLM not RSQUERYCOMPLETE.NLM
  NLM Stationery
  Version 1.02     1 August 2001
  (C) Copyright IBM Corp. 1998, 1999 All Rights Reserved
>
NW_51:
NW_51:ces.rsQueryComplete -v -u yourusername -p yourpassword -m 2 -t 80
-s primaryservername es_pair_12

rsQueryComplete:Got task manager reference
rsQueryComplete:---------Task Name:es_pair_12 ---------
rsQueryComplete:Task es_pair_12 found by TaskManager
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =1
rsQueryComplete:waiting 120 seconds...
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =35
rsQueryComplete:waiting 120 seconds...
rsQueryComplete:Sampling volumes...
rsQueryComplete:Percentage complete =82
rsQueryComplete:-------------------------------------------
rsQueryComplete:Command successful
```

rsTestConnection.nlm

The **rsTestConnection.nlm** command determines whether you can successfully connect to the ESS Copy Services server.

Syntax

The syntax for the **rsTestConnection.nlm** command is:

```
rsTestConnection.nlm [/v] /s servername
```

Flags and parameters

Table 34 lists and describes the flags and parameters for the **rsTestConnection.nlm** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Table 34. rsTestConnection.nlm command flags and parameters for Novell 5.x host systems

Flag	Parameter	Description
/v	None	/v is the verbose flag. When you use the /v flag, the command will display all responses from the server. This flag is optional.
/s	servername	The servername parameter specifies the IP address or the complete host name of the ESS Copy Services server for which you want to test the connection

Output samples

The following is an example of the output you see when you invoke the **rsTestConnection.nlm** command on a Novell 5.x host system:

```
rsTestConnection /v /s primaryservername
Loading module RSTESTCONNECTION.NLM
SERVER-5.00-1956:   Module name is RSTESTCO.NLM not RSTESTCONNECTION.NLM
  NLM Stationery
  Version 1.02     1 August 2001
  (C) Copyright IBM Corp. 1998, 1999 All Rights Reserved
>
NW_51:
NW_51:105CLI\rsCopyServices.jar;  rsCopyServices.rsWebTest -Verbose -Server=yourhostname

rsWebTest:Using yourhostname as server name
rsWebTest:rsVSServer reference obtained successfully
rsWebTest:rsVSServer reference narrowed successfully
rsWebTest:HeartBeat to the server was successful.
rsWebTest:command successful
```

Chapter 6. Copy Services CLI for NUMA-Q host systems

This chapter contains step-by-step procedures for you to install and use the Copy Services CLI on a NUMA-Q host system. It also describes the commands and parameters of the Copy Services CLI. Specifically, it helps you perform the following tasks:

- Installing the Copy Services CLI
- Verifying server connections and ESS volume allocations
- Managing the CLI userid and password
- Using CLI commands

Installing the Copy Services CLI

This section describes the procedures for planning and performing the installation of the Copy Services CLI on a NUMA-Q host system.

Planning the installation

Perform the following steps before you install the Copy Services CLI for a NUMA-Q host system.

1. Check the IBM Enterprise Storage Server List of Supported Servers Web site for updates to the CLI support for your host system environments:
   - From your Web browser, type and enter the following Web address:
     www.storage.ibm.com/hardsoft/products/ess/supserver.htm
   - Click to open the PDF version of the ESS Support Servers document.
   - From the Table of Contents, click **ESS and Software Applications**.
   - Review the Copy Services Interface section for support updates.
2. Install the correct version of `ptx/JSE` on your NUMA-Q host system.

   You must install `ptx/JSE` on your system to use the Copy Services CLI. Table 35 lists the `ptx/JSE` versions required for NUMA-Q host systems. It also refers you to a specific source to obtain the `ptx/JSE` version for your NUMA-Q host system.

Table 35. ptx/JSE versions required for NUMA-Q host systems

NUMA-Q Release Level	Required ptx/JSE version	Name of the source CD
NUMAQ-PTX V4.4.7	ptx/JSE 1.1.2	″DYNIX/ptx V4.4.7 Operating System and Layered Products Software, US, 08/00, Revision B″ (or later revisions)
NUMAQ-PTX V4.4.8	ptx/JSE 1.1.2	″DYNIX/ptx V4.4.8 Operating System and Layered Products Software, US, 08/00, Revision B″ (or later revisions)
NUMAQ-PTX V4.4.9	ptx/JSE 1.1.2	″DYNIX/ptx V4.4.9 Operating System and Layered Products Software, US, 06/01, Revision A″ (or later revisions)

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Table 35. ptx/JSE versions required for NUMA-Q host systems (continued)

NUMA-Q Release Level	Required ptx/JSE version	Name of the source CD
NUMAQ-PTX V4.5.x	ptx/JSE 1.18.0	″DYNIX/ptx V4.5.2 Operating System and Layered Products Software, Vol. 1, 05/01, Revision C″ (or later revisions) **Note:** If you do not have this CD, you can call the NUMAQ-PTX customer service to request one. Provide the serial number of your NUMAQ-PTX operating system and ask for the upgrade package of NUMAQ-PTX V4.5.2.
NUMAQ-PTX V4.6.1	ptx/JSE V1.18.0	″DYNIX/ptx V4.6.1 Operating System and Layered Products Software, Vol. 1, 03/01, Revision A″ (or later revisions)

If you already have `ptx/JSE` installed on your host system, ensure that you have the required version by typing the following command at the command prompt:

```
java -version
```

If you have `ptx/JSE` 1.1.2 on your host system, you will see a message similar to the following:

```
Java version "1.1.6"
```

If you have `ptx/JSE 1.18.0` on your host system, you will see a message similar to the following:

```
Java version "1.1.8"
```

Performing the installation

The installation process installs the Copy Services CLI in the default /opt/ibm2105cli directory. You can accept the default directory or choose a different directory as the installation destination.

Perform the following steps to install the Copy Services CLI on a NUMA-Q host system

1. Log onto your host system as the root user.
2. Insert the IBM Enterprise Storage Server compact disc (CD) into the CD-ROM drive.

   A window might pop up for the CD-ROM drive. Close the window and proceed to the next step.
3. At the command prompt, type the following command to mount partition# 0 in read-only mode:

   ```
   /etc/mount -r -f cdfs /dev/dsk/cd0 /mnt
   ```

   If `cd0` does not exist, type the following command to find the `cd` device name:

   ```
   /etc/dumpconf |grep cd
   ```

   Substitute `cd0` with the device name you just found, and type the following command again:

   ```
   /etc/mount -r -f cdfs /dev/dsk/your_device_name /mnt
   ```

where *your_device_name* is the name of the device you just found.

4. Type `menu` at the command prompt.
5. Select **A System Administration**.
6. Select **G Software Management**.
7. Select **A Install Software Package**.
8. For the Installation source, type `directory`
9. For the patch source directory, type `/mnt/numa-q/IBMcli`
10. Install on the current root /usr/var partitions.
11. Answer **Yes** or **No** to the prompts.
12. Press Ctrl+X to exit the menu.
13. Remove the CD from the CD-ROM drive.
14. If you have installed the Copy Services CLI in a directory of your own choice, edit each shell script and change the following line:

    `export INSTALL=/opt/ibm2105cli`

    to read like this:

    `export INSTALL=/`*`your_installation_directory`*

    where */your_installation_directory* is the name of the directory in which you have installed the Copy Services CLI.
15. If you installed ptx/JSE 1.1.2 for NUMAQ-PTX 4.4.x in a directory other than the /opt/jse1.1 directory, change the following shell script line:

    `export JAVA_HOME=/opt/jse1.1`

    to read like this:

    `export JAVA_HOME=/`*`your_java_directory`*

    where */your_java_directory* is the name of the directory where you have installed ptx/JSE 1.1.2.

    If you installed ptx/JSE 1.18.0 for NUMAQ-PTX 4.5.x or 4.6.x in a directory other than the /opt/jse1.18 directory, change the following shell script line:

    `export JAVA_HOME=/opt/jse1.18`

    to read like this:

    `export JAVA_HOME=/`*`your_java_directory`*

    where */your_java_directory* is the name of the directory where you have installed `ptx/JSE 1.18.0`.

Do not remove any files from the directory where you have installed the Copy Services CLI. The shell scripts, with a file extension of .sh, will not run correctly if the directory structure is changed.

Verifying the installation

Type the following command to verify that the Copy Services CLI is installed on your NUMA-Q host system:

```
grep ibm2105Cli /etc/versionlog
```

You will see a message similar to the following if you have successfully installed the Copy Services CLI on your NUMA-Q host system:

```
Mon Mar 19 16:25:14 PST 2001 - ibm2105Cli V1.2.0 PN: 1000-00001-00
```

If nothing is returned from the command, it means that the Copy Services CLI is *not* currently installed on your NUMA-Q host system. In this case, follow the instructions provided in “Installing the Copy Services CLI” on page 79 to install the Copy Services CLI.

Verifying server connections and ESS volume allocations

This section describes the following verification tasks that you need to complete before you use the Copy Services CLI:

- Testing the server connection
- Checking the communication link
- Verifying the allocation of ESS volumes

Testing the server connection

Before using the Copy Services CLI, you need to ensure that the connection between the ESS Copy Services server and your host system is correctly established.

Issue the **rsTestConnection.sh** command to verify the connection between the ESS Copy Services server and your host system. See “rsTestConnection.sh” on page 93 for more information about using the **rsTestConnection.sh** command.

If the **rsTestConnection.sh** command can establish a connection between the ESS Copy Services server and your host system, proceed to “Checking the communication link”.

If the **rsTestConnection.sh** command cannot establish a connection between the ESS Copy Services server and your host system, see “Chapter 10. Troubleshooting” on page 133 for detailed instructions to diagnose and correct the problems.

Checking the communication link

Before using the Copy Services CLI, you need to verify that the communication link between the ESS Copy Services server and your host system is established. Communication links are initially configured when the ESS is installed. Use the ESS Specialist to display and modify the ESS communications configuration. See *IBM TotalStorage Enterprise Storage Server Web Interface User's Guide* for information about using the ESS Specialist to modify the communications configuration.

If the communication link between the ESS Copy Services server and your host system is working, proceed to “Verifying the allocation of ESS volumes”.

If the communication link between the ESS Copy Services server and your host system is not established, see “Chapter 10. Troubleshooting” on page 133 for detailed instructions to diagnose and correct the problems.

Verifying the allocation of ESS volumes

Before using the Copy Services CLI, you need to verify that ESS volumes are allocated for your host system. Issue the **rsList2105s.sh** command to generate a list of ESS volumes that are currently allocated for your host system. See “rsList2105s.sh” on page 86 for more information about the **rsList2105s.sh** command.

You can use the Copy Services CLI if the **rsList2105s.sh** command determines that there are ESS volumes allocated for your host system.

If the **rsList2105s.sh** command determines that there are no ESS volumes allocated for your host system or that ESS volumes are incorrectly allocated for your host system, see “Chapter 10. Troubleshooting” on page 133 for detailed instructions to diagnose and correct the problems.

Managing the CLI userid and password

You can use the ESS Copy Services Administration panel to manage the userid and password for a NUMA-Q host system that uses the Copy Services CLI. When you define the userid and password, all hosts that issue CLI commands must provide this userid and password as part of the command string.

See “Flags and parameters for password-protection-enabled host systems” on page 84 for detailed instructions about issuing the CLI commands for open-systems hosts with password protection.

See the *IBM TotalStorage Enterprise Storage Server Web Interface User's Guide* for detailed instructions on how to define and remove the CLI userid and password.

Using CLI commands

This section describes the CLI commands that you can use from a NUMA-Q host system. It presents the full syntax and describes the flags and parameters of each command.

Overview of CLI commands

Table 36 provides an alphabetical list of CLI commands and a brief description of each command.

Table 36. Summary of CLI commands for NUMA-Q host systems

Command	Description	Page
rsExecuteTask.sh	Executes one or more ESS Copy services tasks (as defined and saved using the ESS Copy Services interface) and waits for the given tasks to complete execution.	84
rsList2105s.sh	Displays the mapping of a host disk name to a 2105 volume serial number.	86
rsPrimeServer.sh	Notifies the ESS Copy Services server about the hostname (from which this command has been executed) so that the hostname is displayed in the source and target list on the ESS Copy Services Volumes panel. This command is useful when you use the ESS Copy Services Volumes panel to perform FlashCopy, PPRC, or both functions because it shows the host names for all the volumes that are connected to the selected host in one view.	87
rsQuery.sh	Queries the status of one or more volumes.	89
rsQueryComplete.sh	Accepts the ESS Copy Services server tasks (as defined and saved from the ESS Copy Services interface) and determines whether all volumes that are defined in the given tasks have completed initial PPRC synchronization.	91

Table 36. Summary of CLI commands for NUMA-Q host systems (continued)

Command	Description	Page
rsTestConnection.sh	Determines whether you can successfully connect to the ESS Copy Services server.	93

Flags and parameters for password-protection-enabled host systems

If the password-protection option is enabled, you must specify *one* of the following flags and parameters when you use any of the CLI commands from your NUMA-Q host system:

- Both the -u flag, followed by the username parameter, and the -p flag, followed by the password parameter
- The -a flag with the securityfilepath parameter

  You can use this option for additional security. The file specified in the securityfilepath parameter contains the username and password.

Flags and parameters for primary and backup servers

When using CLI commands other than **rsList2105s.sh** and **rsTestConnection.sh**, you must specify *either* the -s flag with the primaryserver parameter *or* the -b flag with the backupserver parameter. You can also specify *both* flags if necessary.

Use the following guidelines for specifying the -s and -b flags:

- Specify only the -s flag with the primaryserver parameter to check the connection to the primary server. If the command can establish a connection, it is sent to the primary server for processing. The command fails if it cannot establish a connection.
- Specify only the -b flag with the backupserver parameter to check the connection to the backup server. If the command can establish a connection, it is sent to the backup server for processing. If the command cannot establish a connection, it fails.
- Specify both the -s flag with the primaryserver parameter and the -b lag with the backupserver parameter to check the connection to the primary server and then, if the primary server is down, to the backup server.

  If the command can establish a connection to the primary server, it is sent to the primary server for processing. If the command cannot establish a connection to the primary server, the connection to the backup server is checked. If the command can establish a connection to the backup server, it is sent to the backup server for processing. If the command cannot establish a connection to the backup server, it fails.

Return codes and messages

See “Chapter 9. Return codes and messages” on page 127 for a complete list and descriptions of CLI return codes and messages.

rsExecuteTask.sh

The **rsExecuteTask.sh** command executes one or more ESS Copy services tasks as defined and saved using the ESS Copy Services interface, and it waits for the given tasks to complete execution.

Successful completion of the tasks means that the volumes are in the relationship (PPRC or FlashCopy) specified in the given tasks. It does not mean that the volumes have completed the specified relationship.

For established PPRC tasks, use the **rsQueryComplete.sh** command to determine if PPRC pairs have completed copying. For established FlashCopy tasks, use **rsQuery.sh** command to determine if FlashCopy with background copy pairs have completed copying.

Syntax

The syntax for the **rsExecuteTask.sh** command is:

```
rsExecuteTask.sh [-v] {-u username -p password | -a securityfilepath} -s
primaryserver [-b backupserver] tasknames
```

See "Flags and parameters for password-protection-enabled host systems" on page 84 for detailed information about how to use CLI commands if the host password-protection option is enabled.

Flags and parameters

Table 37 lists and describes the flags and parameters for the **rsExecuteTask.sh** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Note: All flags and parameters are case-sensitive.

Table 37. rsExecuteTask.sh command flags and parameters for NUMA-Q host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command will display all responses from the server. This flag is optional.
-u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for the host system and if the -a flag and the securityfilepath parameter are not used.
-p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for the host system and if the -a flag and the securityfilepath parameter are not used.
-a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for using CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for the host system and if the -u username and -p password flags and parameters are not used. The format of this file is as follows: `username password`
-s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
-b	backupserver	The -b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.

Table 37. rsExecuteTask.sh command flags and parameters for NUMA-Q host systems (continued)

Flag	Parameter	Description
None	tasknames	The tasknames parameter specifies the name of one or more previously saved ESS Copy Services established PPRC tasks for which you want to query the initial copy completion. To specify more than one task, separate the task names with a space.

Output samples
The following is an example of the output you see when you invoke the **rsExecuteTask.sh** command on a NUMA-Q host system:

```
# ./rsExecuteTask.sh -v -u yourusername -p yourpassword -s primaryservername es_pair_12
rsExecuteTask: Got task manager reference
rsExecuteTask: *************Finding the tasks****************
rsExecuteTask: Task es_pair_12 found by task manager
rsExecuteTask: *************Scheduling the tasks****************
rsExecuteTask: Task es_pair_12 scheduled with copy services server
rsExecuteTask: *************Monitoring the tasks****************
rsExecuteTask: Waiting on server...
rsExecuteTask: Task es_pair_12 completed successfully
rsExecuteTask: Command successful
```

rsList2105s.sh
The **rsList2105s.sh** command displays the mapping of a host disk name to a 2105 volume serial number.

If you have the IBM Subsystem Device Driver (SDD) running on your host system and you change the configuration for the host (such as adding or removing volumes) you must restart the host so that SDD can recognize, add, or remove the paths.

Syntax
The syntax for the **rsList2105s.sh** command is simply:

```
rsList2105s.sh
```

Flags and parameters
There are no flags and parameters for the **rsList2105s.sh** command.

Output samples
The following is an example of the output you see when you invoke the **rsList2105s.sh** command on a NUMA-Q host system:

```
disk name       2105 serial number
---------       ------------------
sd321            00018749
sd322            30018749
sd323            F0018749
sd324            00118749
sd325            30118749
sd326            F0118749
sd327            00218749
sd328            30218749
sd329            F0218749
sd330            00318749
sd331            30318749
sd332            F0318749
sd333            00418749
```

rsPrimeServer.sh

The **rsPrimeServer.sh** command notifies the ESS Copy Services server to display the hostname (from which this command has been executed) to display the hostname in the source and target list on the ESS Copy Services Volumes panel.

This command is useful when you use the ESS Copy Services Volumes panel to perform FlashCopy, PPRC, or both functions because it shows the host names for all the volumes that are connected to the selected host in one view.

If you have SDD installed on your host system and you change the configuration for the host (such as adding or removing volumes), you must perform the following steps:

- Restart your host system so that SDD can recognize, add, or remove the paths.
- Run the **rsPrimeServer.sh** command to generate the current mapping for the host volumes.

If you do not have SDD installed on your host system and you change the configuration for the host (such as adding or removing volumes), you must run the **rsPrimeServer.sh** command to generate the current mapping for the host volumes.

Syntax

The syntax for the **rsPrimeServer.sh** command is:

```
rsPrimeServer.sh [-v] {-u username -p password | -a securityfilepath} -d
hostname -s primaryserver [-b backupserver]
```

Flags and parameters

Table 38 lists and describes the flags and parameters for the **rsPrimeServer.sh** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Table 38. rsPrimeServer.sh command flags and parameters for NUMA-Q host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command will display all responses from the server. This flag is optional.
-u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the -a flag and the securityfilepath parameter are not used.

Table 38. rsPrimeServer.sh command flags and parameters for NUMA-Q host systems (continued)

Flag	Parameter	Description
-p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the-a flag and the securityfilepath parameter are not used.
-a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for using CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the -u username and -p password flags and parameters are not used. The format of this file is as follows- `username password`
-d	hostname	The -d flag and hostname parameter are required when you are removing the hostname. The hostname parameter specifies the IP address or hostname to be removed. The hostname needs to match exactly one of the entries that is displayed in the list on the Volumes panels of the ESS Copy Services.
-s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
-b	backupserver	The -b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.

Output samples

The following is an example of the output you see when you invoke the **rsPrimeServer.sh** command to add a host name on a NUMA-Q host system:

```
# ./rsPrimeServer.sh -v -u yourusername -p yourpassword -s primaryservername
rsPrimeServer: Local host is abc.def.ghi.com
rsPrimeServer: Got task manager reference
rsPrimeServer: Host abc.def.ghi.com registered
rsPrimeServer: Configuration change requested made to primaryserver
rsPrimeServer: Command successful
```

The following is an example of the output you see when you invoke the **rsPrimeServer.sh** command to delete a host name on a NUMA-Q host system:

```
# ./rsPrimeServer.sh -v -u yourusername -p yourpassword -d abc.def.ghi.com -s
   primaryservername
rsPrimeServer: host to unregister is abc.def.ghi.com
rsPrimeServer: Got task manager reference
rsPrimeServer: Host abc.def.ghi.com unregistered
rsPrimeServer: Configuration change requested made to primaryserver
rsPrimeServer: Command successful
```

rsQuery.sh

The **rsQuery.sh** command queries the status of one or more volumes.

You can invoke the **rsQuery.sh** command for the vpath name, the host volume name, or the volume serial number under various conditions.

Syntax

The syntax for the **rsQuery.sh** command is:

```
rsQuery.sh [-v] -m {-u username -p password | -a securityfilepath} {-q
volumename | -f filename} -s primaryserver [-b backupserver]
```

Flags and parameters

Table 39 lists and describes the flags and parameters for the **rsQuery.sh** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Table 39. rsQuery.sh command flags and parameters for NUMA-Q host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command will display all responses from the server. This flag is optional.
-m	None	-m is the map flag. The -m flag maps host volume names to a 2105 volume serial numbers. This flag permits host volumes names to be used as a volume flag. If you use the **rsQuery.sh** command for the vpath name or host volume name, you must use the -m flag. If you use the **rsQuery.sh** command for a serial number, you do not need to use the -m flag.
-u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the -a flag and the securityfilepath parameter are not used.
-p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the -a flag and the securityfilepath parameter are not used.

Table 39. rsQuery.sh command flags and parameters for NUMA-Q host systems (continued)

Flag	Parameter	Description
-a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for the use of host CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands and if the {-u username and -p password} flags and parameters are not used. The format of this file is as follows: `username password`
-q	volumename	The volume parameter specifies the vpath name, host volume name, or volume serial number. Use the **rsQuery.sh** command for the vpath name, host volume name, or volume serial number under the following conditions: • If SDD is installed, use the **rsQuery.sh** command only for the vpath name or volume serial number. • If SDD is not installed, use the **rsQuery.sh** command only on a host volume name or volume serial number. • If you use the **rsQuery.sh** command for the vpath name or the host volume name, you must use the -m flag. • If you use the **rsQuery.sh** command for a serial number, you do not need to use the -m flag. You need to use the -q flag with the volume parameter if the -f flag and the filename parameter are not used.

-f	filename	The filename parameter specifies the name of a file containing vpath names, host volume names or volume serial numbers, all of which are to be queried.
		
		You need to use the -f flag with the filename parameter if the -q flag and the volume parameter are not used.
		
		The format of this file may be either:
		`sourceVolume1 targetVolume1`
		`sourceVolume2 targetVolume2`
		`...`
		sourceVolume`N` targetVolume`N`
		or
		`volume1`
		`volume2`
		`volume3`
		`...`
		`volumeN`

-s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.

Table 39. rsQuery.sh command flags and parameters for NUMA-Q host systems (continued)

Flag	Parameter	Description
-b	backupserver	The -b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.

Output samples

The following is an example of the output you see when you invoke the **rsQuery.sh** command to query a serial number on a NUMA-Q host system:

```
# ./rsQuery.sh -v -u cli -p yourpassword -q 40EFC102 -s primaryservername
************************Volume Information************************
Volume 40EFC102 found on FC102:14 as volume number 014
PPRC State=simplex, status=none, FlashCopy_state=none, Size=0.5_GB
******************************************************************
rsQuery: Command successful
```

The following is an example of the output you see when you invoke the **rsQuery.sh** command to query a `vpath` name on a NUMA-Q host system:

```
# ./rsQuery.sh -v -u cli -p yourpassword -m -q vpath10 -s primaryservername
************************Volume Information************************
Volume 40EFC102 found on FC102:14 as volume number 014
PPRC State=simplex, status=none, FlashCopy_state=none, Size=0.5_GB
******************************************************************
rsQuery: Command successful
```

rsQueryComplete.sh

The **rsQueryComplete.sh** command accepts ESS Copy Services server tasks as defined and saved from the ESS Copy Services interface and determines whether all volumes defined in the given tasks have completed the initial PPRC synchronization.

When the **rsQueryComplete.sh** command is executed on grouped tasks, the output displays the first subtask until it has reached the completion threshold; and then it displays the next subtask until it has reached the completion threshold. It repeats this process until all the subtasks are queried.

You can invoke the **rsQueryComplete.sh** command only on tasks that create PPRC pairs. You cannot invoke the **rsQueryComplete.sh** command on tasks that create FlashCopy pairs.

Syntax

The syntax for the **rsQueryComplete.sh** command is:

`rsQueryComplete.sh [-v] {-u` *`username`* `-p` *`password`*`| -a` *`securityfilepath`*`} [-m` *`minutes`*`] [-t` *`threshold`*`] -s` *`primaryserver`* `[-b` *`backupserver`*`]` *`tasknames`*

Flags and parameters

Table 40 on page 92 lists and describes the flags and parameters for the **rsQueryComplete.sh** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Table 40. rsQueryComplete.sh command flags and parameters for NUMA-Q host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command will display all responses from the server. This flag is optional.
-u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services has enabled password protection for host CLI commands, and if the -a flag and the securityfilepath parameter are not used.
-p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services has enabled password protection for host CLI commands, and if the -a flag and the securityfilepath parameter are not used.
-a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for the use of host CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the -u username and -p password flags and parameters are not used. The format of this file is as follows: `username password`
-m	minutes	The -m flag and the minutes parameter are optional. The minutes parameter specifies the number of minute intervals between queries for verifying when the PPRC initialization has completed. The default is 1 minute.
-t	threshold	The -t flag and the threshold parameter are optional. The threshold parameter specifies the threshold percentage that defines completion. The default is 100%.
-s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
-b	backupserver	The -b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.
None	tasknames	The tasknames parameter specifies the name of one or more previously saved ESS Copy Services established PPRC tasks, for which you want to query the initial copy completion of the volumes in those tasks. To specify more than one task, separate the task names with a space.

Output samples

The following is an example of the output you see when you invoke the **rsQueryComplete.sh** command with default settings for the minutes (-m) and threshold (/t) parameters on a NUMA-Q host system:

```
# ./rsQueryComplete.sh -v -u yourusername -p yourpassword -s primaryservername es_pair_12
rsQueryComplete: Got task manager reference
rsQueryComplete: --------- Task Name: es_pair_12 ---------
rsQueryComplete: Task es_pair_12 found by TaskManager
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 1
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 17
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 35
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 63
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 82
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 100
rsQueryComplete: ------------------------------------------
rsQueryComplete: Command successful
```

The following is an example of the output you see when you invoke the **rsQueryComplete.sh** command and specify the minutes (-m) parameter with a value of 2 and the threshold (-t) parameter with a value of 80% on a NUMA-Q host system:

```
# ./rsQueryComplete.sh -v -u yourusername -p yourpassword -m 2 -t 80
-s primaryservername es_pair_12
rsQueryComplete: Got task manager reference
rsQueryComplete: --------- Task Name: es_pair_12 ---------
rsQueryComplete: Task es_pair_12 found by TaskManager
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 1
rsQueryComplete: waiting 120 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 35
rsQueryComplete: waiting 120 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 82
rsQueryComplete: ------------------------------------------
rsQueryComplete: Command successful
```

rsTestConnection.sh

The **rsTestConnection.sh** command determines whether you can successfully connect to the ESS Copy Services server.

Syntax

The syntax for the **rsTestConnection.sh** command is:

```
rsTestConnection.sh [-v] -s servername
```

Flags and parameters

Table 41 on page 94 lists and describes the flags and parameters for the **rsTestConnection.sh** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Table 41. rsTestConnection.sh command flags and parameters for NUMA-Q host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command will display all responses from the server. This flag is optional.
-s	servername	The servername parameter specifies the IP address or the complete host name of the ESS Copy Services server for which you want to test the connection.

Output samples

The following is an example of the output you see when you invoke the **rsTestConnection.sh** command on a NUMA-Q host system:

```
#./rsTestConnection.sh -v -s primaryservername
rsWebTest: Using yourhostname as server name
rsWebTest: rsVSServer reference obtained successfully
rsWebTest: rsVSServer reference narrowed successfully
rsWebTest: HeartBeat to the server was successful.
rsWebTest: command successful
```

Chapter 7. Copy Services CLI for Sun host systems

This chapter contains step-by-step procedures for you to install and use the Copy Services CLI on a Sun host system. It also describes the commands and parameters of the Copy Services CLI. Specifically, it helps you perform the following tasks:

- Installing the Copy Services CLI
- Verifying server connections and ESS volume allocations
- Managing the CLI userid and password
- Using CLI commands

Installing the Copy Services CLI

This section describes the procedures for planning and performing the installation of the Copy Services CLI on a Sun host system.

Planning the installation

Perform the following steps before you install the Copy Services CLI for a Sun host system.

1. Check the IBM Enterprise Storage Server List of Supported Servers Web site for updates to the CLI support for your host system environments:
   - From your Web browser, type and enter the following Web address:
     www.storage.ibm.com/hardsoft/products/ess/supserver.htm
   - Click to open the PDF version of the ESS Support Servers document.
   - From the Table of Contents, click **ESS and Software Applications**.
   - Review the Copy Services Interface section for support updates.
2. Perform the following steps to remove any previously-installed Copy Services CLI:
   a. Log onto your host system as the root user.
   b. Type `pkgrm IBMcli` and press Enter.
      You will see an output similar to the following:

```
The following package is currently installed:
    IBMcli          ibm2105cli
                     (sparc) 1.4.0.13

   Do you want to remove this package?
```

   c. Type `Y` for Yes and press Enter to remove the previous installation.
3. Perform the following steps to determine if the CD-ROM drive can automatically mount itself:
   a. Log onto your host system as the root user.
   b. Insert the IBM Enterprise Storage Server compact disc (CD) into the CD-ROM drive.
      A window might pop up for the CD-ROM drive. Close the window and proceed to the next step.
   c. Type `mount` to display the devices that are mounted to your host system.

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If the output that is displayed shows the paths to all the devices that are connected to your host system, the CD-ROM drive can automatically mount itself. In this case, proceed to “Installation Option A” to install the Copy Services CLI.

If an error message is displayed, the CD-ROM drive cannot automatically mount itself. In this case, proceed to “Installation Option B” to install the Copy Services CLI.

Performing the installation

You must complete the installation planning tasks in “Planning the installation” on page 95 before installing the Copy Services CLI. Proceed to “Installation Option A” or “Installation Option B” depending on whether or not the CD-ROM drive of your host system can automatically mount itself.

The installation process installs the Copy Services CLI in the default /opt/ibm2105cli directory. You can accept the default directory or choose a different directory as the installation destination.

Do not remove any files from the directory where you have installed the Copy Services CLI. The shell scripts, with a file extension of .sh, will not run correctly if the directory structure is changed.

Installation Option A

Perform the following steps to install the Copy Services CLI on a Sun host system if your CD-ROM drive can automatically mount itself:

1. Log onto your host system as the root user.
2. Type a command similar to the following to change your directory to the full path for the CD-ROM device.

   ```
   cd /cdrom/unnamed_cdrom/
   ```
3. Type `pkgadd -d sunCli`
4. Click **1** to install the Copy Services CLI (`ibm2105cli`).
5. If you choose to perform a typical installation, click `Yes` for the next set of questions.

   If you choose to do a custom installation, answer the questions based on your needs.
6. When the installation program returns to the option menu, click **q** to exit the program.
7. Type `eject cdrom` to remove the CD.

   If the system responds with a busy statement, type `cd`, press Enter and then type `eject cdrom`
8. If you have installed the Copy Services CLI in a directory of your own choice, edit each shell script and change the following line:

   ```
   export INSTALL=/opt/ibm2105cli
   ```

   to read like this:

   ```
   export INSTALL=/your_installation_directory
   ```

   where */your_installation_directory* is the name of the directory in which you have installed the Copy Services CLI.

Installation Option B

Perform the following steps to install the Copy Services CLI on a Sun host system if your CD-ROM drive cannot automatically mount itself:

1. Log on your host system as the root user.

2. Type `/etc/init.d/volmgt stop` to stop the volume manager.

   Successful completion of this command allows you to manually mount the CD-ROM.
3. Type `mount -F hsfs -o ro /dev/dsk/c0t6d0s0 /mnt` to mount the CD-ROM.
4. Type `cd /mnt` to change the directory to /mnt.
5. Type `pkgadd -d sunCli`.
6. Click **1** to install the Copy Services CLI (ibm2105cli).
7. If you choose to perform a typical installation, click `Yes` to answer the next set of questions.

   If you choose to do a custom installation, answer the questions based on your needs.
8. When the installation program returns to the option menu, click **q** to exit the program.
9. Type `cd` to change to the root directory.
10. Type `umount -a /mnt` to unmount the CD-ROM.
11. Type `eject /dev/dsk/c0t6d0s0` to remove the CD-ROM.
12. Type `/etc/init.d/volmgt start` to restart the volume manager.
13. If you have installed the Copy Services CLI in a directory of your own choice, edit each shell script and change the following line:

    `export INSTALL=/opt/ibm2105cli`

    to read like this:

    `export INSTALL=`*`/your_installation_directory`*

    where */your_installation_directory* is the name of the directory in which you have installed the Copy Services CLI.

Verifying the installation

Type the following command to verify that the Copy Services CLI is installed on your Sun host system:

```
pkginfo -l IBMcli
```

You will see a message similar to the following if you have successfully installed the Copy Services CLI on your Sun host system:

```
   PKGINST:  IBMcli
      NAME:  ibm2105cli
  CATEGORY:  system
      ARCH:  sparc
   VERSION:  1.1.0.0
    VENDOR:  IBM
      DESC:  IBM Command Line Interface for Sun Solaris
    PSTAMP:  2000.277.14:57:24
  INSTDATE:  Oct 03 2000 16:13
    STATUS:  completely installed
     FILES:  17 installed pathnames
              1 shared pathnames
              2 directories
              3 executables
          10991 blocks used (approx)
```

You will see a message similar to the following if the Copy Services CLI is currently not installed on a Sun host system:

```
ERROR: information for "IBMcli" was not found
```

In this case, follow the instructions in “Planning the installation” on page 95 and “Installing the Copy Services CLI” on page 95 to install the Copy Services CLI.

Verifying server connections and ESS volume allocations

This section describes tasks that you need to complete before you use the Copy Services CLI:

- Testing the server connection
- Checking the communication link
- Verifying the allocation of ESS volumes.

Testing the server connection

Before using the Copy Services CLI, you need to ensure that the connection between the ESS Copy Services server and your host system is correctly established.

Issue the **rsTestConnection.sh** command to verify the connection between the ESS Copy Services server and your host system. See “rsTestConnection.sh” on page 109 for more information about using the **rsTestConnection.sh** command.

If the **rsTestConnection.sh** command can establish a connection between the ESS Copy Services server and your host system, proceed to “Checking the communication link”.

If the **rsTestConnection.sh** command cannot establish a connection between the ESS Copy Services server and your host system, see “Chapter 10. Troubleshooting” on page 133 for detailed instructions to diagnose and correct the problems.

Checking the communication link

Before using the Copy Services CLI, you need to verify that the communication link between the ESS Copy Services server and your host system is established. Communication links are initially configured when the ESS is installed. Use the ESS Specialist to display and modify the ESS communications configuration. See *IBM TotalStorage Enterprise Storage Server Web Interface User's Guide* for information about using the ESS Specialist to modify the communications configuration.

If the communication link between the ESS Copy Services server and your host system is working, proceed to “Verifying the allocation of ESS volumes”.

If the communication link between the ESS Copy Services server and your host system is not established, see “Chapter 10. Troubleshooting” on page 133 for detailed instructions to diagnose and correct the problems.

Verifying the allocation of ESS volumes

Before using the Copy Services CLI, you need to verify that ESS volumes are allocated for your host system. Issue the **rsList2105s.sh** command to generate a list of ESS volumes that are currently allocated for your host system. See “rsList2105s.sh” on page 102 for more information about the **rsList2105s.sh** command.

You can use the Copy Services CLI if the **rsList2105s.sh** command determines that there are ESS volumes allocated for your host system.

If the **rsList2105s.sh** command determines that there are no ESS volumes allocated for your host system or that ESS volumes are incorrectly allocated for your host system, see “Chapter 10. Troubleshooting” on page 133 for detailed instructions to diagnose and correct the problems.

Managing the CLI userid and password

You can use the ESS Copy Services Administration panel to manage the userid and password for a Sun host system that uses the Copy Services CLI. When you define the userid and password, all hosts that issue CLI commands must provide this userid and password as part of the command string.

See “Flags and parameters for password-protection-enabled host systems” on page 100 for detailed instructions about issuing the CLI commands for open-systems hosts with password protection.

See the *IBM TotalStorage Enterprise Storage Server Web Interface User's Guide* for detailed instructions on how to define and remove the CLI userid and password.

Using CLI commands

This section describes the CLI commands that you can use from a Sun host system. It presents the full syntax and describes the flags and parameters of each command.

Overview of CLI commands

Table 42 provides an alphabetical list of CLI commands and a brief description of each command.

Table 42. Summary of CLI commands for Sun host systems

Command	Description	Page
rsExecuteTask.sh	Executes one or more ESS Copy services tasks (as defined and saved using the ESS Copy Services interface) and waits for the given tasks to complete execution.	100
rsList2105s.sh	Displays the mapping of a host disk name to a 2105 volume serial number.	102
rsPrimeServer.sh	Notifies the ESS Copy Services server about the hostname (from which this command has been executed) so that the hostname is displayed in the source and target list on the ESS Copy Services Volumes panel. This command is useful when you use the ESS Copy Services Volumes panel to perform FlashCopy, PPRC, or both functions because it shows the host names for all the volumes that are connected to the selected host in one view.	103
rsQuery.sh	Queries the status of one or more volumes.	105
rsQueryComplete.sh	Accepts the ESS Copy Services server tasks (as defined and saved from the ESS Copy Services interface) and determines whether all volumes that are defined in the given tasks have completed initial PPRC synchronization.	107

Table 42. Summary of CLI commands for Sun host systems (continued)

Command	Description	Page
rsTestConnection.sh	Determines whether you can successfully connect to the ESS Copy Services server.	109

Flags and parameters for password-protection-enabled host systems

If the password-protection option is enabled, you must specify *one* of the following flags and parameters when you use any of the CLI commands from your Sun host system:

- Both the -u flag, followed by the username parameter, and the -p flag, followed by the password parameter
- The -a flag with the securityfilepath parameter

  You can use this option for additional security. The file specified in the securityfilepath parameter contains the username and password.

Flags and parameters for primary and backup servers

When using CLI commands other than **rsList2105s.sh** and **rsTestConnection.sh**, you must specify *either* the -s flag with the primaryserver parameter *or* the -b flag with the backupserver parameter. You can also specify *both* flags if necessary.

Use the following guidelines for specifying the -s and -b flags:

- Specify only the -s flag with the primaryserver parameter to check the connection to the primary server. If the command can establish a connection, it is sent to the primary server for processing. The command fails if it cannot establish a connection.
- Specify only the -b flag with the backupserver parameter to check the connection to the backup server. If the command can establish a connection, it is sent to the backup server for processing. If the command cannot establish a connection, it fails.
- Specify both the -s flag with the primaryserver parameter and the -b flag with the backupserver parameter to check the connection to the primary server and then, if the primary server is down, to the backup server.

  If the command can establish a connection to the primary server, it is sent to the primary server for processing. If the command cannot establish a connection to the primary server, the connection to the backup server is checked. If the command can establish a connection to the backup server, it is sent to the backup server for processing. If the command cannot establish a connection to the backup server, it fails.

Return codes and messages

See “Chapter 9. Return codes and messages” on page 127 for a complete list and descriptions of CLI return codes and messages.

rsExecuteTask.sh

The **rsExecuteTask.sh** command executes one or more ESS Copy Services tasks as defined and saved using the ESS Copy Services interface and it waits for the given tasks to complete execution.

Successful completion of the tasks means that the volumes are in the relationship (PPRC or FlashCopy) specified in the given tasks. It does not mean that the volumes have completed the specified relationship.

For established PPRC tasks, use the **rsQueryComplete.sh** command to determine if PPRC pairs have completed copying. For established FlashCopy tasks, use **rsQuery.sh** command to determine if FlashCopy with background copy pairs have completed copying.

Syntax

The syntax for the **rsExecuteTask.sh** command is:

```
rsExecuteTask.sh [-v] {-u username -p password | -a securityfilepath} -s
primaryserver [-b backupserver] tasknames
```

See "Flags and parameters for password-protection-enabled host systems" on page 100 for detailed information about how to use the CLI commands if the host password-protection option is enabled.

Flags and parameters

Table 43 lists and describes the flags and parameters for the **rsExecuteTask.sh** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Attention: All flags and parameters are case-sensitive.

Table 43. rsExecuteTask.sh command flags and parameters for Sun host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command will display all responses from the server. This flag is optional.
-u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for the host system and if the -a flag and the securityfilepath parameter are not used.
-p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for the host system and if the -a flag and the securityfilepath parameter are not used.
-a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for using CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for the host system and if the -u username and -p password flags and parameters are not used. The format of this file is as follows: `username password`
-s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
-b	backupserver	The -b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.

Table 43. rsExecuteTask.sh command flags and parameters for Sun host systems (continued)

Flag	Parameter	Description
None	tasknames	The tasknames parameter specifies the name of one or more previously saved ESS Copy Services established PPRC tasks for which you want to query the initial copy completion. To specify more than one task, separate the task names with a space.

Output samples
The following is a sample output when you invoke the **rsExecuteTask.sh** command on a Sun host system:

```
# ./rsExecuteTask.sh -v -u yourusername -p yourpassword -s primaryservername es_pair_12
rsExecuteTask: Got task manager reference
rsExecuteTask: **************Finding the tasks****************
rsExecuteTask: Task es_pair_12 found by task manager
rsExecuteTask: **************Scheduling the tasks****************
rsExecuteTask: Task es_pair_12 scheduled with copy services server
rsExecuteTask: **************Monitoring the tasks****************
rsExecuteTask: Waiting on server...
rsExecuteTask: Task es_pair_12 completed successfully
rsExecuteTask: Command successful
```

rsList2105s.sh
The **rsList2105s.sh** command displays the mapping of a host disk name to 2105 volume serial number.

If you have the IBM Subsystem Device Driver (SDD) running on your host system and you change the configuration for the host, such as adding or removing volumes, you must restart the host so that SDD can recognize, add, or remove the paths.

Syntax
The syntax for the **rsList2105s.sh** command is simply:

```
rsList2105s.sh
```

Flags and parameters
There are no flags and parameters for the **rsList2105s.sh** command.

Output samples
If you have SDD on your Sun host system, you will see an output similar to the following when you invoke the **rsList2105s.sh** command:

```
>./rsList2105s.sh
VpathName     Serial     VolumeNames
-----------    ------     -----------
 vpath20      524FCA31    c2t5d0s0
 vpath21      525FCA31    c2t5d1s0
 vpath22      51CFCA31    c2t6d0s0
 vpath23      51DFCA31    c2t6d1s0
 vpath24      51EFCA31    c2t6d2s0
 vpath25      51FFCA31    c2t6d3s0
 vpath26      520FCA31    c2t6d4s0
 vpath27      521FCA31    c2t6d5s0
 vpath28      522FCA31    c2t6d6s0
 vpath29      523FCA31    c2t6d7s0
 vpath30      450FCA31    c3t5d0s0
```

If you do not have SDD on your Sun host system, you will see an output message similar to the following when you invoke the **rsList2105s.sh** command:

```
>./rsList2105s.sh
disk name       2105 serial number
---------       ------------------
 c2t5d1s0          525FCA31
 c2t6d0s0          51CFCA31
 c2t6d1s0          51DFCA31
 c2t6d2s0          51EFCA31
 c2t6d3s0          51FFCA31
   c2t6d4s0          520FCA31
   c2t6d5s0          521FCA31
 c2t6d6s0          522FCA31
   c2t6d7s0          523FCA31
   c3t5d0s0          450FCA31
```

rsPrimeServer.sh

The **rsPrimeServer.sh** command notifies the ESS Copy Services server about the hostname (from which this command has been executed) to display the hostname in the source and target list on the ESS Copy Services Volumes panel.

This command is useful when you use the ESS Copy Services Volumes panel to perform FlashCopy, PPRC, or both functions as it shows the host names for all the volumes that are connected to the selected host in one view.

If you have SDD installed on your host system and you change the configuration for the host (such as adding or removing volumes), you must perform the following steps:

- Restart your host system so that SDD can recognize, add, or remove the paths.
- Run the **rsPrimeServer.sh** command to generate the current mapping for the host volumes.

If you do not have SDD installed on your host system and you change the configuration for the host (such as adding or removing volumes), you must run the **rsPrimeServer.sh** command to generate the current mapping for the host volumes.

Syntax

The syntax for the **rsPrimeServer.sh** command is:

```
rsPrimeServer.sh [-v] {-u username -p password | -a securityfilepath} -d
hostname -s primaryserver [-b backupserver]
```

Flags and parameters

Table 44 lists and describes the flags and parameters for the **rsPrimeServer.sh** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Table 44. rsPrimeServer.sh command flags and parameters for Sun host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command will display all responses from the server. This flag is optional.
-u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the -a flag and the securityfilepath parameter are not used.

Table 44. rsPrimeServer.sh command flags and parameters for Sun host systems (continued)

Flag	Parameter	Description
-p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the -a flag and the securityfilepath parameter are not used.
-a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for using CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the -u username and -p password flags and parameters are not used. The format of this file is as follows- `username password`
-d	hostname	The -d flag and hostname parameter are required when you are removing the hostname. The hostname parameter specifies the IP address or hostname to be removed. The hostname needs to match exactly one of the entries that is displayed in the list on the Volumes panels of the ESS Copy Services.
-s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
-b	backupserver	The -b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.

Output samples

The following is an example of the output you see when you invoke the **rsPrimeServer.sh** command to add a host name on a Sun host system:

```
# ./rsPrimeServer.sh -v -u yourusername -p yourpassword -s primaryservername
rsPrimeServer: Local host is abc.def.ghi.com
rsPrimeServer: Got task manager reference
rsPrimeServer: Host abc.def.ghi.com registered
rsPrimeServer: Configuration change requested made to primaryserver
rsPrimeServer: Command successful
```

The following is an example of the output you see when you invoke the **rsPrimeServer.sh** command to delete a host name on a Sun host system:

```
# ./rsPrimeServer.sh -v -u yourusername -p yourpassword -d abc.def.ghi.com
   -s primaryservername
rsPrimeServer: host to unregister is abc.def.ghi.com
rsPrimeServer: Got task manager reference
rsPrimeServer: Host abc.def.ghi.com unregistered
rsPrimeServer: Configuration change requested made to primaryserver
rsPrimeServer: Command successful
```

rsQuery.sh

The **rsQuery.sh** command queries the status of one or more volumes.

You can invoke the **rsQuery.sh** command for the vpath name, the host volume name, or the volume serial number under various conditions.

Syntax

The syntax for the **rsQuery.sh** command is:

```
rsQuery.sh [-v] -m {-u username -p password | -a securityfilepath} {-q
volumename | -f filename} -s primaryserver [-b backupserver]
```

Flags and parameters

Table 45 lists and describes the flags and parameters for the **rsQuery.sh** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Table 45. rsQuery.sh command flags and parameters for Sun host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command will display all responses from the server. This flag is optional.
-m	None	-m is the map flag. The -m flag maps host volume names to a 2105 volume serial numbers. This flag permits host volumes names to be used as a volume flag. If you use the **rsQuery.sh** command for the vpath name or host volume name, you must use the -m flag. If you use the **rsQuery.sh** command for a serial number, you do not need to use the -m flag.
-u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the -a flag and the securityfilepath parameter are not used.
-p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the -a flag and the securityfilepath parameter are not used.

Table 45. rsQuery.sh command flags and parameters for Sun host systems (continued)

Flag	Parameter	Description
-a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for the use of host CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands and if the {-u username and -p password} flags and parameters are not used. The format of this file is as follows: `username password`
-q	volumename	The volume parameter specifies the vpath name, host volume name, or volume serial number. Use the **rsQuery.sh** command for the vpath name, host volume name, or volume serial number under the following conditions: • If SDD is installed, use the **rsQuery.sh** command only for the vpath name or volume serial number. • If SDD is not installed, use the **rsQuery.sh** command only on a host volume name or volume serial number. • If you use the **rsQuery.sh** command for the vpath name or the host volume name, you must use the -m flag. • If you use the **rsQuery.sh** command for a serial number, you do not need to use the -m flag. You need to use the -q flag with the volume parameter if the -f flag and the filename parameter are not used.

-f	filename	The filename parameter specifies the name of a file containing vpath names, host volume names or volume serial numbers, all of which are to be queried.
		
		You need to use the -f flag with the filename parameter if the -q flag and the volume parameter are not used.
		
		The format of this file may be either:
		`sourceVolume1 targetVolume1`
		`sourceVolume2 targetVolume2`
		`...`
		sourceVolume`N` targetVolume`N`
		or
		`volume1`
		`volume2`
		`volume3`
		`...`
		`volumeN`

-s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.

Table 45. rsQuery.sh command flags and parameters for Sun host systems (continued)

Flag	Parameter	Description
-b	backupserver	The -b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.

Output samples

The following is an example of the output you see when you invoke the **rsQuery.sh** command to query a serial number on a Sun host system:

```
# ./rsQuery.sh -v -u cli -p yourpassword -q 40EFC102 -s primaryservername
************************Volume Information************************
Volume 40EFC102 found on FC102:14 as volume number 014
PPRC State=simplex, status=none, FlashCopy_state=none, Size=0.5_GB
******************************************************************
rsQuery: Command successful
```

The following is an example of the output you see when you invoke the **rsQuery.sh** command to query a `vpath` name on a Sun host system:

```
# ./rsQuery.sh -v -u cli -p yourpassword -m -q vpath10 -s primaryservername
************************Volume Information************************
Volume 40EFC102 found on FC102:14 as volume number 014
PPRC State=simplex, status=none, FlashCopy_state=none, Size=0.5_GB
******************************************************************
rsQuery: Command successful
```

rsQueryComplete.sh

The **rsQueryComplete.sh** command accepts ESS Copy Services server tasks as defined and saved from the ESS Copy Services interface and determines whether all volumes defined in the given tasks have completed the initial PPRC synchronization.

When the **rsQueryComplete.sh** command is executed on grouped tasks, the output will display the first subtask until it has reached the completion threshold, and then it will display the next subtask until it has reached the completion threshold. It will repeat this process until all the subtasks are queried.

You can invoke the **rsQueryComplete.sh** command only on tasks that create PPRC pairs. You cannot invoke the **rsQueryComplete.sh** command on tasks that create FlashCopy pairs.

Syntax

The syntax for the **rsQueryComplete.sh** command is:

```
rsQueryComplete.sh [-v] {-u username -p password| -a securityfilepath} [-m
minutes] [-t threshold] -s primaryserver [-b backupserver] tasknames
```

Flags and parameters

Table 46 on page 108 lists and describes the flags and parameters for the **rsQueryComplete.sh** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Table 46. rsQueryComplete.sh command flags and parameters for Sun host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command will display all responses from the server. This flag is optional.
-u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the ESS Copy Services administrator has enabled password protection for host CLI commands, and if the -a flag and the securityfilepath parameter are not used.
-p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services has enabled password protection for host CLI commands, and if the -a flag and the securityfilepath parameter are not used.
-a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for the use of host CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the -u username and -p password flags and parameters are not used. The format of this file is as follows: `username password`
-m	minutes	The -m flag and the minutes parameter are optional. The minutes parameter specifies the number of minute intervals between queries for verifying when the PPRC initialization has completed. The default is 1 minute.
-t	threshold	The -t flag and the threshold parameter are optional. The threshold parameter specifies the threshold percentage that defines completion. The default is 100%.
-s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
-b	backupserver	The -b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.
None	tasknames	The tasknames parameter specifies the name of one or more previously saved ESS Copy Services established PPRC tasks, for which you want to query the initial copy completion of the volumes in those tasks. To specify more than one task, separate the task names with a space.

Output samples

The following is an example of the output you see when you invoke the **rsQueryComplete.sh** command with default settings for the minutes (-m) and threshold (-t) parameters on a Sun host system:

```
# ./rsQueryComplete.sh -v -u yourusername -p yourpassword -s primaryservername es_pair_12
rsQueryComplete: Got task manager reference
rsQueryComplete: --------- Task Name: es_pair_12 ---------
rsQueryComplete: Task es_pair_12 found by TaskManager
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 1
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 17
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 35
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 63
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 82
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 100
rsQueryComplete: ------------------------------------------
rsQueryComplete: Command successful
```

The following is an example of the output when you invoke the **rsQueryComplete.sh** command and specify the minutes (-m) parameter with a value of 2 and the threshold (-t) parameter with a value of 80% on a Sun host system:

```
# ./rsQueryComplete.sh -v -u yourusername -p yourpassword -m 2 -t 80
-s primaryservername es_pair_12
rsQueryComplete: Got task manager reference
rsQueryComplete: --------- Task Name: es_pair_12 ---------
rsQueryComplete: Task es_pair_12 found by TaskManager
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 1
rsQueryComplete: waiting 120 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 35
rsQueryComplete: waiting 120 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 82
rsQueryComplete: ------------------------------------------
rsQueryComplete: Command successful
```

rsTestConnection.sh

The **rsTestConnection.sh** command determines whether you can successfully connect to the ESS Copy Services server.

Syntax

The syntax for the **rsTestConnection.sh** command is:

```
rsTestConnection.sh [-v] -s servername
```

Flags and parameters

Table 47 on page 110 lists and describes the flags and parameters for the **rsTestConnection.sh** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Table 47. rsTestConnection.sh command flags and parameters for Sun host systems

Flag	Parameter	Description
-v	None	-v is the verbose flag. When you use the -v flag, the command will display all responses from the server. This flag is optional.
-s	servername	The servername parameter specifies the IP address or the complete host name of the ESS Copy Services server for which you want to test the connection.

Output samples

The following is an example of the output you see when you invoke the **rsTestConnection.sh** command on a Sun host system:

```
#./rsTestConnection.sh -v -s primaryservername
rsWebTest: Using yourhostname as server name
rsWebTest: rsVSServer reference obtained successfully
rsWebTest: rsVSServer reference narrowed successfully
rsWebTest: HeartBeat to the server was successful.
rsWebTest: command successful
```

Chapter 8. Copy Services CLI for Windows NT or Windows 2000 host systems

This chapter contains step-by-step procedures for you to install and use the Copy Services CLI on a Windows NT or Windows 2000 host system. It also describes the commands and parameters of the Copy Services CLI. Specifically, it helps you perform the following tasks:

- Installing the Copy Services CLI
- Verifying server connections and ESS volume allocations
- Managing the CLI userid and password
- Using CLI commands

Installing the Copy Services CLI

This section describes the procedures for planning and performing the installation of the Copy Services CLI on a Windows NT or Windows 2000 host system.

Planning the installation

Perform the following steps before you install the Copy Services CLI for a Windows NT or Windows 2000 host system:

1. Check the IBM Enterprise Storage Server List of Supported Servers Web site for updates to the CLI support for your host system environments:
   - From your Web browser, type and enter the following Web address:
     www.storage.ibm.com/hardsoft/products/ess/supserver.htm
   - Click to open the PDF version of the ESS Support Servers document.
   - From the Table of Contents, click **ESS and Software Applications**.
   - Review the Copy Services Interface section for support updates.
2. Make sure that you have Service Pack 4.0 or higher on your Windows 4.0 host system.

Performing the installation

The installation process installs the Copy Services CLI in the default \Program Files\IBM 2105 CLI directory. You can accept the default directory or choose a different directory as the installation destination.

Perform the following steps to install the Copy Services CLI on a Windows NT or Windows 2000 host system.

1. Log onto your host system as an Administrator user.
2. Insert the IBM Enterprise Storage Server compact disc (CD) into the CD-ROM drive.

   A window might pop up for the CD-ROM drive. Close the window and proceed to the next step.
3. Click **Start** —> **Run**.
4. In the Run window, click on **Browse**.
5. Look in the list in the Browse window, select the drive letter for the CD-ROM drive.
6. Click to select **winCli\IBMcli\setup.exe**.
7. Click **Open**.

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8. Click **OK**.
9. Follow the instructions of the installation wizard to install the Copy Services CLI (ibm2105 cli code).
10. Restart your host system to complete the installation process.

Do not remove any files from the directory where you have installed the Copy Services CLI. The executable files, with a file extension of .exe, will not run correctly if the directory structure is changed.

Verifying the installation

Perform the following steps to verify that the Copy Services CLI is installed on your Windows NT or Windows 2000 host system:

1. Click **Start** —> **Settings Control Panel**. The Control Panel window opens.
2. Open **Add/Remove Programs** in the Control Panel.
3. In the Add/Remove Programs Properties window, scroll down the list of installed programs to locate the IBM 2105 CLI program name for the Copy Services CLI .

If you do not see the `IBM 2105 CLI` name on the list of the installed programs, it means that the Copy Services CLI is currently *not* installed on your host system. In this case, follow the instructions in “Installing the Copy Services CLI” on page 111 to install the Copy Services CLI .

Verifying server connections and ESS volume allocations

This section describes the following verification tasks that you need to complete before you use the Copy Services CLI:

- Testing the server connection
- Checking the communication link
- Verifying the allocation of ESS volumes

Testing the server connection

Before using the Copy Services CLI, you need to ensure that the connection between the ESS Copy Services server and your host system is correctly established.

Issue the **rsTestConnection.exe** command to verify the connection between the ESS Copy Services server and your host system. See “rsTestConnection.exe” on page 124 for more information about using the **rsTestConnection.exe** command.

If the **rsTestConnection.exe** command can establish a connection between the ESS Copy Services server and your host system, proceed to “Checking the communication link”.

If the **rsTestConnection.exe** command cannot establish a connection between the ESS Copy Services server and your host system, see “Chapter 10. Troubleshooting” on page 133 for detailed instructions to diagnose and correct the problems.

Checking the communication link

Before using the Copy Services CLI, you need to verify that the communication link between the ESS Copy Services server and your host system is established. Communication links are initially configured when the ESS is installed. Use the ESS

Specialist to display and modify the ESS communications configuration. See *IBM TotalStorage Enterprise Storage Server Web Interface User's Guide* for information about using the ESS Specialist to modify the communications configuration.

If the communication link between the ESS Copy Services server and your host system is working, proceed to "Verifying the allocation of ESS volumes".

If the communication link between the ESS Copy Services server and your host system is not established, see "Chapter 10. Troubleshooting" on page 133 for detailed instructions to diagnose and correct the problems.

Verifying the allocation of ESS volumes

Before using the Copy Services CLI, you need to verify that ESS volumes are allocated for your host system. Issue the **rsList2105s.exe** command to generate a list of ESS volumes that are currently allocated for your host system. See "rsList2105s.exe" on page 116 for more information about the **rsList2105s.exe** command.

You can use the Copy Services CLI if the **rsList2105s.exe** command determines that there are ESS volumes allocated for your host system.

If the **rsList2105s.exe** command determines that there are no ESS volumes allocated for your host system or that ESS volumes are incorrectly allocated for your host system, see "Chapter 10. Troubleshooting" on page 133 for detailed instructions to diagnose and correct the problems.

Managing the CLI userid and password

You can use the ESS Copy Services Administration panel to manage the userid and password for a Windows NT or Windows 2000 host system that uses the CLI. When you define the userid and password, all hosts that issue CLI commands must provide this userid and password as part of the command string.

See "Flags and parameters for password-protection-enabled host systems" on page 114 for detailed instructions about issuing the CLI commands for open-systems hosts with password protection.

See the *IBM TotalStorage Enterprise Storage Server Web Interface User's Guide* for detailed instructions on how to define and remove the CLI userid and password.

Using CLI commands

This section describes the CLI commands that you can use from a Windows NT or Windows 2000 host system. It presents the full syntax and describes the flags and parameters of each command.

Overview of CLI commands

Table 48 on page 114 provides an alphabetical list of CLI commands and a brief description of each command.

Table 48. Summary of CLI commands for Windows NT or Windows 2000 host systems

Command	Description	Page
rsExecuteTask.exe	Executes one or more ESS Copy services tasks (as defined and saved using the ESS Copy Services interface) and waits for the given tasks to complete execution.	115
rsList2105s.exe	Displays the mapping of a host disk name to a 2105 volume serial number.	116
rsPrimeServer.exe	Notifies the ESS Copy Services server about the hostname (from which this command has been executed) so that the hostname is displayed in the source and target list on the ESS Copy Services Volumes panel. This command is useful when you use the ESS Copy Services Volumes panel to perform FlashCopy, PPRC, or both functions because it shows the host names for all the volumes that are connected to the selected host in one view.	117
rsQuery.exe	Queries the status of one or more volumes.	119
rsQueryComplete.exe	Accepts the ESS Copy Services server tasks (as defined and saved from the ESS Copy Services interface) and determines whether all volumes that are defined in the given tasks have completed initial PPRC synchronization.	122
rsTestConnection.exe	Determines whether you can successfully connect to the ESS Copy Services server.	124

Flags and parameters for password-protection-enabled host systems

If the password-protection option is enabled, you must specify *one* of the following flags and parameters when you use any of the CLI commands from your Windows NT or Windows 2000 host system:

- Both the /u flag, followed by the username parameter, and the /p flag, followed by the password parameter
- The /a flag with the securityfilepath parameter.

  You can use this option for additional security. The file specified in the securityfilepath parameter contains the username and password.

Flags and parameters for primary and backup servers

When using CLI commands other than **rsList2105s.exe** and **rsTestConnection.exe**, you must specify *either* the /s flag with the primaryserver parameter *or* the /b flag with the backupserver parameter. You can also specify *both* flags if necessary.

Use the following guidelines for specifying the /s and /b flags:

- Specify only the /s flag with the primaryserver parameter to check the connection to the primary server. If the command can establish a connection, it is sent to the primary server for processing. The command fails if it cannot establish a connection.
- Specify only the /b flag with the backupserver parameter to check the connection to the backup server. If the command can establish a connection, it is sent to the backup server for processing. If the command cannot establish a connection, it fails.

- Specify both the /s flag with the primaryserver parameter and the /b flag with the backupserver parameter to check the connection to the primary server and then, if the primary server is down, to the backup server.

  If the command can establish a connection to the primary server, it is sent to the primary server for processing. If the command cannot establish a connection to the primary server, the connection to the backup server is checked. If the command can establish a connection to the backup server, it is sent to the backup server for processing. If the command cannot establish a connection to the backup server, it fails.

Return codes and messages

See "Chapter 9. Return codes and messages" on page 127 for a complete list and descriptions of CLI return codes and messages.

rsExecuteTask.exe

The **rsExecuteTask.exe** command executes one or more ESS Copy services tasks as defined and saved using the ESS Copy Services interface and it waits for the given tasks to complete execution.

Successful completion of the tasks means that the volumes are in the relationship (PPRC or FlashCopy) specified in the given tasks. It does not mean that the volumes have completed the specified relationship.

For established PPRC tasks, use the **rsQueryComplete.exe** command to determine if PPRC pairs have completed copying. For established FlashCopy tasks, use the **rsQuery.exe** command to determine if FlashCopy with background copy pairs have completed copying.

Syntax

The syntax for the **rsExecuteTask.exe** command is:

```
rsExecuteTask.exe [/v] {/u username /p password | /a securityfilepath} /s
primaryserver [/b backupserver] tasknames
```

See "Flags and parameters for password-protection-enabled host systems" on page 114 for detailed information about how to use the CLI commands if the host password-protection option is enabled.

Flags and parameters

Table 49 lists and describes the flags and parameters for the **rsExecuteTask.exe** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Note: All flags and parameters are case-sensitive.

Table 49. rsExecuteTask.exe command flags and parameters for Windows NT or Windows 2000 host systems

Flag	Parameter	Description
/v	None	/v is the verbose flag. When you use the /v flag, the command will display all responses from the server. This flag is optional.
/u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /a flag and the securityfilepath parameter are not used.

Table 49. rsExecuteTask.exe command flags and parameters for Windows NT or Windows 2000 host systems (continued)

Flag	Parameter	Description
/p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /a flag and the securityfilepath parameter are not used.
/a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for the use of host CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /u username and /p password flags and parameters are not used. The format of this file is as follows: `username password`
/s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
/b	backupserver	The /b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.
None	tasknames	The tasknames parameter specifies the name of one or more previously saved ESS Copy Services established PPRC tasks, for which you want to query the initial copy completion of the volumes in those tasks. To specify more than one task, separate the task names with a space.

Output samples

The following is an example of the output you see when you invoke the **rsExecuteTask.exe** command on a Windows NT or Windows 2000 host system:

```
C:\Program Files\IBM 2105 CLI>rsExecuteTask.exe /v /u yourusername /p raman
/s primaryservername es_pair_12
rsExecuteTask: Got task manager reference
rsExecuteTask: *************Finding the tasks****************
rsExecuteTask: Task es_pair_12 found by task manager
rsExecuteTask: *************Scheduling the tasks****************
rsExecuteTask: Task es_pair_12 scheduled with copy services server
rsExecuteTask: *************Monitoring the tasks****************
rsExecuteTask: Waiting on server...
rsExecuteTask: Task es_pair_12 completed successfully
rsExecuteTask: Command successful
```

rsList2105s.exe

The **rsList2105s.exe** command displays the mapping of a host disk name to a 2105 volume serial number.

If you have the IBM Subsystem Device Driver (SDD) running on your host system and you change the configuration for the host (such as adding or removing volumes) you must restart the host so that SDD can recognize, add, or remove the paths.

Syntax
The syntax for the **rsList2105s.exe** command is simply:

```
rsList2105s.exe
```

Flags and parameters
There are no flags and parameters for the **rsList2105s.exe** command.

Output samples
If you have SDD on your Windows NT or Windows 2000 host system, you will see an output similar to the following when you invoke the **rsList2105s.exe** command:

```
C:\Program Files\IBM 2105 CLI>rsList2105s.exe
 Vpath    Serial    Volume Names
-------  --------  --------------
Disk1     01BFCA24  Disk1
Disk2     01CFCA24  Disk2
Disk3     01DFCA24  Disk3
Disk4     01EFCA24  Disk4
Disk5     01FFCA24  Disk5
Disk6     020FCA24  Disk6
Disk7     021FCA24  Disk7
Disk8     022FCA24  Disk8
Disk9     20DFCA24  Disk9
Disk10    20EFCA24  Disk10
```

If you *do not* have SDD on your Windows NT or Windows 2000 host system, you see output similar to the following when you invoke the **rsList2105s.exe** command:

```
C:\Program Files\IBM 2105 CLI>rsList2105s.exe
disk name 2105 serial number
--------- ------------------
 Disk  1      01BFCA24
 Disk  2      01CFCA24
 Disk  3      01DFCA24
 Disk  4      01EFCA24
 Disk  5      01FFCA24
 Disk  6      020FCA24
 Disk  7      021FCA24
 Disk  8      022FCA24
 Disk  9      20DFCA24
 Disk 10      20EFCA24
```

rsPrimeServer.exe
The **rsPrimeServer.exe** command notifies the ESS Copy Services server to display the hostname (from which this command has been executed) in the source and target list on the ESS Copy Services Volumes panel.

This command is useful when you use the ESS Copy Services Volumes panel to perform FlashCopy, PPRC, or both functions because it shows the host names for all the volumes that are connected to the selected host in one view.

If you have SDD installed on your host system and you change the configuration for the host (such as adding or removing volumes), you must perform the following steps:

- Restart your host system so that SDD can recognize, add, or remove the paths.

- Run the **rsPrimeServer.exe** command to generate the current mapping for the host volumes.

If you do not have SDD installed on your host system and you change the configuration for the host (such as adding or removing volumes), you must run the **rsPrimeServer.exe** command to generate the current mapping for the host volumes.

Syntax

The syntax for the **rsPrimeServer.exe** command is:

```
rsPrimeServer.exe [/v] {/u username /p password | /a securityfilepath} /d
hostname /s primaryserver [/b backupserver]
```

Flags and parameters

Table 50 lists and describes the flags and parameters for the **rsPrimeServer.exe** command line. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Table 50. rsPrimeServer.exe command flags and parameters for Windows NT or Windows 2000 host systems

Flag	Parameter	Description
/v	None	/v is the verbose flag. When you use the /v flag, the command will display all responses from the server. This flag is optional.
/u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /a flag and the securityfilepathparameter are not used.
/p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /a flag and the securityfilepath parameter are not used.
/a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for the use of host CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /u username and /p password flags and parameters are not used. The format of this file is as follows: `username password`
/d	hostname	The /d flag and hostname parameter are required when you are removing the hostname. The hostname parameter specifies the IP address or hostname to be removed. The hostname needs to match exactly one of the entries that is displayed in the list on the Volumes panels of the ESS Copy Services.
/s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.

Table 50. rsPrimeServer.exe command flags and parameters for Windows NT or Windows 2000 host systems (continued)

Flag	Parameter	Description
/b	backupserver	The /b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.

Output samples

The following is an example of the output you see when you invoke the **rsPrimeServer.exe** command to add a host name on a Windows NT or Windows 2000 host system:

```
C:\Program Files\IBM 2105 CLI>rsPrimeServer.exe /v /u yourusername /p yourpassword
/s primaryservername
rsPrimeServer: Local host is abc.def.ghi.com
rsPrimeServer: Got task manager reference
rsPrimeServer: Host abc.def.ghi.com registered
rsPrimeServer: Configuration change requested made to primaryserver
rsPrimeServer: Command successful
```

The following is an example of the output you see when you invoke the **rsPrimeServer.exe** command to delete a host name on a Windows NT or Windows 2000 host system:

```
C:\Program Files\IBM 2105 CLI>rsPrimeServer.exe /v /u yourusername
/p yourpassword /d abc.def.ghi.com /s primaryservername
rsPrimeServer: host to unregister is abc.def.ghi.com
rsPrimeServer: Got task manager reference
rsPrimeServer: Host abc.def.ghi.com unregistered
rsPrimeServer: Configuration change requested made to primaryserver
rsPrimeServer: Command successful
```

rsQuery.exe

The **rsQuery.exe** command queries the status of one or more volumes.

You can invoke the **rsQuery.exe** command for the vpath name, the host volume name, or the volume serial number under various conditions.

Syntax

The syntax for the **rsQuery.exe** command is:

```
rsQuery.exe [/v] /m {/u username /p password | /a securityfilepath} {/q
volumename | /f filename} /s primaryserver [/b backupserver]
```

Flags and parameters

Table 51 on page 120 lists and describes the flags and parameters for the **rsQuery.exe** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Table 51. rsQuery.exe command flags and parameters for Windows NT or Windows 2000 host systems

Flag	Parameter	Description
/v	None	/v is the verbose flag. When you use the/v flag, the command will display all responses from the server. This flag is optional.
/m	None	/m is the map flag. The /m flag maps host volume names to a 2105 volume serial numbers. This flag permits host volumes names to be used as a volume flag. If you use the **rsQuery.exe** command for the vpath name or host volume name, you must use the /m flag. If you use the **rsQuery.exe** command for a serial number, you do not need to use the /m flag.
/u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /a flag and the securityfilepath parameter are not used.
/p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /a flag and the securityfilepath parameter are not used.
/a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for the use of host CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands and if the {/u username and /p password} flags and parameters are not used. The format of this file is as follows: `username password`
/q	volumename	The volume parameter specifies the vpathname, host volume name, or volume serial number. Use the **rsQuery.exe** command for the vpath name, host volume name, or volume serial number under the following conditions: • If SDD is installed, use the **rsQuery.exe** command only for the `vpath` name or volume serial number. • If SDD is not installed, use the **rsQuery.exe** command only on a host volume name or volume serial number. • If you use the **rsQuery.exe** command for the vpath name or host volume name, you must use the /m flag. • If you use the **rsQuery.exe** command for a serial number, you do not need to use the `/m` flag. You need to use the /q flag with the volume parameter if the /f flag and the filename parameter are not used.

Table 51. rsQuery.exe command flags and parameters for Windows NT or Windows 2000 host systems (continued)

Flag	Parameter	Description

/f	filename	The filename parameter specifies the name of a file containing vpath names, host volume names or volume serial numbers, all of which are to be queried.
		
		You need to use the /f flag with the filename parameter if the /q flag and the volume parameter are not used.
		
		The format of this file may be either:
		`sourceVolume1 targetVolume1`
		`sourceVolume2 targetVolume2`
		`...`
		sourceVolume*N* targetVolume`N`
		or
		`volume1`
		`volume2`
		`volume3`
		`...`
		`volumeN`

/s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
/b	backupserver	The /b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.

Output samples

The following is an example of the output you see when you invoke the **rsQuery.exe** command to query a serial number on a Windows NT or Windows 2000 host system:

```
C:\Program Files\IBM 2105 CLI>rsQuery.exe /v /u yourusername /p yourpassword
/q 01BFCA24 /s primaryservername
**********Volume Information**********
Volume 01BFCA24 found on FC102:12 as volume number 012
PPRC State=simplex, status=none, FlashCopy_state=none, Size=0.5_GB
****************************************************************
rsQuery: Command successful
```

The following is an example of the output you see when you invoke the **rsQuery.exe** command to query a `vpath` name on a Windows NT or Windows 2000 host system:

```
C:\Program Files\IBM 2105 CLI>rsQuery.exe /v /u yourusername /p yourpassword
/m /q disk1 /s primaryservername
************************Volume Information************************
Volume 01BFCA24 found on FC102:12 as volume number 012
PPRC State=simplex, status=none, FlashCopy_state=none, Size=0.5_GB
******************************************************************
rsQuery: Command successful
```

rsQueryComplete.exe

The **rsQueryComplete.exe** command accepts ESS Copy Services server tasks as defined and saved from the ESS Copy Services interface and determines whether all volumes defined in the given tasks have completed the initial PPRC synchronization.

When the **rsQueryComplete.exe** command is executed on grouped tasks, the output displays the first subtask until it has reached the completion threshold; and then it displays the next subtask until it has reached the completion threshold. It repeats this process until all the subtasks are queried.

You can invoke the **rsQueryComplete.exe** command only on tasks that create PPRC pairs. You cannot invoke the **rsQueryComplete.exe** command on tasks that create FlashCopy pairs.

Syntax

The syntax for the **rsQueryComplete.exe** command is:

```
rsQueryComplete.exe [/v] {/u username /p password| /a securityfilepath} [/m
minutes] [/t threshold] /s primaryserver [/b backupserver] tasknames
```

Flags and parameters

Table 52 lists and describes the flags and parameters for the **rsQueryComplete.exe** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Table 52. rsQueryComplete.exe command flags and parameters for Windows NT or Windows 2000 host systems

Flag	Parameter	Description
/v	None	/v is the verbose flag. When you use the /v flag, the command will display all responses from the server. This flag is optional.
/u	username	The username parameter specifies the username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services has enabled password protection for host CLI commands, and if the /a flag and the securityfilepath parameter are not used.
/p	password	The password parameter specifies the password of a username that is authorized to execute CLI commands. This parameter is required if the administrator for the ESS Copy Services has enabled password protection for host CLI commands, and if the /a flag and the securityfilepath parameter are not used.

Table 52. rsQueryComplete.exe command flags and parameters for Windows NT or Windows 2000 host systems (continued)

Flag	Parameter	Description
/a	securityfilepath	The securityfilepath parameter specifies the full path to the file that contains the username and password defined at the ESS Copy Services server for the use of host CLI commands. This parameter is required if the administrator for the ESS Copy Services server has enabled password protection for host CLI commands, and if the /u username and /p password flags and parameters are not used. The format of this file is as follows: `username password`
/m	minutes	The /m flag and the minutes parameter are optional. The minutes parameter specifies the number of minute intervals between queries for verifying when the PPRC initialization has completed. The default is 1 minute.
/t	threshold	The /t flag and the threshold parameter are optional. The threshold parameter specifies the threshold percentage that defines completion. The default is 100%.
/s	primaryserver	The primaryserver parameter specifies the IP address or the complete host name of the ESS Copy Services primary server. Before you use this parameter, you must identify and configure an ESS Copy Services server.
/b	backupserver	The /b flag and backupserver parameter are optional. The backupserver parameter specifies the IP address or the complete host name of the ESS Copy Services backup server. Before you use this server, the primary server must be down.
None	tasknames	The tasknames parameter specifies the name of one or more previously saved ESS Copy Services established PPRC tasks, for which you want to query the initial copy completion of the volumes in those tasks. To specify more than one task, separate the task names with a space.

Output samples

The following is an example of the output you see when you invoke the **rsQueryComplete.exe** command with default settings for the minutes (/m) and threshold (/t) parameters on a Windows NT or Windows 2000 host system:

```
C:\Program Files\IBM 2105 CLI>rsQueryComplete.exe /v /u yourusername
/p yourpassword /s primaryservername es_pair_12
rsQueryComplete: Got task manager reference
rsQueryComplete: --------- Task Name: es_pair_12 ---------
rsQueryComplete: Task es_pair_12 found by TaskManager
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 1
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 17
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 35
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 63
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 82
rsQueryComplete: waiting 60 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 100
rsQueryComplete: ------------------------------------------------
rsQueryComplete: Command successful
```

The following is an example of the output you see when you invoke the **rsQueryComplete.exe** command and specify the minutes (/m) parameter with a value of 2 and the threshold (/t) parameter with a value of 80% on a Windows NT or Windows 2000 host system:

```
C:\Program Files\IBM 2105 CLI>rsQueryComplete.exe /v /u yourusername
/p yourpassword /m 2 /t 80 /s primaryservername es_pair_12
rsQueryComplete: Got task manager reference
rsQueryComplete: --------- Task Name: es_pair_12 ---------
rsQueryComplete: Task es_pair_12 found by TaskManager
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 1
rsQueryComplete: waiting 120 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 35
rsQueryComplete: waiting 120 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 82
rsQueryComplete: ------------------------------------------------
rsQueryComplete: Command successful
```

rsTestConnection.exe

The **rsTestConnection.exe** command determines whether you can successfully connect to the ESS Copy Services server.

Syntax

The syntax for the **rsTestConnection.exe** command is:

```
rsTestConnection.exe [/v] /s servername
```

Flags and parameters

Table 53 on page 125 lists and describes the flags and parameters for the **rsTestConnection.exe** command. It also explains the required or optional flags and parameters, and it explains the flags that use a parameter.

Table 53. rsTestConnection.exe command flags and parameters for Windows NT or Windows 2000 host systems

Flag	Parameter	Description
/v	None	/v is the verbose flag. When you use the /v flag, the command will display all responses from the server. This flag is optional.
/s	servername	The servername parameter specifies the IP address or the complete host name of the ESS Copy Services server for which you want to test the connection.

Output samples

The following is an example of the output you see when you invoke the **rsTestConnection.exe** command on a Windows NT or Windows 2000 host system:

```
C:\Program Files\IBM 2105 CLI>rsTestConnection.exe /v /s primaryservername
rsWebTest: Using yourhostname as server name
rsWebTest: rsVSServer reference obtained successfully
rsWebTest: rsVSServer reference narrowed successfully
rsWebTest: HeartBeat to the server was successful.
rsWebTest: command successful
```

Chapter 9. Return codes and messages

This chapter helps you understand the following types of return codes and messages from the Copy Services CLI:

- Successful completion return codes and messages
- Miscellaneous return codes and messages
- Server connection return codes and messages
- Exception-related return codes and messages
- Command-failure return codes and messages.

Whenever possible, it explains what actions you must take to respond to a CLI code and message.

Successful completion return codes and messages

The following is the return code and message you see when the command you invoke is successful.

0 = Task completed or command successful
The command executed successfully.

Miscellaneous return codes and messages

The following is a list of codes and messages that are returned by CLI commands:

1 = Username not specified or missing parameter username
You specified the -u or /u flag, but you did not specify the username parameter, or you did not enter a valid username.

2 = Password not specified or missing parameter for password
You specified the -u or /u flag, but you did not specify the password parameter, or you entered the password incorrectly.

3 = Server name not specified
You did not specify the required IP address or host name of the ESS Copy Services server.

4 = No task names specified
You must specify at least one task to run. A task can be defined using the ESS Copy Services panels.

5 = Missing parameter disk serial numbers
You collected the configuration information for the ESS logical unit numbers (LUNs) configured on this host, but the ESS serial number for some of the volumes was not available. Verify that the ESS LUNs are correctly configured to your host system.

6 = Mismatching number of disk pairs specified
You collected the configuration information for the ESS LUNs configured on this host, but some of the information was not available. Verify that the ESS LUNs are correctly configured to your host system correctly and try the command again.

7 = Missing parameter local disks
You collected the configuration information for the ESS LUNs configured on

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the host, but some of the information was not available. Verify that the ESS LUNs are correctly configured to your host system, and try the command again.

8 = No disk pairs specified
You collected the configuration information for the ESS LUNs configured on this host, but some of the information was not available. Verify that the ESS LUNs are correctly configured to your host system, and try the command again.

9 = Missing parameter hostname to be deleted
You specified the -d or /d flag to remove a host definition from the ESS Copy Services. You must specify the complete hostname of the host you want to delete.

10 = Missing parameters
You must specify either the -q or /q flag with a volume name or the -f or /f flag with a filename of the file containing the volumes you want to query.

11 = Missing parameter minutes between samples
You specified the -m or /m flag, but the argument to the minutes parameter was not specified.

12 = Missing parameter threshold
You specified the -t or /t flag, but the argument to the threshold parameter was not specified.

13 = No 2105 volumes found
There are no ESS 2105 volumes configured to the host system.

14 = Volume list not specified
You must specify either the -q or /q flag with a volume name or the -f or /f flag with a filename of the file containing the volumes you want to query.

15 = Conflicting parameters
You specified the -q or /q flag and the -f or /f flag. These parameters conflict.

Example:

```
rsQuery.sh -q volume ..
```

or

```
rsQuery.sh /f filename..
```

16 = More volumes per line
The format of the file with the -f or /f flag is not correct. You must specify either one or two volumes per line of the file. You have specified more than two volumes in at least one or more lines of the file.

17 = Volume list file ″$FILENAME″ does not exist
The volume list file with the filename you specified does not exist.

18 = No volumes specified or no volumes specified in a given file
You must either specify the -q or /q flag with a volume name or the -f or /f flag with a filename of the file containing the volumes you want to query.

19 = Invalid parameter specified
You have made one of the following errors:

- Specified a parameter that does not exist for the given command
- Included a space between the minus ("-") or slash ("/") sign
- Typed a flag without the minus ("-") or slash ("/") sign

Issue the command with no arguments, and you will get the usage or the correct syntax for the command. Refer to the usage information for the command.

20 = Missing argument for a parameter
You specified a flag but did not follow it by a required argument. Refer to the usage information for the command.

Issue the command with no arguments, and you will get the usage information or the correct syntax for the command.

21 = No parameter specified
You did not specify any flag. Refer to the usage information for the command.

Issue the command with no arguments, and you will get the usage or the correct syntax for the command.

22 = Missing parameter securityfilepath
You specified the -a or /a flag, which indicates that the username and password should be read from a file. You must specify the full path to the file that contains the username and password.

23 = Security file filename could not be found
You specified the `-a` or `/a` flag with a filename. The file cannot be found. Correct the name of the file and try again.

24 = Format of security file filename is incorrect
The security file that you specified does not have the correct format. The correct format for this file is `username password` (where the username and password are on the same line but separated by one or more spaces).

25 = Some of the volumes could not be found
Some of the volumes could not be found. You have issued an **rsQuery.sh** command on some volumes that could not be found on the ESS Copy Services server. Verify the volume names and try again.

26 = Unsuccessful
The command did not successfully complete. In the case of the **rsExecuteTask** command, one of more invoked tasks did not successfully complete.

27 = The volume filename could not be found
The file containing volume hostnames and serial numbers could not be found. Try to run the command again.

Server connection return codes and messages

The following is a list of server connection codes and messages that are returned by CLI commands:

40 = Failed to connect to server
The connection failed due to one or more of the following reasons:

- There is a communication problem between the host system and the server.
- The given username or password is not correct.
- The version of the Copy Services CLI is incompatible with the version of the ESS code.

- The username or password is not specified if the administrative user has enabled the password protection for host commands on the ESS Specialist Copy Services Configuration panel.

41 = The primary server is down and there is no backup server specified. The task did not finish.
A communication problem occurred when you tried to connect to the server. The problem might be a temporary network problem, or it might be a problem with the ESS Copy Services server. Try again later or specify a backup server.

42 = The primary and backup servers are down. The task is not completed.
A communication problem occurred when you tried to connect to the primary server and the backup server. The problem might be a temporary network problem, or it might be a problem with the Copy Services server. Try again later.

43 = Failed while creating communication to server
A communication problem occurred when you executed the command.

44 = Failed while disconnecting from server
A communication problem occurred when you disconnected from the server.

45 = The backup server is down and there is no primary server specified. The task is not completed.
A communication problem occurred when you tried to connect to the backup server. You did not specify the primary server. You may want to retry the command specifying the primary server. The problem might be a temporary network problem, or it might be a problem with the ESS Copy Services server.

50 = Heartbeat to the server failed.
Connection to the server cannot be established at this time. Verify that the ESS Copy Services server is active. See *IBM TotalStorage Enterprise Storage Server Web Interface User's Guide* for more information. The problem might also be due to a temporary network problem.

51 = Failed while creating ORB
The command failed because of an internal code or communication problem.

Exception-related return codes and messages

The following is a list of exception-related codes and messages that are returned by CLI commands:

60 = A system exception occurred
The command failed because of an internal code or communication problem.

61 = Exception occurred while reading the security file filename
The command failed because of an internal code or communication problem.

62 = Exception occurred while reading the volume filename
The command failed because of an internal code or communication problem.

Command-failure return codes and messages

The following is the return code and message you will receive when a CLI command fails.

80 = Command failed

A communication problem occurred when you executed the command.

Chapter 10. Troubleshooting

This chapter provides instructions for you to diagnose and correct the problems that might occur in one or more of the following areas:

- Connections between the ESS Copy Services server and your host system
- Communication links between the ESS Copy Services server and your host system
- Allocation of ESS volumes for your host system

Connections between the ESS Copy Services server and your host system

If an **rsTestConnection** or **rsTConn** command fails, you need to perform one or more of the following tasks to correct the connection problems.

1. Verifying the configuration of the ESS Copy Services server
2. Confirming that the ESS Copy Services is operational

When you issue the **rsTestConnection** command, be sure to use the file extension appropriate to your host system environment.

Verifying the configuration of the ESS Copy Services server

The first diagnostic task is to ensure that the ESS Copy Services server is correctly configured. You can use the ESS Specialist Tools panel to access the ESS Copy Services server.

Perform the following steps after you open the ESS Specialist Web Interface:

1. Log onto the ESS Specialist as an administrator.
2. From the ESS Specialist Welcome panel, click **Tools** to link to the Tools panel.
3. Click **Determining which Copy Services server is the active server?**
4. Click **Find the active Copy Services server.**

   The next panel displays two tables. The first table contains the Current Configuration information.
5. In the Current Configuration table, verify that the primary and backup servers are configured and that the IP addresses are correct.

   Contact your maintenance support representative or the IBM Service Support Representative for assistance if the primary and backup servers are not configured or if the IP addresses are incorrect.
6. In the Current Configuration table, verify that the IP address of the ESS Copy Services primary server matches the IP address that you used when you invoked the **rsTestConnection** command.

   If the IP addresses match, proceed to the next diagnostic task, “Confirming that the ESS Copy Services is operational” on page 134.

   Perform the following steps if the IP addresses do not match:

   a. Use the IP address of the ESS Copy Services primary server to execute the **rsTestConnection** command.

   b. If the **rsTestConnection** command is still not successful, proceed to the next diagnostic task, “Confirming that the ESS Copy Services is operational” on page 134.

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Confirming that the ESS Copy Services is operational

The next diagnostic task is to ensure that the ESS Copy Services server is up and running. You can use the ESS Specialist Storage Allocation panel to access the ESS Copy Services server.

Perform the following steps to verify that the ESS Copy Services server is operational:

1. Log onto the ESS Specialist as an administrator.

   The ESS Specialist Welcome panel opens.
2. Click **Copy Services** from the ESS Specialist Welcome panel.

   If the ESS Copy Services displays the Welcome panel, it means that the ESS Copy Services server is up and running.

   If you cannot access the ESS Copy Services, it is possible that the ESS Copy Services servers are not operational. You might need to perform a restart.
3. **Attention:** Restarting ESS Copy Services is a disruptive action. It is not recommended that you use the restart function unless there are no other options. See *IBM TotalStorage Enterprise Storage Server Web Interface User's Guide* for instructions for restarting the ESS Copy Services.

   It is your responsibility to ensure that no one is using the ESS Copy Services before implementing a restart or disable action to the ESS Copy Services. Be aware of the impacts of implementing a restart to the ESS Copy Services. See *IBM TotalStorage Enterprise Storage Server Web Interface User's Guide* for more information about the impacts of restarting ESS Copy Services.
   Restart ESS Copy Services.
4. Invoke the **rsTestConnection** command to verify your connection to the ESS Copy Services server.

   Contact your maintenance support representative or the IBM SSR if the **rsTestConnection** command is still not successful.

Communication links between the ESS Copy Services server and your host system

If the communication link between the Copy Services server and your host system is not established or working, you need to use the ESS Specialist to configure the link.

- See *IBM TotalStorage Enterprise Storage Server Web Interface User's Guide* for detailed instructions for configuring the ESS communications.
- Use the Communication Resources Work Sheet available in *IBM TotalStorage Enterprise Storage Server Introduction and Planning Guide* to plan the ESS Communications configuration.

Allocation of ESS volumes for your host system

If an **rsList2105s** or **rsL2105s** command does not detect any ESS volumes allocated for your host system, you must allocate them before you can use the Copy Services CLI. If an **rsList2105s** or **rsL2105s** command indicates incorrect allocation of ESS volumes for your host system, you must correct and verify the allocation.

See *IBM TotalStorage Enterprise Storage Server Web Interface User's Guide* and *IBM TotalStorage Enterprise Storage Server Quick Configuration Guide* for detailed instructions for using the ESS Specialist.

Complete the following steps to allocate and verify ESS volumes for your host system.

Note: Be sure to use the file extension appropriate to your host system environment when you issue the **rsList2105s** command.

1. Access the ESS Specialist.
2. From the ESS Specialist Welcome panel, click **Storage Allocation**.

   If your host system is configured in the ESS, you will see icons that represent the host system.
3. Click **Tabular View** from the ESS Specialist Storage Allocation panel.

   Sort the table using the first column (Host/SSID) as the first sort. Scroll down to find the host system in the first column. The serial numbers of the logical volumes that are configured to the host system are displayed in the third column.
4. On your host system, run the operating system commands to configure new logical volumes to the system. See *IBM TotalStorage Enterprise Storage Server Web Interface User's Guide* for more information.
5. On your host system, issue either the **rsList2105s** or **rsL2105s** command to generate a list of ESS logical volumes that are currently configured to that host.
6. Verify that in the Tabular View of the ESS Specialist, the logical volume serial numbers configured to your host system match those in the output from the **rsList2105s** or **rsL2105s** command.

   Shut down and restart your host system if the logical volume serial numbers configured to your host system in the ESS Specialist do not match those in the output from the **rsList2105s** or **rsL2105s** command.

Statement of Limited Warranty

Part 1 – General Terms

International Business Machines Corporation

Armonk, New York, 10504

This Statement of Limited Warranty includes Part 1 - General Terms and Part 2 - Country or region-unique Terms. The terms of Part 2 may replace or modify those of Part 1. The warranties provided by IBM in this Statement of Limited Warranty apply only to Machines you purchase for your use, and not for resale, from IBM or your reseller. The term "Machine" means an IBM machine, its features, conversions, upgrades, elements, or accessories, or any combination of them. The term "Machine" does not include any software programs, whether pre-loaded with the Machine, installed subsequently or otherwise. Unless IBM specifies otherwise, the following warranties apply only in the country or region where you acquire the Machine. Nothing in this Statement of Warranty affects any statutory rights of consumers that cannot be waived or limited by contract. If you have any questions, contact IBM or your reseller.

Unless IBM specifies otherwise, the following warranties apply only in the country or region where you acquire the Machine. If you have any questions, contact IBM or your reseller.

Machine: IBM 2105 (Models E10, E20, F10, and F20) TotalStorage Enterprise Storage Server (ESS)

Warranty Period: Three Years *

**Contact your place of purchase for warranty service information. Some IBM Machines are eligible for On-site warranty service depending on the country or region where service is performed.*

The IBM Warranty for Machines

IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications ("Specifications"). The warranty period for a Machine is a specified, fixed period commencing on its Date of Installation. The date on your sales receipt is the Date of Installation, unless IBM or your reseller informs you otherwise.

During the warranty period IBM or your reseller, if approved by IBM to provide warranty service, will provide repair and exchange service for the Machine, without charge, under the type of service designated for the Machine and will manage and install engineering changes that apply to the Machine.

If a Machine does not function as warranted during the warranty period, and IBM or your reseller are unable to either 1) make it do so or 2) replace it with one that is at least functionally equivalent, you may return it to your place of purchase and your money will be refunded. The replacement may not be new, but will be in good working order.

Extent of Warranty

The warranty does not cover the repair or exchange of a Machine resulting from misuse, accident, modification, unsuitable physical or operating environment,

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improper maintenance by you, or failure caused by a product for which IBM is not responsible. The warranty is voided by removal or alteration of Machine or parts identification labels.

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Items Not Covered by Warranty

IBM does not warrant uninterrupted or error-free operation of a Machine.

Unless specified otherwise, IBM provides non-IBM machines **WITHOUT WARRANTIES OF ANY KIND.**

Any technical or other support provided for a Machine under warranty, such as assistance via telephone with ″how-to″ questions and those regarding Machine setup and installation, will be provided **WITHOUT WARRANTIES OF ANY KIND.**

Warranty Service

To obtain warranty service for the Machine, contact your reseller or IBM. In the United States, call IBM at **1-800-IBM-SERV (426-7378)**. In Canada, call IBM at **1-800-465-6666** . You may be required to present proof of purchase.

IBM or your reseller provides certain types of repair and exchange service, either at your location or at a service center, to keep Machines in, or restore them to, conformance with their Specifications. IBM or your reseller will inform you of the available types of service for a Machine based on its country or region of installation. IBM may repair the failing Machine or exchange it at its discretion.

When warranty service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours. You represent that all removed items are genuine and unaltered. The replacement may not be new, but will be in good working order and at least functionally equivalent to the item replaced. The replacement assumes the warranty service status of the replaced item.

Any feature, conversion, or upgrade IBM or your reseller services must be installed on a Machine which is 1) for certain Machines, the designated, serial-numbered Machine and 2) at an engineering-change level compatible with the feature, conversion, or upgrade. Many features, conversions, or upgrades involve the removal of parts and their return to IBM. A part that replaces a removed part will assume the warranty service status of the removed part.

Before IBM or your reseller exchanges a Machine or part, you agree to remove all features, parts, options, alterations, and attachments not under warranty service.

You also agree to

1. ensure that the Machine is free of any legal obligations or restrictions that prevent its exchange;.
2. obtain authorization from the owner to have IBM or your reseller service a Machine that you do not own; and
3. where applicable, before service is provided
   a. follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provides,
   b. secure all programs, data, and funds contained in a Machine,
   c. provide IBM or your reseller with sufficient, free, and safe access to your facilities to permit them to fulfill their obligations, and
   d. inform IBM or your reseller of changes in a Machine's location.

IBM is responsible for loss of, or damage to, your Machine while it is 1) in IBM's possession or 2) in transit in those cases where IBM is responsible for the transportation charges.

Neither IBM nor your reseller is responsible for any of your confidential, proprietary or personal information contained in a Machine which you return to IBM or your reseller for any reason. You should remove all such information from the Machine prior to its return.

Production Status

Each IBM Machine is manufactured from new parts, or new and used parts. In some cases, the Machine may not be new and may have been previously installed. Regardless of the Machine's production status, IBM's appropriate warranty terms apply.

Limitation of Liability

Circumstances may arise where, because of a default on IBM's part or other liability, you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages from IBM (including fundamental breach, negligence, misrepresentation, or other contract or tort claim), IBM is liable for no more than

1. damages for bodily injury (including death) and damage to real property and tangible personal property; and
2. the amount of any other actual direct damages, up to the greater of U.S. $100,000 (or equivalent in local currency) or the charges (if recurring, 12 months' charges apply) for the Machine that is the subject of the claim.

   This limit also applies to IBM's suppliers and your reseller. It is the maximum for which IBM, its suppliers, and your reseller are collectively responsible.

UNDER NO CIRCUMSTANCES IS IBM LIABLE FOR ANY OF THE FOLLOWING: 1) THIRD-PARTY CLAIMS AGAINST YOU FOR DAMAGES (OTHER THAN THOSE UNDER THE FIRST ITEM LISTED ABOVE); 2) LOSS OF, OR DAMAGE TO, YOUR RECORDS OR DATA; OR 3) SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES (INCLUDING LOST PROFITS OR SAVINGS), EVEN IF IBM, ITS SUPPLIERS OR YOUR RESELLER IS INFORMED OF THEIR POSSIBILITY. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

Part 2 - Country or region-unique Terms

ASIA PACIFIC

AUSTRALIA: The IBM Warranty for Machines: The following paragraph is added to this Section: The warranties specified in this Section are in addition to any rights you may have under the Trade Practices Act 1974 or other legislation and are only limited to the extent permitted by the applicable legislation.

Extent of Warranty: The following replaces the first and second sentences of this Section: The warranty does not cover the repair or exchange of a Machine resulting from misuse, accident, modification, unsuitable physical or operating environment, operation in other than the Specified Operating Environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible.

Limitation of Liability: The following is added to this Section: Where IBM is in breach of a condition or warranty implied by the Trade Practices Act 1974, IBM's liability is limited to the repair or replacement of the goods or the supply of equivalent goods. Where that condition or warranty relates to right to sell, quiet possession or clear title, or the goods are of a kind ordinarily acquired for personal, domestic or household use or consumption, then none of the limitations in this paragraph apply.

PEOPLE'S REPUBLIC OF CHINA: Governing Law: The following is added to this Statement: The laws of the State of New York govern this Statement.

INDIA: Limitation of Liability: The following replaces items 1 and 2 of this Section: 1. liability for bodily injury (including death) or damage to real property and tangible personal property will be limited to that caused by IBM's negligence; 2. as to any other actual damage arising in any situation involving nonperformance by IBM pursuant to, or in any way related to the subject of this Statement of Limited Warranty, IBM's liability will be limited to the charge paid by you for the individual Machine that is the subject of the claim.

NEW ZEALAND: The IBM Warranty for Machines: The following paragraph is added to this Section: The warranties specified in this Section are in addition to any rights you may have under the Consumer Guarantees Act 1993 or other legislation which cannot be excluded or limited. The Consumer Guarantees Act 1993 will not apply in respect of any goods which IBM provides, if you require the goods for the purposes of a business as defined in that Act.

Limitation of Liability: The following is added to this Section: Where Machines are not acquired for the purposes of a business as defined in the Consumer Guarantees Act 1993, the limitations in this Section are subject to the limitations in that Act.

EUROPE, MIDDLE EAST, AFRICA (EMEA)

The following terms apply to all EMEA countries or regions.

The terms of this Statement of Limited Warranty apply to Machines purchased from an IBM reseller. If you purchased this Machine from IBM, the terms and conditions of the applicable IBM agreement prevail over this warranty statement.

Warranty Service

If you purchased an IBM Machine in Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland or United Kingdom, you may obtain warranty service for that Machine in any of those countries or regions from either (1) an IBM reseller approved to perform warranty service or (2) from IBM.

If you purchased an IBM Personal Computer Machine in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Hungary, Kazakhstan, Kirghizia, Federal Republic of Yugoslavia, Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, or Ukraine, you may obtain warranty service for that Machine in any of those countries or regions from either (1) an IBM reseller approved to perform warranty service or (2) from IBM.

The applicable laws, Country or region-unique terms and competent court for this Statement are those of the country or region in which the warranty service is being provided. However, the laws of Austria govern this Statement if the warranty service is provided in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Federal Republic of Yugoslavia, Georgia, Hungary, Kazakhstan, Kirghizia, Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, and Ukraine.

The following terms apply to the country or region specified:

EGYPT: Limitation of Liability: The following replaces item 2 in this Section: 2. as to any other actual direct damages, IBM's liability will be limited to the total amount you paid for the Machine that is the subject of the claim.

Applicability of suppliers and resellers (unchanged).

FRANCE: Limitation of Liability: The following replaces the second sentence of the first paragraph of this Section:

In such instances, regardless of the basis on which you are entitled to claim damages from IBM, IBM is liable for no more than: (items 1 and 2 unchanged).

GERMANY: The IBM Warranty for Machines: The following replaces the first sentence of the first paragraph of this Section:

The warranty for an IBM Machine covers the functionality of the Machine for its normal use and the Machine's conformity to its Specifications.

The following paragraphs are added to this Section:

The minimum warranty period for Machines is six months.

In case IBM or your reseller are unable to repair an IBM Machine, you can alternatively ask for a partial refund as far as justified by the reduced value of the unrepaired Machine or ask for a cancellation of the respective agreement for such Machine and get your money refunded.

Extent of Warranty: The second paragraph does not apply.

Warranty Service: The following is added to this Section: During the warranty period, transportation for delivery of the failing Machine to IBM will be at IBM's expense.

Production Status: The following paragraph replaces this Section: Each Machine is newly manufactured. It may incorporate in addition to new parts, reused parts as well.

Limitation of Liability: The following is added to this Section:

The limitations and exclusions specified in the Statement of Limited Warranty will not apply to damages caused by IBM with fraud or gross negligence and for express warranty.

In item 2, replace ″U.S. $100,000″ with ″1,000,000 DM.″

The following sentence is added to the end of the first paragraph of item 2:

IBM's liability under this item is limited to the violation of essential contractual terms in cases of ordinary negligence.

IRELAND: Extent of Warranty: The following is added to this Section:

Except as expressly provided in these terms and conditions, all statutory conditions, including all warranties implied, but without prejudice to the generality of the foregoing all warranties implied by the Sale of Goods Act 1893 or the Sale of Goods and Supply of Services Act 1980 are hereby excluded.

Limitation of Liability: The following replaces items one and two of the first paragraph of this Section:

1. death or personal injury or physical damage to your real property solely caused by IBM's negligence; and 2. the amount of any other actual direct damages, up to the greater of Irish Pounds 75,000 or 125 percent of the charges (if recurring, the 12 months' charges apply) for the Machine that is the subject of the claim or which otherwise gives rise to the claim.

Applicability of suppliers and resellers (unchanged).

The following paragraph is added at the end of this Section:

IBM's entire liability and your sole remedy, whether in contract or in tort, in respect of any default shall be limited to damages.

ITALY: Limitation of Liability: The following replaces the second sentence in the first paragraph:

In each such instance unless otherwise provided by mandatory law, IBM is liable for no more than: (item 1 unchanged) 2) as to any other actual damage arising in all situations involving nonperformance by IBM pursuant to, or in any way related to the subject matter of this Statement of Warranty, IBM's liability, will be limited to the total amount you paid for the Machine that is the subject of the claim.

Applicability of suppliers and resellers (unchanged).

The following replaces the second paragraph of this Section:

Unless otherwise provided by mandatory law, IBM and your reseller are not liable for any of the following: (items 1 and 2 unchanged) 3) indirect damages, even if IBM or your reseller is informed of their possibility.

SOUTH AFRICA, NAMIBIA, BOTSWANA, LESOTHO AND SWAZILAND: Limitation of Liability: The following is added to this Section:

IBM's entire liability to you for actual damages arising in all situations involving nonperformance by IBM in respect of the subject matter of this Statement of Warranty will be limited to the charge paid by you for the individual Machine that is the subject of your claim from IBM.

TURKIYE: Production Status: The following replaces this Section:

IBM fulfills customer orders for IBM Machines as newly manufactured in accordance with IBM's production standards.

UNITED KINGDOM: Limitation of Liability: The following replaces items 1 and 2 of the first paragraph of this Section:

1. death or personal injury or physical damage to your real property solely caused by IBM's negligence;

2. the amount of any other actual direct damages or loss, up to the greater of Pounds Sterling 150,000 or 125 percent of the charges (if recurring, the 12 months' charges apply) for the Machine that is the subject of the claim or which otherwise gives rise to the claim;

The following item is added to this paragraph:

3. breach of IBM's obligations implied by Section 12 of the Sale of Goods Act 1979 or Section 2 of the Supply of Goods and Services Act 1982.

Applicability of suppliers and resellers (unchanged).

The following is added to the end of this Section:

IBM's entire liability and your sole remedy, whether in contract or in tort, in respect of any default will be limited to damages.

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This equipment has been tested and complies with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, might cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

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This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device might not cause harmful interference, and (2) this device must accept any interference received, including interference that might cause undesired operation.

Industry Canada compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conform à la norme NMB-003 du Canada.

European community compliance statement

This product is in conformity with the protection requirements of EC Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards.

Germany only

Zulassungsbescheinigung laut Gesetz ueber die elektromagnetische Vertraeglichkeit von Geraeten (EMVG) vom 30. August 1995.

Dieses Geraet ist berechtigt, in Uebereinstimmung mit dem deutschen EMVG das EG-Konformitaetszeichen - CE - zu fuehren.

Der Aussteller der Konformitaetserklaeung ist die IBM Deutschland.

Informationen in Hinsicht EMVG Paragraph 3 Abs. (2) 2:

Das Geraet erfuellt die Schutzanforderungen nach EN 50082-1 und EN 55022 Klasse A.

EN 55022 Klasse A Geraete beduerfen folgender Hinweise:

Nach dem EMVG:

"Geraete duerfen an Orten, fuer die sie nicht ausreichend entstoert sind, nur mit besonderer Genehmigung des Bundesministeriums fuer Post und Telekommunikation oder des Bundesamtes fuer Post und Telekommunikation
betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Stoerungen zu erwarten sind." (Auszug aus dem EMVG, Paragraph 3, Abs.4)

Dieses Genehmigungsverfahren ist nach Paragraph 9 EMVG in Verbindung mit der entsprechenden Kostenverordnung (Amtsblatt 14/93) kostenpflichtig.

Nach der EN 55022:

"Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstoerungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Massnahmen durchzufuehren und dafuer aufzukommen."

Anmerkung:

Um die Einhaltung des EMVG sicherzustellen, sind die Geraete wie in den Handbuechern angegeben zu installieren und zu betreiben.

Japanese Voluntary Control Council for Interference (VCCI) class A statement

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Korean government Ministry of Communication (MOC) statement

Please note that this device has been approved for business purpose with regard to electromagnetic interference. If you find this is not suitable for your use, you may exchange it for a nonbusiness purpose one.

Taiwan class A compliance statement

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1. Form Z125-4144

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Glossary

This glossary includes terms for the IBM TotalStorage Enterprise Storage Server (ESS) and other Seascape solution products.

This glossary includes selected terms and definitions from:

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- The *Information Technology Vocabulary* developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and the International Electrotechnical Commission (SIO/IEC JTC1/SC1). Definitions derived from this book have the symbol (I) after the definition. Definitions taken from draft international standards, committee drafts, and working papers being developed by ISO/IEC JTC1/SCI have the symbol (T) after the definition, indicating that final agreement has not been reached among the participating National Bodies of SCI.

This glossary uses the following cross-reference form:

See This refers the reader to one of three kinds of related information:

- A related term
- A term that is the expanded form of an abbreviation or acronym
- A synonym or more preferred term

A

access. (1) To obtain the use of a computer resource. (2) In computer security, a specific type of interaction between a subject and an object that results in flow of information from one to the other.

access-any mode. One of the two access modes that can be set for the ESS during initial configuration. It enables all fibre-channel-attached host systems with no defined access profile to access all logical volumes on the ESS. With a profile defined in ESS Specialist for a particular host, that host has access only to volumes that are assigned to the WWPN for that host. See *pseudo-host* and *worldwide port name*.

active Copy Services server. The Copy Services server that manages the Copy Services domain. Either the primary or the backup Copy Services server can be the active Copy Services server. The backup Copy Services server is available to become the active Copy Services server if the primary Copy Services server fails. See *backup Copy Services server* and *primary Copy Services server*.

alert. A message or log that a storage facility generates as the result of error event collection and analysis. An alert indicates that a service action is required.

allegiance. In Enterprise Systems Architecture/390, a relationship that is created between a device and one or more channel paths during the processing of certain conditions. See *implicit allegiance*, *contingent allegiance*, and *reserved allegiance*.

allocated storage. On an ESS, the space allocated to volumes, but not yet assigned. See *assigned storage*.

American National Standards Institute (ANSI). An organization of producers, consumers, and general interest groups that establishes the procedures by which accredited organizations create and maintain voluntary industry standards in the United States. (A)

Anonymous. The label in ESS Specialist on an icon representing all connections using fibre-channel adapters between the ESS and hosts that are not completely defined to the ESS. See *anonymous host*, *pseudo-host*, and *access-any mode*.

anonymous host. Synonym for “pseudo-host” (in contrast to the Anonymous label that appears on some pseudo-host icons. See *Anonymous* and *pseudo-host*.

ANSI. See *American National Standards Institute*.

APAR. See *authorized program analysis report*.

arbitrated loop. For fibre-channel connections, a topology that enables the interconnection of a set of nodes. See *point-to-point connection* and *switched fabric*.

array. An ordered collection, or group, of physical devices (disk drive modules) that are used to define logical volumes or devices. More specifically, regarding the ESS, an array is a group of disks designated by the user to be managed by the RAID-5 technique. See *redundant array of inexpensive disks*.

ASCII. American Standard Code for Information Interchange. An ANSI standard (X3.4–1977) for assignment of 7-bit numeric codes (plus 1 bit for parity) to represent alphabetic and numeric characters and

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common symbols. Some organizations, including IBM, have used the parity bit to expand the basic code set.

assigned storage. On an ESS, the space allocated to a volume and assigned to a port.

authorized program analysis report (APAR). A report of a problem caused by a suspected defect in a current, unaltered release of a program.

availability. The degree to which a system or resource is capable of performing its normal function. See *data availability*.

B

backup Copy Services server. One of two Copy Services servers in a Copy Services domain. The other Copy Services server is the primary Copy Services server. The backup Copy Services server is available to become the active Copy Services server if the primary Copy Services server fails. A Copy Services server is software that runs in one of the two clusters of an ESS, and manages data-copy operations for that Copy Services server group. See *primary Copy Services server* and *active Copy Services server*.

bay. Physical space on an ESS used for installing SCSI, ESCON, and fibre-channel host adapter cards. The ESS has four bays, two in each cluster. See *service boundary*.

bit. (1) A binary digit. (2) The storage medium required to store a single binary digit. (3) Either of the digits 0 or 1 when used in the binary numeration system. (T) See *byte*.

block. A group of consecutive bytes used as the basic storage unit in fixed-block architecture (FBA). All blocks on the storage device are the same size (fixed size). See *fixed-block architecture* and *data record*.

byte. (1) A group of eight adjacent binary digits that represent one EBCDIC character. (2) The storage medium required to store eight bits. See *bit*.

C

cache. A buffer storage that contains frequently accessed instructions and data, thereby reducing access time.

cache fast write. A form of the fast-write operation in which the subsystem writes the data directly to cache where it is available for later destaging.

cache hit. An event that occurs when a read operation is sent to the cluster, and the requested data is found in cache. The opposite of *cache miss*.

cache memory. Memory, typically volatile memory, that a subsystem uses to improve access times to instructions or data. The cache memory is typically smaller and faster than the primary memory or storage medium. In addition to residing in cache memory, the same data also resides on the storage devices in the storage facility.

cache miss. An event that occurs when a read operation is sent to the cluster, but the data is not found in cache. The opposite of *cache hit*.

call home. A communication link established between the ESS and a service provider. The ESS can use this link to place a call to IBM or to another service provider when it requires service. With access to the machine, service personnel can perform service tasks, such as viewing error logs and problem logs or initiating trace and dump retrievals. See *heartbeat* and *remote technical assistance information network*.

cascading. (1) Connecting network controllers to each other in a succession of levels, to concentrate many more lines than a single level permits. (2) In high-availability cluster multiprocessing (HACMP), cascading pertains to a cluster configuration in which the cluster node with the highest priority for a particular resource acquires the resource if the primary node fails. The cluster node relinquishes the resource to the primary node upon reintegration of the primary node into the cluster.

catcher. A server that service personnel use to collect and retain status data that an ESS sends to it.

CCR. See *channel-command retry*.

CCW. See *channel command word*.

CD-ROM. See *compact disc, read-only memory*.

CEC. See *computer-electronic complex*.

channel. In Enterprise Systems Architecture/390, the part of a channel subsystem that manages a single I/O interface between a channel subsystem and a set of control units.

channel command retry (CCR). In Enterprise Systems Architecture/390, the protocol used between a channel and a control unit that enables the control unit to request that the channel reissue the current command.

channel command word (CCW). In Enterprise Systems Architecture/390, a data structure that specifies an I/O operation to the channel subsystem.

channel path. In Enterprise Systems Architecture/390, the interconnection between a channel and its associated control units.

channel subsystem. In Enterprise Systems Architecture/390, the part of a host computer that manages I/O communication between the program and any attached control units.

channel-subsystem image. In Enterprise Systems Architecture/390, the logical functions that a system requires to perform the function of a channel subsystem. With ESCON multiple image facility (EMIF), one channel subsystem image exists in the channel subsystem for each logical partition (LPAR). Each image appears to be an independent channel subsystem program, but all images share a common set of hardware facilities.

CKD. See *count key data*.

CLI. See *command-line interface*.

cluster. (1) A partition in the ESS capable of performing all ESS functions. With two clusters in the ESS, any operational cluster can take over the processing of a failing cluster. (2) On an AIX platform, a group of nodes within a complex.

cluster processor complex (CPC). The unit within a cluster that provides the management function for the storage server. It consists of cluster processors, cluster memory, and related logic.

command-line interface (CLI). (1) An interface provided by an operating system that defines a set of commands and enables a user (or a script-like language) to issue these commands by typing text in response to the command prompt (for example, DOS commands, UNIX shell commands). (2) An optional ESS software that enables a user to issue commands to and retrieve information from the Copy Services server.

compact disc, read-only memory (CD-ROM). High-capacity read-only memory in the form of an optically read compact disc.

compression. (1) The process of eliminating gaps, empty fields, redundancies, and unnecessary data to shorten the length of records or blocks. (2) Any encoding that reduces the number of bits used to represent a given message or record.

computer-electronic complex (CEC). The set of hardware facilities associated with a host computer.

Concurrent Copy. A facility on a storage server that enables a program to make a backup of a data set while the logical volume remains available for subsequent processing. The data in the backup copy is frozen at the point in time that the server responds to the request.

concurrent installation of licensed internal code. Process of installing licensed internal code on an ESS while applications continue to run.

concurrent maintenance. Service that is performed on a unit while it is operational.

concurrent media maintenance. Service performed on a disk drive module (DDM) without losing access to the data.

configure. To define the logical and physical configuration of the input/output (I/O) subsystem through the user interface provided for this function on the storage facility.

consistent copy. A copy of a data entity (a logical volume, for example) that contains the contents of the entire data entity at a single instant in time.

console. A user interface to a server, such as can be provided by a personal computer. See *IBM TotalStorage ESS Master Console*.

contingent allegiance. In Enterprise Systems Architecture/390, a relationship that is created in a control unit between a device and a channel when unit-check status is accepted by the channel. The allegiance causes the control unit to guarantee access; the control unit does not present the busy status to the device. This enables the channel to retrieve sense data that is associated with the unit-check status on the channel path associated with the allegiance.

control unit (CU). (1) A device that coordinates and controls the operation of one or more input/output devices, and synchronizes the operation of such devices with the operation of the system as a whole. (2) In Enterprise Systems Architecture/390, a storage server with ESCON, FICON, or OEMI interfaces. The control unit adapts a native device interface to an I/O interface supported by an ESA/390 host system. On an ESS, the control unit would be the parts of the storage server that support the attachment of emulated CKD devices over ESCON, FICON, or OEMI interfaces. See *cluster*.

control-unit image. In Enterprise Systems Architecture/390, a logical subsystem that is accessed through an ESCON or FICON I/O interface. One or more control-unit images exist in each control unit. Each image appears as an independent control unit, but all control-unit image share a common set of hardware facilities. The ESS can emulate 3990-3, TPF, 3990-6, or 2105 control units.

control-unit initiated reconfiguration (CUIR). A software mechanism used by the ESS to request that an operating system verify that one or more subsystem resources can be taken off-line for service. The ESS can use this process to automatically vary channel paths offline and online to facilitate bay service or concurrent code installation. Depending on the operating system, support for this process may be model-dependent, may depend on the IBM Subsystem Device Driver, or may not exist.

Coordinated Universal Time (UTC). The international standard of time that is kept by atomic clocks around the world.

Copy Services client. Software that runs on each ESS cluster in the Copy Services server group and that performs the following functions:

- Communicates configuration, status, and connectivity information to the Copy Services server.
- Performs data-copy functions on behalf of the Copy Services server.

Copy Services server group. A collection of user-designated ESS clusters participating in Copy Services functions managed by a designated active Copy Services server. A Copy Services server group is also called a Copy Services domain.

count field. The first field of a count key data (CKD) record. This eight-byte field contains a four-byte track address (CCHH). It defines the cylinder and head that are associated with the track, and a one-byte record number (R) that identifies the record on the track. It defines a one-byte key length that specifies the length of the record's key field (0 means no key field). It defines a two-byte data length that specifies the length of the record's data field (0 means no data field). Only the end-of-file record has a data length of zero.

count key data (CKD). In Enterprise Systems Architecture/390, a data-record format employing self-defining record formats in which each record is represented by up to three fields—a *count* area identifying the record and specifying its format, an optional *key* area that can be used to identify the data area contents; and an optional *data* area that typically would contain the user data for the record. For CKD records on the ESS, the logical volume size is defined in terms of the device emulation mode (3390 or 3380 track format). The count field is always 8 bytes long and contains the lengths of the key and data fields, the key field has a length of 0 to 255 bytes, and the data field has a length of 0 to 65 535 or the maximum that will fit on the track. Typically, customer data appears in the data field. The use of the key field is dependent on the software managing the storage. See *data record*.

CPC. See *cluster processor complex*.

CRC. See *cyclic redundancy check*.

CU. See *control unit*.

CUIR. See *control-unit initiated reconfiguration*.

customer console. See *console*and *IBM TotalStorage ESS Master Console*.

CUT. See *Coordinated Universal Time*.

cyclic redundancy check (CRC). A redundancy check in which the check key is generated by a cyclic algorithm. (T)

cylinder. A unit of storage on a CKD device. A cylinder has a fixed number of tracks.

D

DA. See *device adapter* and *SSA adapter*.

daisy chain. See *serial connection*.

DASD. See *direct access storage device*.

DASD fast write (DFW). Caching of active write data by a storage server by journaling the data in nonvolatile storage, avoiding exposure to data loss.

data availability. The degree to which data is available when needed, typically measured as a percentage of time that the system would be capable of responding to any data request (for example, 99.999% available).

data compression. A technique or algorithm used to encode data such that the encoded result can be stored in less space than the original data. The original data can be recovered from the encoded result through a reverse technique or reverse algorithm. See *compression*.

Data Facility Storage Management Subsystem. An operating environment that helps automate and centralize the management of storage. To manage storage, DFSMS provides the storage administrator with control over data class, storage class, management class, storage group, and automatic class selection routine definitions.

data field. The optional third field of a count key data (CKD) record. The count field specifies the length of the data field. The data field contains data that the program writes.

data record. The basic unit of S/390 and zSeries storage on an ESS, also known as a count-key-data (CKD) record. Data records are stored on a track. The records are sequentially numbered starting with 0. The first record, R0, is typically called the track descriptor record and contains data normally used by the operating system to manage the track. See *count-key-data* and fixed-block architecture.

data sharing. The ability of homogeneous or divergent host systems to concurrently utilize data that they store on one or more storage devices. The storage facility enables configured storage to be accessible to any, or all, attached host systems. To use this capability, the host program must be designed to support data that it is sharing.

DDM. See *disk drive module*.

DDM group. See *disk drive module group*.

dedicated storage. Storage within a storage facility that is configured such that a single host system has exclusive access to the storage.

demote. To remove a logical data unit from cache memory. A subsystem demotes a data unit in order to make room for other logical data units in the cache. It might also demote a data unit because the logical data unit is not valid. A subsystem must destage logical data units with active write units before they can be demoted.

destaging. (1) Movement of data from an online or higher priority to an offline or lower (2) priority device. The ESS stages incoming data into cache and then destages it to disk.

device. In Enterprise Systems Architecture/390, a disk drive.

device adapter (DA). A physical component of the ESS that provides communication between the clusters and the storage devices. The ESS has eight device adapters that it deploys in pairs, one from each cluster. DA pairing enables the ESS to access any disk drive from either of two paths, providing fault tolerance and enhanced availability.

device address. In Enterprise Systems Architecture/390, the field of an ESCON or FICON device-level frame that selects a specific device on a control-unit image.

device interface card. A physical subunit of a storage cluster that provides the communication with the attached DDMs.

device number. In Enterprise Systems Architecture/390, a four-hexadecimal-character identifier, for example 13A0, that the systems administrator associates with a device to facilitate communication between the program and the host operator. The device number is associated with a subchannel.

device sparing. A subsystem function that automatically copies data from a failing DDM to a spare DDM. The subsystem maintains data access during the process.

direct access storage device (DASD). (1) A mass storage medium on which a computer stores data. (2) A disk device.

disk drive. Standard term for a disk-based nonvolatile storage medium. The ESS uses hard disk drives as the primary nonvolatile storage media to store host data.

disk drive module (DDM). A field replaceable unit that consists of a single disk drive and its associated packaging.

disk drive module group. In the ESS, a group of eight disk drive modules (DDMs) contained in an 8-pack and installed as a unit.

disk group. Pertaining the the ESS, a collection of seven or eight disk drives in the same SSA loop and set up by the ESS to be available to be assigned as a RAID-5 rank. You can format a disk group as CKD or FB, and as RAID or non-RAID, or leave it unassigned.

DNS. See *domain name system*.

domain. (1) That part of a computer network in which the data processing resources are under common control. (2) In TCP/IP, the naming system used in hierarchical networks. (3) A Copy Services server group, in other words, the set of clusters designated by the user to be managed by a particular Copy Services server.

domain name system (DNS). In TCP/IP, the server program that supplies name-to-address translation by mapping domain names to internet addresses. The address of a DNS server is the internet address of the server that hosts the DNS software for the network.

drawer. A unit that contains multiple DDMs and provides power, cooling, and related interconnection logic to make the DDMs accessible to attached host systems.

drive. (1) A peripheral device, especially one that has addressed storage media. See *disk drive module*. (2) The mechanism used to seek, read, and write information on a storage medium.

duplex. A communication mode in which data can be sent and received at the same time.

dynamic sparing. The ability of a storage server to move data from a failing disk drive module (DDM) to a spare DDM while maintaining storage functions.

E

E10. The forerunner of the F10 model of the ESS. See *F10*.

E20. The forerunner of the F20 model of the ESS. See *F20*

EBCDIC. See *extended binary-coded decimal interchange code*.

EC. See *engineering change*.

ECKD. See *extended count key data*.

electrostatic discharge (ESD). An undesirable discharge of static electricity that can damage equipment and degrade electrical circuitry.

emergency power off (EPO). A means of turning off power during an emergency, usually a switch.

EMIF. See *ESCON multiple image facility*.

enclosure. A unit that houses the components of a storage subsystem, such as a control unit, disk drives, and power source.

end of file. A coded character recorded on a data medium to indicate the end of the medium. On a CKD direct access storage device, the subsystem indicates the end of a file by including a record with a data length of zero.

engineering change (EC). An update to a machine, part, or program.

Enterprise Storage Server. See *IBM TotalStorage Enterprise Storage Server*.

Enterprise Systems Architecture/390® (ESA/390) and z/Architecture. IBM architectures for mainframe computers and peripherals. Processor systems that follow the ESA/390 architecture include the ES/9000® family, while the IBM @server zSeries server uses the z/Architecture.

Enterprise Systems Connection (ESCON). (1) An ESA/390 and zSeries computer peripheral interface. The I/O interface uses ESA/390 logical protocols over a serial interface that configures attached units to a communication fabric. (2) A set of IBM products and services that provide a dynamically connected environment within an enterprise.

EPO. See *emergency power off*.

ERP. See *error recovery procedure*.

error recovery procedure (ERP). Procedures designed to help isolate and, where possible, to recover from errors in equipment. The procedures are often used in conjunction with programs that record information on machine malfunctions.

ESA/390. See *Enterprise Systems Architecture/390*.

ESCD. See *ESCON director*.

ESCON. See *Enterprise System Connection*.

ESCON channel. An S/390 or zSeries channel that supports ESCON protocols.

ESCON director (ESCD). An I/O interface switch that provides for the interconnection of multiple ESCON interfaces in a distributed-star topology.

ESCON host systems. S/390 or zSeries hosts that attach to the ESS with an ESCON adapter. Such host systems run on MVS, VM, VSE, or TPF operating systems.

ESCON multiple image facility (EMIF). In Enterprise Systems Architecture/390, a function that enables LPARs to share an ESCON channel path by providing each LPAR with its own channel-subsystem image.

EsconNet. In ESS Specialist, the label on a pseudo-host icon representing a host connection that uses the ESCON protocol and that is not completely defined on the ESS. See *pseudo-host* and *access-any mode*.

ESD. See *electrostatic discharge*.

eserver. See *IBM @server*.

ESS. See *IBM TotalStorage Enterprise Storage Server*.

ESS Expert. See *IBM StorWatch Enterprise Storage Server Expert*.

ESS Specialist. See *IBM TotalStorage Enterprise Storage Server Specialist*.

ESS Copy Services. See *IBM TotalStorage Enterprise Storage Server Copy Services*.

ESS Master Console. See *IBM TotalStorage ESS Master Console*.

ESSNet. See *IBM TotalStorage Enterprise Storage Server Network*.

Expert. See *IBM StorWatch Enterprise Storage Server Expert*.

extended binary-coded decimal interchange code (EBCDIC). A coding scheme developed by IBM used to represent various alphabetic, numeric, and special symbols with a coded character set of 256 eight-bit codes.

extended count key data (ECKD). An extension of the CKD architecture.

Extended Remote Copy (XRC). A function of a storage server that assists a control program to maintain a consistent copy of a logical volume on another storage facility. All modifications of the primary logical volume by any attached host are presented in order to a single host. The host then makes these modifications on the secondary logical volume.

extent. A continuous space on a disk that is occupied by or reserved for a particular data set, data space, or file. The unit of increment is a track. See *multiple allegiance* and *parallel access volumes*.

F

F10. A model of the ESS featuring a single-phase power supply. It has fewer expansion capabilities than the Model F20.

F20. A model of the ESS featuring a three-phase power supply. It has more expansion capabilities than the Model F10, including the ability to support a separate expansion enclosure.

fabric. In fibre-channel technology, a routing structure, such as a switch, receives addressed information and routes to the appropriate destination. A fabric can consist of more than one switch. When multiple fibre-channel switches are interconnected, they are said to be *cascaded*.

failback. Cluster recovery from failover following repair. See *failover*.

failover. On the ESS, the process of transferring all control of a storage facility to a single cluster when the other cluster in the storage facility fails.

fast write. A write operation at cache speed that does not require immediate transfer of data to a disk drive. The subsystem writes the data directly to cache, to nonvolatile storage, or to both. The data is then available for destaging. A fast-write operation reduces the time an application must wait for the I/O operation to complete.

FBA. See *fixed-block architecture*.

FC-AL. See *Fibre Channel-Arbitrated Loop*.

FCP. See *fibre-channel protocol*.

FCS. See *fibre-channel standard*.

feature code. A code that identifies a particular orderable option and that is used by service personnel to process hardware and software orders. Individual optional features are each identified by a unique feature code.

fibre channel (FC). A data-transmission architecture based on the ANSI fibre-channel standard, which supports full-duplex communication. The ESS supports data transmission over fiber-optic cable through its fibre-channel adapters. See *fibre-channel protocol*and *fibre-channel standard*.

Fibre Channel-Arbitrated Loop (FC-AL). An implementation of the fibre-channel standard that uses a ring topology for the communication fabric. Refer to American National Standards Institute (ANSI) X3T11/93-275. In this topology, two or more fibre-channel end points are interconnected through a looped interface. The ESS supports this topology.

fibre-channel connection (FICON). A fibre-channel communications protocol designed for IBM mainframe computers and peripherals.

fibre-channel protocol (FCP). For fibre-channel communication, the protocol has five layers. The layers define how fibre-channel ports interact through their physical links to communicate with other ports.

fibre-channel standard (FCS). An ANSI standard for a computer peripheral interface. The I/O interface defines a protocol for communication over a serial interface that configures attached units to a communication fabric. The protocol has two layers. The IP layer defines basic interconnection protocols. The upper layer supports one or more logical protocols. Refer to American National Standards Institute (ANSI) X3.230-199x.

FICON. See *fibre-channel connection*.

FiconNet. In ESS Specialist, the label on a pseudo-host icon representing a host connection that uses the FICON protocol and that is not completely defined on the ESS. See *pseudo-host* and *access-any mode*.

field replaceable unit (FRU). An assembly that is replaced in its entirety when any one of its components fails. In some cases, a field replaceable unit may contain other field replaceable units.

FIFO. See *first-in-first-out*.

firewall. A protection against unauthorized connection to a computer or a data storage system. The protection is usually in the form of software on a gateway server that grants access to users who meet authorization criteria.

first-in-first-out (FIFO). A queuing technique in which the next item to be retrieved is the item that has been in the queue for the longest time. (A)

fixed-block architecture (FBA). An architecture for logical devices that specifies the format of and access mechanisms for the logical data units on the device. The logical data unit is a block. All blocks on the device are the same size (fixed size). The subsystem can access them independently.

fixed-block device. An architecture for logical devices that specifies the format of the logical data units on the device. The logical data unit is a block. All blocks on the device are the same size (fixed size); the subsystem can access them independently. This is the required format of the logical data units for host systems that attach with a Small Computer System Interface (SCSI) or fibre-channel interface. See *fibre-channel*, *Small Computer System Interface* and *SCSI-FCP*.

FlashCopy. An optional feature for the ESS that can make an instant copy of data, that is, a point-in-time copy of a volume.

FRU. See *field replaceable unit*.

full duplex. See *duplex*.

G

GB. See *gigabyte*.

gigabyte (GB). A gigabyte of storage is 10^9 bytes. A gigabyte of memory is 2^{30} bytes.

GDPS. Geographically Dispersed Parallel Sysplex, an S/390 multi-site application availability solution.

group. See *disk drive module group* or *Copy Services server group*.

H

HA. See *host adapter*.

HACMP. Software that provides host clustering, so that a failure of one host is recovered by moving jobs to other hosts within the cluster; named for high-availability cluster multiprocessing

hard disk drive (HDD). (1) A storage medium within a storage server used to maintain information that the storage server requires. (2) A mass storage medium for computers that is typically available as a fixed disk (such as the disks used in system units of personal computers or in drives that are external to a personal computer) or a removable cartridge.

Hardware Service Manager (HSM). An option selected from System Service Tools or Dedicated Service Tools on the AS/400 or iSeries host that enables the user to display and work with system hardware resources, and to debug input-output processors (IOP), input-output adapters (IOA), and devices.

HDA. See *head and disk assembly*.

HDD. See *hard disk drive*.

hdisk. An AIX term for storage space.

head and disk assembly (HDA). The portion of an HDD associated with the medium and the read/write head.

heartbeat. A status report sent at regular intervals from the ESS. The service provider uses this report to monitor the health of the call home process. See *call home*, *heartbeat call home record*, and *remote technical assistance information network*.

heartbeat call home record. Machine operating and service information sent to a service machine. These records might include such information as feature code information and product logical configuration information.

High Speed Link (HSL). Bus technology for input-output tower attachment on iSeries host.

home address. A nine-byte field at the beginning of a track that contains information that identifies the physical track and its association with a cylinder.

hop. Interswitch connection. A hop count is the number of connections that a particular block of data traverses between source and destination. For example, data traveling from one hub over a wire to another hub traverses one hop.

host adapter (HA). A physical subunit of a storage server that provides the ability to attach to one or more host I/O interfaces. The Enterprise Storage Server has four HA bays, two in each cluster. Each bay supports up to four host adapters.

host processor. A processor that controls all or part of a user application network. In a network, the processing unit in which the data communication access method resides. See *host system*.

host system. (1) A computer system that is connected to the ESS. The ESS supports both mainframe (S/390 or zSeries) hosts as well as open-systems hosts. S/390 or zSeries hosts are connected to the ESS through ESCON or FICON interfaces. Open-systems hosts are connected to the ESS by SCSI or fibre-channel interfaces. (2) The data processing system to which a network is connected and with which the system can communicate. (3) The controlling or highest level system in a data communication configuration.

hot plug. Pertaining to the ability to add or remove a hardware facility or resource to a unit while power is on.

HSL. See *High Speed Link*.

I

IBM @server. The brand name for a series of server products that are optimized for e-commerce. The products include the iSeries, pSeries, xSeries, and zSeries.

IBM product engineering (PE). The third-level of IBM service support. Product engineering is composed of IBM engineers who have experience in supporting a product or who are knowledgeable about the product.

IBM StorWatch Enterprise Storage Server Expert (ESS Expert). The software that gathers performance data from the ESS and presents it through a Web browser.

IBM TotalStorage Enterprise Storage Server (ESS). A member of the Seascape® product family of storage servers and attached storage devices (disk drive modules). The ESS provides for high-performance, fault-tolerant storage and management of enterprise data, providing access through multiple concurrent operating systems and communication protocols. High performance is provided by four symmetric multiprocessors, integrated caching, RAID support for the disk drive modules, and disk access through a high-speed serial storage architecture (SSA) interface.

IBM TotalStorage Enterprise Storage Server Specialist (ESS Specialist). Software with a Web-browser interface for configuring the ESS.

IBM TotalStorage Enterprise Storage Server Copy Services (ESS Copy Services). Software with a Web-browser interface for configuring, managing, and monitoring the data-copy functions of FlashCopy and PPRC.

IBM TotalStorage Enterprise Storage Server Network (ESSNet). A private network providing Web browser access to the ESS. IBM installs the ESSNet software on an IBM workstation called the IBM TotalStorage ESS Master Console, supplied with the first ESS delivery.

IBM TotalStorage ESS Master Console (ESS Master Console). An IBM workstation (formerly named the ESSNet console and hereafter referred to simply as the ESS Master Console) that IBM installs to provide the ESSNet facility when they install your ESS. It includes a Web browser that provides links to the ESS user interface, including ESS Specialist and ESS Copy Services.

ID. See *identifier*.

identifier (ID). A unique name or address that identifies things such as programs, devices, or systems.

IML. See *initial microprogram load*.

implicit allegiance. In Enterprise Systems Architecture/390, a relationship that a control unit creates between a device and a channel path when the device accepts a read or write operation. The control unit guarantees access to the channel program over the set of channel paths that it associates with the allegiance.

initial microprogram load (IML). To load and initiate microcode or firmware that controls a hardware entity such as a processor or a storage server.

initial program load (IPL). To load and initiate the software, typically an operating system that controls a host computer.

initiator. A SCSI device that communicates with and controls one or more targets. An initiator is typically an I/O adapter on a host computer. A SCSI initiator is analogous to an S/390 channel. A SCSI logical unit is analogous to an S/390 device. See *target*.

i-node. The internal structure in an AIX operating system that describes the individual files in the operating system. It contains the code, type, location, and owner of a file.

input/output (I/O). Pertaining to (a) input, output, or both or (b) a device, process, or channel involved in data input, data output, or both.

Internet Protocol (IP). In the Internet suite of protocols, a protocol without connections that routes data through a network or interconnecting networks and acts as an intermediary between the higher protocol layers and the physical network. The upper layer supports one or more logical protocols (for example, a SCSI-command protocol and an ESA/390 command protocol). Refer to ANSI X3.230-199x. The IP acronym is the IP in TCP/IP. See *Transmission Control Protocol/Internet Protocol*.

invalidate. To remove a logical data unit from cache memory, because it cannot support continued access to the logical data unit on the device. This removal may be the result of a failure within the storage server or a storage device that is associated with the device.

I/O. See *input/output*.

I/O adapter (IOA). Input-output adapter on the PCI bus.

I/O device. An addressable read and write unit, such as a disk drive device, magnetic tape device, or printer.

I/O interface. An interface that enables a host to perform read and write operations with its associated peripheral devices.

I/O Priority Queueing. Facility provided by the Workload Manager of OS/390 and supported by the ESS that enables the systems administrator to set priorities for queueing I/Os from different system images. See *multiple allegiance* and *parallel access volume*.

I/O processor (IOP). Controls input-output adapters and other devices.

IP. See *Internet Protocol*.

IPL. See *initial program load*.

iSeries. An IBM @server product that emphasizes integration..

J

Java virtual machine (JVM). A software implementation of a central processing unit (CPU) that runs compiled Java code (applets and applications).

JVM. See *Java virtual machine*.

K

KB. See *kilobyte*.

key field. The second (optional) field of a CKD record. The key length is specified in the count field. The key length determines the field length. The program writes

the data in the key field and use the key field to identify or locate a given record. The subsystem does not use the key field.

kilobyte (KB). (1) For processor storage, real, and virtual storage, and channel volume, 2^{10} or 1024 bytes. (2) For disk storage capacity and communications volume, 1000 bytes.

Korn shell. Interactive command interpreter and a command programming language.

KPOH. See *thousands of power-on hours*.

L

LAN. See *local area network*.

last-in first-out (LIFO). A queuing technique in which the next item to be retrieved is the item most recently placed in the queue. (A)

LBA. See *logical block address*.

LCU. See *logical control unit*.

least recently used (LRU). (1) The algorithm used to identify and make available the cache space that contains the least-recently used data. (2) A policy for a caching algorithm that chooses to remove from cache the item that has the longest elapsed time since its last access.

LED. See *light-emitting diode*.

LIC. See *licensed internal code*.

licensed internal code (LIC). Microcode that IBM does not sell as part of a machine, but licenses to the customer. LIC is implemented in a part of storage that is not addressable by user programs. Some IBM products use it to implement functions as an alternate to hard-wired circuitry.

LIFO. See *last-in first-out*.

light-emitting diode (LED). A semiconductor chip that gives off visible or infrared light when activated.

link address. On an ESCON or FICON interface, the portion of a source or destination address in a frame that ESCON or FICON uses to route a frame through an ESCON or FICON director. ESCON or FICON associates the link address with a specific switch port that is on the ESCON or FICON director. Equivalently, it associates the link address with the channel-subsystem or control unit link-level functions that are attached to the switch port.

link-level facility. The ESCON or FICON hardware and logical functions of a control unit or channel subsystem that allow communication over an ESCON or FICON write interface and an ESCON or FICON read interface.

local area network (LAN). A computer network located on a user's premises within a limited geographic area.

local e-mail. An e-mail configuration option for storage servers that are connected to a host-system network that does not have a domain name system (DNS) server.

logical address. On an ESCON or FICON interface, the portion of a source or destination address in a frame used to select a specific channel-subsystem or control-unit image.

logical block address (LBA). The address assigned by the ESS to a sector of a disk.

logical control unit (LCU). See *control-unit image*.

logical data unit. A unit of storage that is accessible on a given device.

logical device. The facilities of a storage server (such as the ESS) associated with the processing of I/O operations directed to a single host-accessible emulated I/O device. The associated storage is referred to as a logical volume. The logical device is mapped to one or more host-addressable units, such as a device on an S/390 I/O interface or a logical unit on a SCSI I/O interface, such that the host initiating I/O operations to the I/O-addressable unit interacts with the storage on the associated logical device.

logical partition (LPAR). A set of functions that create the programming environment that is defined by the ESA/390 architecture. ESA/390 architecture uses this term when more than one LPAR is established on a processor. An LPAR is conceptually similar to a virtual machine environment except that the LPAR is a function of the processor. Also the LPAR does not depend on an operating system to create the virtual machine environment.

logical path. For Copy Services, a relationship between a source logical subsystem and target logical subsystem that is created over a physical path through the interconnection fabric used for Copy Services functions.

logical subsystem (LSS). Pertaining to the ESS, a construct that consists of a group of up to 256 logical devices. An ESS can have up to 16 CKD-formatted logical subsystems (4096 CKD logical devices) and also up to 16 fixed-block (FB) logical subsystems (4096 FB logical devices). The logical subsystem facilitates configuration of the ESS and may have other implications relative to the operation of certain functions. There is a one-to-one mapping between a CKD logical subsystem and an S/390 control-unit image.

For S/390 or zSeries hosts, a logical subsystem represents a logical control unit (LCU). Each control-unit image is associated with only one logical subsystem. See *control-unit image*.

logical unit. The open-systems term for a logical disk drive.

logical unit number (LUN). A SCSI term for a unique number used on a SCSI bus to enable it to differentiate between up to eight separate devices, each of which is a logical unit.

logical volume. The storage medium associated with a logical disk drive. A logical volume typically resides on one or more storage devices. The ESS administrator defines this unit of storage. The logical volume, when residing on a RAID-5 array, is spread over 6 +P or 7 +P drives, where P is parity. A logical volume can also reside on a non-RAID storage device. See *count key data* and *fixed block address*.

logical volume manager (LVM). A set of system commands, library routines, and other tools that allow the user to establish and control logical volume storage. The LVM maps data between the logical view of storage space and the physical disk drive module (DDM).

longitudinal redundancy check (LRC). A method of error-checking during data transfer that involves checking parity on a row of binary digits that are members of a set that forms a matrix. Longitudinal redundancy check is also called a longitudinal parity check.

longwave laser adapter. A connector used between host and theESS to support longwave fibre-channel communication.

loop. The physical connection between a pair of device adapters in the ESS. See *device adapter*.

LPAR. See *logical partition*.

LRC. See *longitudinal redundancy check*.

LRU. See *least recently used*.

LSS. See *logical subsystem*.

LUN. See *logical unit number*.

LVM. See *logical volume manager*.

M

machine level control (MLC). A database that contains the EC level and configuration of products in the field.

machine reported product data (MRPD). Product data gathered by a machine and sent to a destination such as an IBM support server or RETAIN. These records might include such information as feature code information and product logical configuration information.

mainframe. A computer, usually in a computer center, with extensive capabilities and resources to which other computers may be connected so that they can share facilities. (T)

maintenance analysis procedure (MAP). A hardware maintenance document that gives an IBM service representative a step-by-step procedure for tracing a symptom to the cause of a failure.

management information base (MIB). (1) A schema for defining a tree structure that identifies and defines certain objects that can be passed between units using an SNMP protocol. The objects passed typically contain certain information about the product such as the physical or logical characteristics of the product. (2) Shorthand for referring to the MIB-based record of a network device. Information about a managed device is defined and stored in the management information base (MIB) of the device. Each ESS has a MIB. SNMP-based network management software uses the record to identify the device. See *simple network management protocol*.

MAP. See *maintenance analysis procedure*.

Master Console. See *IBM TotalStorage ESS Master Console*.

MB. See *megabyte*.

MCA. See *Micro Channel architecture*.

mean time between failures (MTBF). (1) A projection of the time that an individual unit remains functional. The time is based on averaging the performance, or projected performance, of a population of statistically independent units. The units operate under a set of conditions or assumptions. (2) For a stated period in the life of a functional unit, the mean value of the lengths of time between consecutive failures under stated conditions. (I) (A)

medium. For a storage facility, the disk surface on which data is stored.

megabyte (MB). (1) For processor storage, real and virtual storage, and channel volume, 2^{20} or 1 048 576 bytes. (2) For disk storage capacity and communications volume, 1 000 000 bytes.

MES. See *miscellaneous equipment specification*.

MIB. See *management information base*.

Micro Channel architecture (MCA). The rules that define how subsystems and adapters use the Micro Channel bus in a computer. The architecture defines the services that each subsystem can or must provide.

Microsoft Internet Explorer (MSIE). Web browser software manufactured by Microsoft.

MIH. See *missing-interrupt handler*.

mirrored pair. Two units that contain the same data. The system refers to them as one entity.

mirroring. In host systems, the process of writing the same data to two disk units within the same auxiliary storage pool at the same time.

miscellaneous equipment specification (MES). IBM field-installed change to a machine.

missing-interrupt handler (MIH). An MVS and MVS/XA facility that tracks I/O interrupts. MIH informs the operator and creates a record whenever an expected interrupt fails to occur before a specified elapsed time is exceeded.

MLC. See *machine level control*.

mobile service terminal (MoST). The mobile terminal used by service personnel.

Model 100. A 2105 Model 100, often simply referred to as a Mod 100, is an expansion enclosure for the ESS. See 2105 and

MoST. See *mobile service terminal*.

MRPD. See *machine reported product data*.

MSIE. See *Microsoft Internet Explorer*.

MTBF. See *mean time between failures*.

multiple allegiance. An ESS hardware function that is independent of software support. This function enables multiple system images to concurrently access the same logical volume on the ESS as long as the system images are accessing different extents. See *extent* and *parallel access volumes*.

multiple virtual storage (MVS). Implies MVS/390, MVS/XA, MVS/ESA, and the MVS element of the OS/390 operating system.

MVS. See *multiple virtual storage*.

N

Netfinity. Obsolete brand name of an IBM Intel-processor-based server.

Netscape Navigator. Web browser software manufactured by Netscape.

node. The unit that is connected in a fibre-channel network. An ESS is a node in a fibre-channel network.

non-RAID. A disk drive set up independently of other disk drives and not set up as part of a disk drive module group to store data using the redundant array of disks (RAID) data-striping methodology.

nonremovable medium. A recording medium that cannot be added to or removed from a storage device.

nonretentive data. Data that the control program can easily recreate in the event it is lost. The control program may cache non-retentive write data in volatile memory.

nonvolatile storage (NVS). (1) Typically refers to nonvolatile memory on a processor rather than to a nonvolatile disk storage device. On a storage facility, nonvolatile storage is used to store active write data to avoid data loss in the event of a power loss. (2) A storage device whose contents are not lost when power is cut off.

NVS. See *nonvolatile storage*.

O

octet. In Internet Protocol (IP) addressing, one of the four parts of a 32-bit integer presented in dotted decimal notation. dotted decimal notation consists of four 8-bit numbers written in base 10. For example, `9.113.76.250` is an IP address containing the octets 9, 113, 76, and 250.

OEMI. See *original equipment manufacturer's information*.

open system. A system whose characteristics comply with standards made available throughout the industry and that therefore can be connected to other systems complying with the same standards. Applied to the ESS, such systems are those hosts that connect to the ESS through SCSI or SCSI-FCP adapters. See *Small Computer System Interface* and *SCSI-FCP*.

organizationally unique identifier (OUI). An IEEE-standards number that identifies an organization with a 24-bit globally unique assigned number referenced by various standards. OUI is used in the family of 802 LAN standards, such as Ethernet and Token Ring.

original equipment manufacturer's information (OEMI). A reference to an IBM guideline for a computer peripheral interface. The interface uses ESA/390 logical protocols over an I/O interface that configures attached units in a multidrop bus topology.

OUI. See *organizationally unique identifier*.

P

panel. The formatted display of information that appears on a display screen.

parallel access volume (PAV). An advanced function of the ESS that enables OS/390 and z/OS systems to issue concurrent I/O requests against a CKD logical volume by associating multiple devices of a single control-unit image with a single logical device. Up to 8 device addresses can be assigned to a parallel access volume. PAV enables two or more concurrent writes to the same logical volume, as long as the writes are not to the same extents. See *extent*, *I/O Priority Queueing*, and *multiple allegiance*.

parity. A data checking scheme used in a computer system to ensure the integrity of the data. The RAID implementation uses parity to recreate data if a disk drive fails.

path group. The ESA/390 term for a set of channel paths that are defined to a control unit as being associated with a single logical partition (LPAR). The channel paths are in a group state and are online to the host. See *logical partition*.

path group identifier. The ESA/390 term for the identifier that uniquely identifies a given logical partition (LPAR). The path group identifier is used in communication between the LPAR program and a device. The identifier associates the path group with one or more channel paths, thereby defining these paths to the control unit as being associated with the same LPAR.

PAV. See *parallel access volume*.

PCI. See *peripheral component interconnect*.

PE. See *IBM product engineering*.

Peer-to-Peer Remote Copy (PPRC). A function of a storage server that maintains a consistent copy of a logical volume on the same storage server or on another storage server. All modifications that any attached host performs on the primary logical volume are also performed on the secondary logical volume.

peripheral component interconnect (PCI). An architecture for a system bus and associated protocols that supports attachments of adapter cards to a system backplane.

physical path. A single path through the I/O interconnection fabric that attaches two units. For Copy Services, this is the path from a host adapter on one ESS (through cabling and switches) to a host adapter on another ESS.

point-to-point connection. For fibre-channel connections, a topology that enables the direct interconnection of ports. See *arbitrated loop* and *switched fabric*.

POST. See *power-on self test*.

power-on self test (POST). A diagnostic test run by servers or computers when they are turned on.

PPRC. See *Peer-to-Peer Remote Copy*.

predictable write. A write operation that can cache without knowledge of the existing format on the medium. All writes on FBA DASD devices are predictable. On CKD DASD devices, a write is predictable if it does a format write for the first data record on the track.

primary Copy Services server. One of two Copy Services servers in a Copy Services domain. The primary Copy Services server is the active Copy Services server until it fails; it is then replaced by the backup Copy Services server. A Copy Services server is software that runs in one of the two clusters of an ESS and performs data-copy operations within that group. See *active Copy Services server* and *backup Copy Services server*.

product engineering. See *IBM product engineering*.

program. On a computer, a generic term for software that controls the operation of the computer. Typically, the program is a logical assemblage of software modules that perform multiple related tasks.

program-controlled interruption. An interruption that occurs when an I/O channel fetches a channel command word with the program-controlled interruption flag on.

program temporary fix (PTF). A temporary solution or bypass of a problem diagnosed by IBM in a current unaltered release of a program

promote. To add a logical data unit to cache memory.

protected volume. An AS/400 term for a disk storage device that is protected from data loss by RAID techniques. An AS/400 does not mirror a volume configured as a protected volume, while it does mirror all volumes configured as unprotected volumes. The ESS, however, can be configured to indicate that an AS/400 volume is protected or unprotected, and give it RAID protection in either case.

pSeries. An IBM @server server Series product that emphasizes performance. See *RS/6000 and pSeries*.

pseudo-host. A host connection that is not explicitly defined to the ESS and that has access to at least one volume configured on the ESS. The FiconNet pseudo-host icon represents the FICON protocol. The EsconNet pseudo-host icon represents the ESCON protocol. The Anonymous pseudo-host icon represents the SCSI-FCP protocol. “Anonymous host” is a commonly used synonym for “pseudo-host”. The ESS adds a pseudo-host icon only when the ESS access mode is set to Access-any. See *access-any mode*.

PTF. See *program temporary fix*.

PV Links. Short for Physical Volume Links, an alternate pathing solution from Hewlett-Packard providing for multiple paths to a volume, as well as static load balancing.

R

rack. See *enclosure*.

RAID. See *redundant array of inexpensive disks* and *array*. RAID also is expanded to redundant array of *independent* disks.

RAID 5. A type of RAID that optimizes cost-effective performance through data striping while providing fault tolerance for up to two failed disk drives by distributing parity across all of the drives in the array plus one parity disk drive. The ESS automatically reserves spare disk drives when it assigns arrays to a device adapter pair (DA pair). See *device adapter*.

random access. A mode of accessing data on a medium in a manner that requires the storage device to access nonconsecutive storage locations on the medium.

redundant array of inexpensive disks (RAID). A methodology of grouping disk drives for managing disk storage to insulate data from a failing disk drive.

remote technical assistance information network (RETAIN). The initial service tracking system for IBM service support for capturing heartbeat and call-home records. See *support catcher* and *support catcher telephone number*.

REQ/ACK. See *request for acknowledgement and acknowledgement*.

request for acknowledgement and acknowledgement (REQ/ACK). A cycle of communication between two data transport devices for the purpose of verifying the connection, which starts with a request for acknowledgement from one of the devices and ends with an acknowledgement from the second device.

reserved allegiance. In Enterprise Systems Architecture/390, a relationship that is created in a control unit between a device and a channel path when a Sense Reserve command is completed by the device. The allegiance causes the control unit to guarantee access (busy status is not presented) to the device. Access is over the set of channel paths that are associated with the allegiance; access is for one or more channel programs, until the allegiance ends.

RETAIN. See *remote technical assistance information network*.

R0. See *track-descriptor record*.

S

S/390 and zSeries. IBM enterprise servers based on Enterprise Systems Architecture/390 (ESA/390) and z/Architecture, respectively. “S/390” is a shortened form of the original name “System/390”. See *zSeries*.

S/390 and zSeries storage. Storage arrays and logical volumes that are defined in the ESS as connected to S/390 and zSeries servers. This term is synonymous with count-key-data (CKD) storage.

SAID. See *system adapter identification number*.

SAM. See *sequential access method*.

SAN. See *storage area network*.

SBCON. See *Single-Byte Command Code Sets Connection*.

screen. The physical surface of a display device upon which information is shown to users.

SCSI. See *Small Computer System Interface*.

SCSI device. A disk drive connected to a host through a an I/O interface using the SCSI protocol. A SCSI device is either an initiator or a target. See *initiator* and *Small Computer System Interface*.

SCSI host systems. Host systems attached to the ESS with a SCSI interface. Such host systems run on UNIX, OS/400, Windows NT, Windows 2000, or Novell NetWare operating systems.

SCSI ID. A unique identifier assigned to a SCSI device that is used in protocols on the SCSI interface to identify or select the device. The number of data bits on the SCSI bus determines the number of available SCSI IDs. A wide interface has 16 bits, with 16 possible IDs.

SCSI-FCP. Short for SCSI-to-fibre-channel protocol, a protocol used to transport data between a SCSI adapter on an open-systems host and a fibre-channel adapter on an ESS. See *fibre-channel protocol* and *Small Computer System Interface*.

Seascape architecture. A storage system architecture developed by IBM for open-systems servers and S/390 and zSeries host systems. It provides storage solutions that integrate software, storage management, and technology for disk, tape, and optical storage.

serial connection. A method of device interconnection for determining interrupt priority by connecting the interrupt sources serially.

self-timed interface (STI). An interface that has one or more conductors that transmit information serially between two interconnected units without requiring any clock signals to recover the data. The interface performs clock recovery independently on each serial data stream

and uses information in the data stream to determine character boundaries and inter-conductor synchronization.

sequential access. A mode of accessing data on a medium in a manner that requires the storage device to access consecutive storage locations on the medium.

sequential access method (SAM). An access method for storing, deleting, or retrieving data in a continuous sequence, based on the logical order of the records in the file.

serial storage architecture (SSA). An IBM standard for a computer peripheral interface. The interface uses a SCSI logical protocol over a serial interface that configures attached targets and initiators in a ring topology. See *SSA adapter*.

server. (1) A type of host that provides certain services to other hosts that are referred to as clients. (2) A functional unit that provides services to one or more clients over a network.

service boundary. Identifies a group of components that are unavailable when one of the components of the group is being serviced. Service boundaries are provided on the ESS, for example, in each host bay and each cluster.

service information message (SIM). A message sent by a storage server to service personnel through an S/390 operating system.

service personnel. A generalization referring to individuals or a company authorized to service the ESS, subsuming “service provider”, “service representative”, and “IBM service support representative (SSR)”.

service processor. A dedicated processing unit used to service a storage facility.

service support representative (SSR). Individuals or a company authorized to service the ESS. This term also refers to a service provider, a service representative, or an IBM service support representative (SSR). An IBM SSR installs the ESS.

shared storage. Storage within an ESS that is configured so that multiple homogeneous or divergent hosts can concurrently access the storage. The storage has a uniform appearance to all hosts. The host programs that access the storage must have a common model for the information on a storage device. The programs must be designed to handle the effects of concurrent access.

shortwave laser adapter. A connector used between host and ESS to support shortwave fibre-channel communication.

SIM. See *service-information message*.

Simple Network Management Protocol (SNMP). In the Internet suite of protocols, a network management protocol that is used to monitor routers and attached networks. SNMP is an application layer protocol. Information on devices managed is defined and stored in the application’s Management Information Base (MIB). See *management information base*.

simplex volume. A volume that is not part of a FlashCopy, XRC, or PPRC volume pair.

Single-Byte Command Code Sets Connection (SBCON). The ANSI standard for the ESCON or FICON I/O interface.

Small Computer System Interface (SCSI). (1) An ANSI standard for a logical interface to computer peripherals and for a computer peripheral interface. The interface uses a SCSI logical protocol over an I/O interface that configures attached initiators and targets in a multidrop bus topology. (2) A standard hardware interface that enables a variety of peripheral devices to communicate with one another.

SMIT. See *System Management Interface Tool*.

SMP. See *symmetric multi-processor*.

SNMP. See *simple network management protocol*.

software transparency. Criteria applied to a processing environment that states that changes do not require modifications to the host software in order to continue to provide an existing function.

spare. A disk drive on the ESS that can replace a failed disk drive. A spare can be predesignated to allow automatic dynamic sparing. Any data preexisting on a disk drive that is invoked as a spare is destroyed by the dynamic sparing copy process.

spatial reuse. A feature of serial storage architecture that enables a device adapter loop to support many simultaneous read/write operations. See *serial storage architecture*.

Specialist. See *IBM TotalStorage Enterprise Storage Server Specialist*.

SSA. See *serial storage architecture*.

SSA adapter. A physical adapter based on serial storage architecture. SSA adapters connect disk drive modules to ESS clusters. See *serial storage architecture*.

SSID. See *subsystem identifier*.

SSR. See *service support representative*.

stacked status. In Enterprise Systems Architecture/390, the condition when the control unit is holding status for the channel, and the channel

responded with the stack-status control the last time the control unit attempted to present the status.

stage operation. The operation of reading data from the physical disk drive into the cache.

staging. To move data from an offline or low-priority device back to an online or higher priority device, usually on demand of the system or on request of the user.

STI. See *self-timed interface*.

storage area network. A network that connects a company's heterogeneous storage resources.

storage complex. Multiple storage facilities.

storage device. A physical unit that provides a mechanism to store data on a given medium such that it can be subsequently retrieved. See *disk drive module*.

storage facility. (1) A physical unit that consists of a storage server integrated with one or more storage devices to provide storage capability to a host computer. (2) A storage server and its attached storage devices.

storage server. A physical unit that manages attached storage devices and provides an interface between them and a host computer by providing the function of one or more logical subsystems. The storage server can provide functions that are not provided by the storage device. The storage server has one or more clusters.

striping. A technique that distributes data in bit, byte, multibyte, record, or block increments across multiple disk drives.

subchannel. A logical function of a channel subsystem associated with the management of a single device.

subsystem identifier (SSID). A number that uniquely identifies a logical subsystem within a computer installation.

support catcher. A server to which a machine sends a trace or a dump package.

support catcher telephone number. The telephone number that connects the support catcher server to the ESS to receive a trace or dump package. See *support catcher*. See *remote technical assistance information network*.

switched fabric. One of three a fibre-channel connection topologies supported by the ESS. See *arbitrated loop* and *point-to-point*.

symmetric multi-processor (SMP). An implementation of a multi-processor computer consisting of several identical processors configured in a way that any subset of the set of processors is capable of continuing the operation of the computer. The ESS contains four processors set up in SMP mode.

synchronous write. A write operation whose completion is indicated after the data has been stored on a storage device.

System/390. See *S/390*.

system adapter identification number (SAID).

System Management Interface Tool (SMIT). An interface tool of the AIX operating system for installing, maintaining, configuring, and diagnosing tasks.

System Modification Program (SMP). A program used to install software and software changes on MVS systems.

T

TAP. See *Telocator Alphanumeric Protocol*.

target. A SCSI device that acts as a slave to an initiator and consists of a set of one or more logical units, each with an assigned logical unit number (LUN). The logical units on the target are typically I/O devices. A SCSI target is analogous to an S/390 control unit. A SCSI initiator is analogous to an S/390 channel. A SCSI logical unit is analogous to an S/390 device. See *Small Computer System Interface*.

TB. See *terabyte*.

TCP/IP. See *Transmission Control Protocol/Internet Protocol*.

Telocator Alphanumeric Protocol (TAP). An industry standard protocol for the input of paging requests.

terabyte (TB). (1) Nominally, 1 000 000 000 000 bytes, which is accurate when speaking of bandwidth and disk storage capacity. (2) For ESS cache memory, processor storage, real and virtual storage, a terabyte refers to 2^{40} or 1 099 511 627 776 bytes.

thousands of power-on hours (KPOH). A unit of time used to measure the mean time between failures (MTBF).

time sharing option (TSO). An operating system option that provides interactive time sharing from remote terminals.

TPF. See *transaction processing facility*.

track. A unit of storage on a CKD device that can be formatted to contain a number of data records. See *home address*, *track-descriptor record*, and *data record*.

track-descriptor record (R0). A special record on a track that follows the home address. The control program uses it to maintain certain information about the track. The record has a count field with a key length of zero, a data length of 8, and a record number of 0. This record is sometimes referred to as R0.

transaction processing facility (TPF). A high-availability, high-performance IBM operating system, designed to support real-time, transaction-driven applications. The specialized architecture of TPF is intended to optimize system efficiency, reliability, and responsiveness for data communication and database processing. TPF provides real-time inquiry and updates to a large, centralized database, where message length is relatively short in both directions, and response time is generally less than three seconds. Formerly known as the Airline Control Program/Transaction Processing Facility (ACP/TPF).

Transmission Control Protocol/Internet Protocol (TCP/IP). (1) Together, the Transmission Control Protocol and the Internet Protocol provide end-to-end connections between applications over interconnected networks of different types. (2) The suite of transport and application protocols that run over the Internet Protocol. See *Internet Protocol*.

transparency. See *software transparency*.

TSO. See *time sharing option*.

U

UFS. UNIX filing system.

ultra-SCSI. An enhanced Small Computer System Interface.

unit address. The ESA/390 term for the address associated with a device on a given control unit. On ESCON or FICON interfaces, the unit address is the same as the device address. On OEMI interfaces, the unit address specifies a control unit and device pair on the interface.

unprotected volume. An AS/400 term that indicates that the AS/400 host recognizes the volume as an unprotected device, even though the storage resides on a RAID array and is therefore fault tolerant by definition. The data in an unprotected volume can be mirrored. Also referred to as an *unprotected device*.

upper-layer protocol. The layer of the Internet Protocol (IP) that supports one or more logical protocols (for example, a SCSI-command protocol and an ESA/390 command protocol). Refer to ANSI X3.230-199x.

UTC. See *Coordinated Universal Time*.

utility device. The ESA/390 term for the device used with the Extended Remote Copy facility to access information that describes the modifications performed on the primary copy.

V

virtual machine (VM). A virtual data processing machine that appears to be for the exclusive use of a particular user, but whose functions are accomplished by sharing the resources of a real data processing system.

vital product data (VPD). Information that uniquely defines the system, hardware, software, and microcode elements of a processing system.

VM. See *virtual machine*.

volume. In Enterprise Systems Architecture/390, the information recorded on a single unit of recording medium. Indirectly, it can refer to the unit of recording medium itself. On a nonremovable-medium storage device, the term can also indirectly refer to the storage device associated with the volume. When multiple volumes are stored on a single storage medium transparently to the program, the volumes can be reffered to as logical volumes.

VPD. See *vital product data*.

W

Web Copy Services. See *IBM TotalStorage Enterprise Storage Server Copy Services*.

worldwide node name (WWNN). A unique 64-bit identifier for a host containing a fibre-channel port. See *worldwide port name*.

worldwide port name (WWPN). A unique 64-bit identifier associated with a fibre-channel adapter port. It is assigned in an implementation- and protocol-independent manner.

write hit. A write operation in which the requested data is in the cache.

write penalty. The performance impact of a classical RAID 5 write operation.

WWPN. See *worldwide port name*.

X

XRC. See *Extended Remote Copy*.

xSeries. An IBM @server Series product that emphasizes architecture.

Z

zSeries. An IBM @server Series product that emphasizes near-zero downtime. See *S/390 and zSeries*.

zSeries storage. See *S/390 and zSeries storage*.

Numerics

2105. The machine number for the IBM Enterprise Storage Server (ESS). 2105-100 is an ESS expansion enclosure typically referred to as the Model 100. See *IBM TotalStorage Enterprise Storage Server* and *Model 100*.

3390. The machine number of an IBM disk storage system. The ESS, when interfaced to IBM S/390 or zSeries hosts, is set up to appear as one or more 3390 devices, with a choice of 3390-2, 3390-3, or 3390-9 track formats.

3990. The machine number of an IBM control unit.

7133. The machine number of an IBM disk storage system. The Model D40 and 020 drawers of the 7133 can be installed in the 2105-100 expansion enclosure of the ESS.

8-pack. See *disk drive module group*.

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