

NearStore® VTL Version 5.2 System Administration Guide

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Preface

Introduction

This guide introduces NearStore® VTL and provides configuration and operations information. It is intended to familiarize the first-time user with NearStore VTL functionality, setup, and operations.

The operations section of this guide provides you with enough information to set up and use a NearStore VTL appliance, as well as to understand and work with virtual libraries and volumes.

Audience

This guide is designed for a qualified system administrator. It is assumed that this person is familiar with Storage Area Networks (SANs) and backup applications.

The overview section of this guide can be used by anyone to gain an understanding of the NearStore VTL product.

Terminology

NetApp® storage products (filers, FAS storage systems, and NearStore systems) are all storage systems—also sometimes called filers or storage systems.

This guide uses the term “type” to mean pressing one or more keys on the keyboard. It uses the term “enter” to mean pressing one or more keys and then pressing the Enter key.

Keyboard Conventions

When describing key combinations, this guide uses the hyphen (-) to separate individual keys. For example, Ctrl-D means pressing the Control and D keys simultaneously. Also, this guide uses the term “enter” to refer to the key that generates a carriage return, although the key is named “Return” on some keyboards.

Typographic Conventions

The following table describes typographic conventions used in this guide.

Convention	Type of information
<i>Italic font</i>	Words or characters that require special attention. Placeholders for information you must supply. For example, if the guide says to enter the <code>arp -d hostname</code> command, you enter the characters arp -d followed by the actual name of the host. Book titles in cross-references.
Monospaced font	Command and daemon names. Information displayed on the system console or other computer monitors. The contents of files.
Bold monospaced font	Words or characters you type. What you type is always shown in lowercase letters, unless you must type it in uppercase letters.

Special Messages

This guide contains special messages that are described as follows:

Note

A note contains important information that helps you install or operate the storage system efficiently.

CAUTION

A caution contains instructions that you must follow to avoid damage to the equipment, a system crash, or loss of data.

Introduction

NearStore VTL software combines a hardware controller and one or more disk subsystems into a system that publishes virtual tape libraries on a SAN. These virtual tape libraries are direct, plug-and-play equivalents for physical tape libraries.

How NearStore VTL Appliances Work

To the backup application, NearStore VTL appliances respond like physical tape libraries. For example, the NearStore VTL retains the native format of the backup application when it writes data to disk. This means that when the NearStore VTL copies data to physical tape, the result is a physical tape that is in the native format of the backup application. The backup application can then restore data from these tapes directly. Major NearStore VTL appliance features include

- Transparency to the backup application

Because there is a significant performance increase when writing data to disk, using virtual tape libraries reduces the amount of time that it takes to backup the data.

- Virtual tape libraries

Like their physical counterparts, virtual tape libraries have cartridge slots, one or more tape drives, an import/export slot, and even a robotic arm. These attributes (number of slots, capacity of tape drives, and so on) are set when the virtual library is created. The NearStore VTL comes with a number of predefined library and virtual tape drive types. You can also create new library types to fit your needs.

- Virtual tape drives

The NearStore VTL includes a number of virtual tape drive types. The type specifies such properties as vendor information, the capacity of the drive, and tape optimization algorithm.

- Virtual tapes

Virtual tapes are the NearStore VTL equivalent of physical tapes. Like physical tapes, virtual tapes have a specified capacity and are labeled by barcodes. Backup applications use these barcodes to

track virtual tapes in the same way that they track physical tapes. In fact, there is a one-to-one correspondence between virtual and physical barcodes.

- Control of physical library entry/exit port (EEP)

The correspondence between virtual tape movement and physical tape movement even extends to the movement of tapes into and out of libraries. When you move a virtual tape, that has a corresponding physical tape, to the virtual library entry/exit port, the NearStore VTL can move the physical tape to the physical library EEP. (This is controlled by the *Move Physical Tapes to EEP After Virtual Export* option.)

- Control of ACSLS managed libraries

The NearStore VTL appliance can use ACSLS-controlled libraries. The ACSLS server and the VTL appliance communicate over a LAN, while the ACS tape drives communicate with the NearStore VTL appliance over the SAN. The NearStore VTL appliance does not communicate directly with the ACS robot arms.

In addition to networking and SAN requirements, before using an ACSLS with a NearStore VTL appliance, you must set the Advanced Option *Use ACSLS to control physical libraries*.

Note

You can attach a SCSI library, or an ACSLS-controlled library to a NearStore VTL appliance, but not both. Before trying to configure the VTL appliance to use an ACSLS-controlled library, make sure that you do not have a SCSI library attached to the appliance.

- Import/Export

When you import a physical tape, the NearStore VTL creates a virtual tape that is the exact copy of that physical tape, including barcode and file mark information. Likewise, when you export a virtual tape, the NearStore VTL sends the data from the virtual tape to an attached physical tape device, resulting in a physical copy of the virtual tape.

You can also use the cloning feature of the backup application as a slower alternative. The tapes that the NearStore VTL creates are in the native format of the backup application.

- Shadow tape pool and shadow tapes

When you export a virtual tape, in parallel with the creation of the physical tape, the NearStore VTL can create a shadow tape stored in the shadow tape pool. The backup application continues to manage the physical tape, with the shadow tape invisible to the backup application (and invisible to the library on the NearStore VTL). If you later import the physical tape, the NearStore VTL immediately moves the shadow tape to the library, which makes it available for reading while the physical tape is still being read. You can also manually import a shadow tape back to a virtual library.

Shadow tapes are assigned a retention period. When a backup application is writing to the NearStore VTL, if the NearStore VTL needs additional space for an existing virtual tape, the VTL reclaims shadow tape space. Space is reclaimed first from expired shadow tapes, but if after reclaiming expired tapes, more space is still needed, space is reclaimed from unexpired shadow tapes.

- Smart sizing

All data is compressible at different rates. This means that each time you back up data to physical tape, the actual amount of data that the physical tape drive writes to tape depends on the compressibility of the data. Because the NearStore VTL must be able to export virtual tapes to physical tape, it is crucial that the amount of data on the virtual tape can fit on the physical tape, without going over its capacity. If the data from a virtual tape cannot fit on a physical tape, you cannot export or clone it.

Most VTL vendors solve this issue by matching the capacity of virtual tapes to the native (uncompressed) capacity of the corresponding physical tapes. This is not an efficient solution, because it does not take compression into account. For example, if the physical tape drive can compress the data at a ratio of 2:1, over half of the physical tape would remain unused when you exported the virtual tape.

With smart sizing, the data stream is monitored to determine the compressibility of the data. This allows the VTL to determine the appropriate size to make the virtual tape so that it correctly fits on its corresponding physical tape. There is no performance impact when using smart sizing. Note that smart sizing is completely different from disk compression. Smart sizing optimizes the utilization of physical tape media, while disk compression minimizes the space used on disk by the VTL. With hardware compression this is an extremely effective method of saving space on disk. Smart sizing and disk compression can be used at the same time on the same NearStore VTL appliance.

- Disk compression

While smart sizing adjusts the size of a virtual tape to match the capacity of a physical tape by taking in account the physical tape drives own data compression algorithm. VTL data compression reduces the size of the data stored on a virtual tape, which in turn saves disk capacity. Some models of NearStore VTL appliances support hardware-based disk compression. Hardware-based compression is high-speed, and recommended when your appliance supports it. Models without hardware-based compression can use software-based data compression, but this can significantly reduce data throughput. Data compression can be separately enabled or disabled for each virtual tape (the default, data compression on or off, can be set separately for each virtual library when the library is created). When compression is enabled, the NearStore VTL appliance selects hardware compression if available, or software compression, if hardware compression is not available. For both hardware- and software- based compression, the compression ratio depends on the actual data compressed, but is typically about 2:1.

- Smart cloning and tape exporting

When a tape is cloned or exported, and then later the (virtual) tape is updated, NearStore VTL keeps track of the location of change—the point starting from which the physical tape and the virtual tape differ. When the tape is again cloned or exported, the NearStore VTL need only write data to the physical tape beginning at the location of change. Smart cloning is the default behavior.

- Direct Tape Creation

The NearStore VTL can export data to physical tapes directly by copying virtual tapes to a physical tape library connected to its backend. This feature is also referred to as “direct tape creation”. The physical tapes are written in native backup application format, so when virtual tapes are exported to physical tape there is a 100% match between the two. This means that any virtual tape stored on the NearStore VTL and then written to physical tape can be restored from any standard tape drive

that can be supported by the backup server. It is therefore possible to back up data to disk while still keeping the data offsite on physical tapes that are stored in the native format of the backup application. Each virtual tape has an export status that suggests whether there is a need to copy this tape to a physical one or not. The export status is therefore one of the two:

- Needs export—a virtual tape that contains data, and has been ejected from a virtual tape drive or library.
- Does not need export—an empty virtual tape, or a virtual tape that has already been copied to a physical one.

Tape exports are triggered when:

- Tape is ejected from virtual library—the backup application ejects a tape from the library based on its offsite policies (if applicable) and the NearStore VTL recognizes the event (tape moved to the EEP) and locates the corresponding physical tape and initiates the copy.
- Tape export is manually triggered—it is possible to trigger export by changing the export status of a tape. This can be useful to recreate missing or failed physical tapes.

After the tape export is done, the virtual tape is deleted (unless Shadow Tape is enabled).

- Ease of use

Because the NearStore VTL virtual tape libraries function in much the same way as physical tape libraries (including the way they are displayed to backup applications), you do not have to alter the existing backup and restore process. You can back the up data to disk using the existing infrastructure and work procedures.

Note

Although a NearStore VTL appliance can support 80 simultaneous backup streams, because of variation in resource use by different backup configurations, operation can be significantly impacted even with fewer simultaneous backup streams. (In this context, a backup stream is a stream of data from the backup application server to a VTL virtual tape drive; it is not a stream of data from backup application client to a backup application server. A backup application server can multiplex streams of data from several backup clients and produce a single stream to the VTL.) A recommended practice is to design backup schedules to require less than 64 simultaneous backup streams on the VTL, and to test the schedule by checking for adequate performance before using in a production environment. When determining the number of backup streams needed, note that some non-backup activities count against this total:

- A loaded virtual drive, even if inactive, counts as one backup stream
 - Each simultaneous export or clone to tape reduces the available total by one
 - Each simultaneous import from tape reduces the available total by two
-

Logging in to a NearStore VTL Appliance

Except for a small number of operations such as the initial assignment of an IP address, the configuration and operation of the NearStore VTL are performed through a Graphical User Interface (GUI) (See Appendix A “Setting the IP Address from the Command Line,” page 123 for more on the command line interface). This GUI is accessed through a standard Web browser by first logging in to the NearStore VTL appliance.

To log in to the VTL, do the following:

1. Launch a supported Web browser.
2. Enter the following in to the URL field:

`http://vtl_IP_addr/`

vtl_IP_addr is the IP address assigned to the NearStore VTL appliance. Accessing this address takes you to the NearStore VTL login screen.

3. Log in to the NearStore VTL appliance.

The first time that you log in to the NearStore VTL appliance, use the default administrative account. The default administrative account login name is `admin` and the password is `NetApp`.



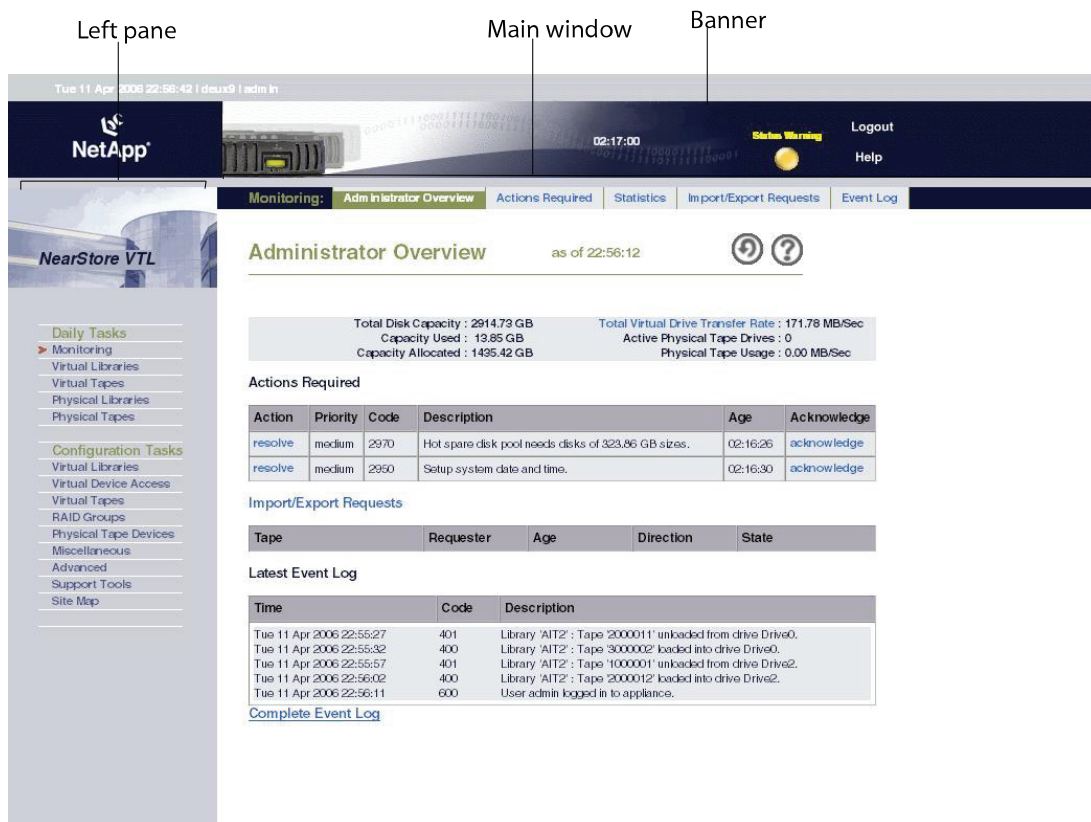
Login Id	admin
Password	*****

4. Click *Enter* to log in to the NearStore VTL appliance.



Navigating the NearStore VTL GUI

The following shows a sample Administrator Overview window, the first window you see after logging in.



Part	Description
Banner	Displays the overall status, time of day, and, if there are any actions requiring administrator action, an actions required icon. - If there is an actions required icon, click the icon to go to the Monitoring > Actions Required screen, where you can take the necessary action to resolve the issue. - Click the status icon to go to the Monitoring > Administrative Overview screen where you can get more details on the status. - Click the NetApp logo to open the NetApp home page. - Click Logout to log out of the VTL.

Part	Description
Left pane	Lists the major categories for tasks organized into daily administrative tasks (Daily Tasks), and Configuration Tasks. To perform a task, first select the major task category, such as Monitoring, and then select the task in the main window.
Main window	Displays tabs for the various subtasks and the information, input fields, and buttons needed to perform the task. Click the tab name to select a specific tab.

To perform a specific task, first select the task category from the left pane, then the appropriate tab, and then fill in, or select, the appropriate values in the fields in the task window. The tab set varies depending on the main task.

In the screen shot, Monitoring, is the main task; with tabs Administrator Overview, Actions Required, Statistics, Import/Export Requests, and Event Log. The Administrator Overview tab is selected.

Note

A number of tasks require you to chose items by clicking a check box selecting the item. If after selecting an item, you want to unselect it, hold down the Ctrl key and click again in the box.

Workflows

Administrative tasks frequently consist of a number of subtasks. For example, when creating a virtual library you can create a nickname for the library, record the name of a customer assigned to the library, define drive and compression characteristics, and so on. Some subtasks are optional and some are required. The VTL interface is organized around the flow of subtasks required for such major tasks as creating a virtual library. Such a flow of subtasks is called a *workflow*.

Configuration Road Map

The configuration road map gives information that you can use to understand the configurations that are available with the NearStore VTL appliance. The configuration road map provides a guide that you can use in conjunction with the task sections to configure the system.

This section outlines the steps needed to configure your NearStore VTL, after you set up the system using the *NearStore VTL Installation and Setup Instructions*. (The *NearStore VTL Installation and Setup Instructions* document is shipped with the VTL and covers such initial configuration steps as cabling, initial power up, and IP address assignment.)

Before using the VTL for backups, or other production data storage, do the following:

1. Log in to the system using the default username (admin) and password (NetApp). See Logging in to a NearStore VTL Appliance for details.
2. (Optional) Change the administrative password of the system.
3. Verify that the system time is synchronized to either the browser host or a Network Time Protocol (NTP) server. If you do not synchronize the system time in this manner, the deferred cloning times might be incorrect. The log times might also be incorrect.
4. (Optional) Define storage pools.
5. (Optional) Enable host access controls. You can control which hosts access which libraries.
6. If you enabled host access control, identify the hosts so you can assign them access to specific devices. (The hosts must be able to access the VTL appliance over Fibre Channel, which means they are either directly attached or are in the same zone.)
7. Create a RAID group.
8. Create virtual libraries.
VTL appliances come preconfigured with many library definitions, but you can also define your own. If you want to define your own, do this before creating the libraries.
9. (Optional) If you created hosts, you can now assign virtual libraries to those hosts.
10. Create virtual tapes.
11. Configure your host systems and applications to use the VTL.

Now, or at a later date, you might also want to create a tape operator account to control access to the VTL, configure the VTL to work with physical tape drives, and import or export physical tapes into the VTL appliance.

Configuring a NearStore VTL Appliance

This chapter provides the information that you need to configure a NearStore VTL appliance.

The configuration tasks provide step-by-step instructions that you can use to customize the features that are available with the NearStore VTL appliance.

Configuration sections include:

- Working with Virtual Libraries
- Managing Virtual Device Access
- Using Virtual Tapes
- Working with RAID Groups
- Working with Physical Tape Devices
- Configuring Miscellaneous Settings
- Advanced Configuration
- Support Tools

Working with Virtual Libraries

NearStore VTL virtual libraries are the logical equivalents of physical tape libraries: they have one or more tape drives, cartridge slots, mailbox ports (also called entry/exit ports, CAP ports, or I/O ports), a barcode reader, and a medium changer. Virtual libraries appear to the backup application in exactly the same way as physical tape libraries. This means that the backup application can work with virtual libraries without any configuration changes. Simply add the virtual library to the backup application as you would a physical library and back up your data.

Because you will, at some point, want to export your virtual tapes to physical tape, you need to create virtual libraries with drives that are compatible with the drives of your physical library. This means that both the capacity and type of the virtual and physical drives should be the same. The NearStore VTL comes with a

number of predefined virtual tape drive types that are compatible with most virtual libraries. If you want to restore directly from physical tape, the virtual and physical drives must be of the same type.

If you decide to create a virtual library that is fully populated with virtual tapes, you need to ensure that the labels (virtual barcodes) of your virtual tapes match the barcodes of the corresponding physical tapes. The best way to understand this is to visualize a one-to-one correlation between virtual tapes and the corresponding physical tapes. For each virtual tape, there is a physical tape with the same capacity and barcode.

You can also have the NearStore VTL create the virtual tapes based on the physical tapes that are currently in your physical tape library. See “Using Virtual Tapes,” page 76 for more information.

There are multiple advanced configuration options that affect the way in which you can use virtual libraries. The first is the customer option. When you enable this option, you can create customer accounts and assign virtual libraries to them. When a virtual library is assigned to a specific customer, only that customer (and the NearStore VTL administrator) can access it.

To use the customer option, you must enable it before you create the virtual libraries that you want to associate with the customer account. See “Working with Customer Accounts,” page 85 for more information.

The next option to consider is the library access (Host access control) feature. This feature gives you the ability to associate specific hosts with specific virtual libraries. These associations can be either dedicated or shared. When an association is shared, multiple hosts can access the same virtual library. When an association is dedicated, only a specific host can access the virtual library. You can enable library access either before or after you create a virtual library.

See “Managing Host Access,” page 88 for more information.

Virtual library tasks include:

- “Viewing Virtual Libraries,” page 10
- “Creating Virtual Libraries,” page 11
- “Deleting Virtual Libraries,” page 14
- “Updating Virtual Libraries,” page 15

Viewing Virtual Libraries

The Virtual Library List screen displays a list of all virtual libraries currently configured for the NearStore VTL. The configuration parameters (such as the name and capacity) for each virtual library are listed.

From the *Configuration Tasks* menu, located on the left side of the screen, click the *Virtual Libraries* task category.

The Virtual Library List screen appears and the NearStore VTL displays the following:

Library Name—gives the name of the virtual library.

Customer Name—(optional) gives the name of the customer with which the virtual library is associated. This field is displayed only if the Use Customer option has been enabled from Configuration Tasks >Advanced.

Capacity Allocated—specifies the amount of disk space allocated to the virtual tapes in the virtual library.

Capacity Used—gives the amount of disk space currently used by the virtual tapes in the specified virtual library.

Data Written—lists the amount of data written to all of the tapes.

Vendor id—lists the vendor ID configured for the library.

Product id—lists the product ID configured for the library.

Tape Drive Type—lists the tape drive type.

#Virtual Tapes—provides the number of virtual tapes that are in the virtual library. If there are no virtual tapes in the virtual library, the capacity allocated will be 0 Gigabytes.

#Slots—gives the number of cartridge slots in the virtual library.

#Drives—provides the number of virtual tape drives in the virtual library.

Disk Compression—(optional) displays either Disabled, if disk compression is disabled, or Enabled, if disk compression is enabled. For a library to use disk compression, disk compression (Advanced > Options) must be enabled for the appliance. This is the default for the library. This default setting can be overridden for individual virtual tapes.

Tape Smart Sizing—tells you whether tape smart sizing is enabled. If it is not enabled, Disabled is displayed.

Storage Pool—(optional) gives the name of the storage pool with which the virtual library is associated. This field is displayed only if the Use Storage Pools option has been enabled from Configuration Tasks > Advanced.

Creating Virtual Libraries

Each NearStore VTL virtual library is associated with a virtual library type. This virtual library type defines the characteristics of the virtual library, such as the type of virtual tape drives that the library uses and how many cartridge (virtual tape) slots it has. The NearStore VTL comes with a number of virtual library types that you can use. Alternatively, you can create a custom virtual library type if your needs are not addressed by one of the default types.

It is important to keep in mind that there is a one-to-one correlation between virtual tapes and physical tapes. This means that you should pick a virtual tape drive type that matches the physical tape drive or drives to which you will be exporting virtual tapes.

Note

When you move a virtual tape, it retains the attributes of its source virtual library.

Complete this task to create virtual tape libraries:

Note

NetApp recommends that you do not create virtual libraries with more than 1024 slots. You cannot complete some tasks using the GUI if there are more than 1024 slots in the library.

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Virtual Libraries* task category.
2. Click the *Create Virtual Library* tab, located in the upper portion of the screen.
The Create Virtual Library screen appears.
3. Complete the following:

Note

Some fields are only displayed if *More Options* is selected (at the bottom of screen), or if a corresponding advanced option is selected from *Advanced > Options*.

Library Nickname—provides the name of the virtual library.

Customer Name—(only displayed if the *Use Customer* advanced option is selected) provides a drop-down menu from which you can select a customer account. The virtual library will be assigned to the customer specified.

See “Working with Customer Accounts,” page 85 for more information.

Library Type—selects the type of virtual library that you want to create. The library type defines the characteristics, such as the type of virtual tape drives and the number of cartridge slots, of the virtual library. See “Working with Virtual Libraries,” page 9.

Virtual Tape Drive Type—select a virtual tape drive type from the pull-down menu.

Automatically assign 'First ...' values—select this to have the appliance automatically assign the first slot number, drive number, mailbox number, and transport number. Otherwise enter the number for the first slot, first drive, first mailbox, and first transport in the appropriate field.

Slot Count—enter the number of slots for the library. This should match the number of slots in the corresponding physical library.

Drive Count—enter the number of tape drives for the library. This should match the number of drives in the corresponding physical library.

Mailbox Count—(only displayed if *More Options* is selected.) Enter the number of mailboxes. This field is gray, if the library type does not support mailboxes.

Transport Count—(only displayed if *More Options* is selected.) The number of tape transports.

Assigned to Port – WWN—(optional) select an already defined port (WWN) for the virtual library.

Accessible from host—(only displayed if advanced option *Hosts* is selected.) Select an already defined host, to grant that host access to the library.

Fully Loaded with Virtual Tapes—specifies whether the NearStore VTL creates a new virtual tape for each slot in the virtual library. In this case, the starting label for these virtual tapes must be specified. The labels of additional volumes will increment automatically.

Note

If the Over Allocation feature is disabled, the NearStore VTL creates only the number of virtual tapes that the currently available disk space allows.

Starting Tape Label—gives the starting label of the virtual tapes. For example, if the starting volume label is ABC100 and there are five virtual tapes the NearStore VTL labels them ABC100, ABC101, ABC102, ABC103, and ABC104. This example assumes that there are no label constraints. If label constraints are enabled, the NearStore VTL increments only part of the label.

See “Using Virtual Tapes,” page 76 for more information.

Disk Compression—select this check box to enable disk compression. This sets the default for the library, although the value can be overridden for individual tapes.

Tape Smart Sizing—NearStore VTL samples the data that the backup application sends to see at which ratio it can be compressed when exported to physical tape. This option optimizes physical tape usage.

Enable Shadow Tape—(only displayed if advanced option *Enable Shadow Tape* is selected) select this check box to enable the use of shadow tapes.

Shadow Tape Retention Time—(only displayed if advanced option *Enable Shadow Tape* is selected) enter a retention time. The retention time is the longest the NearStore VTL appliance keeps shadow tapes. The appliance can delete a shadow tape before the retention period expires, if the space is needed for current backups.

Storage Pool—(only displayed if advanced option *Use Storage Pools* is selected) provides a drop-down menu from which you can select a storage pool. The virtual library uses disk space only from the storage pool that you select. This drop-down menu is available only if the Use Storage Pool option is enabled from Configuration Tasks >Advanced.

See “Working with Storage Pools,” page 58 for more information.

(Optional) you can click *Reset* to clear all of the changes that you have made to the screen.

Automatically Move Volume from EEP to Slot—(only displayed if *More Options* is selected, and if the advanced option *Enable EEP* is selected.) selected by default. When selected, the virtual library automatically moves virtual tapes from the entry/exit port to an available slot when new virtual tapes are created or imported. Otherwise, virtual tapes will appear in the import/export slot one at a time and you can move them into the slots either manually or using the backup application.

Enable Tape Cloning—(only displayed if *More Options* is selected) NearStore VTL creates a physical copy of each virtual tape that has been modified as it is removed from the virtual tape drive. Unlike exporting, this process does not delete the virtual tape.

See [Enabling Advanced Configuration Features](#) for more information.

Disk Allocation Per Tape (GB)—(only displayed if *More Options* is selected) lets you set the maximum amount of disk space reserved for this virtual tape.

4. Click *Apply*.

The NearStore VTL adds the new library and displays it on the Virtual Library List screen. You can manipulate the new library from the Virtual Library screen available from Daily Tasks >Virtual Libraries.

NearStore VTL then publishes the new virtual library on the SAN. It also displays it on the SCSI Addresses screen, available from Configuration Tasks >Virtual Device Access >SCSI Addresses.

If you have enabled the storage pool option, the NearStore VTL uses the specified storage pool for storing this virtual libraries data. See “Working with Storage Pools,” page 58 for detailed information. If you have selected the option to use customer accounts, the NearStore VTL associates the virtual library with the specified customer account. See “Working with Customer Accounts,” page 85 for more information.

Deleting Virtual Libraries

When a virtual library is no longer needed, you can delete it from the configuration of the NearStore VTL appliance. The NearStore VTL exports all virtual tapes that are currently present in the virtual library when you delete it. This is to assure that the data on the virtual tapes is not accidentally deleted.

Once the NearStore VTL has exported all of these virtual tapes, you need to delete the virtual library again.

Note

If you either cannot export the virtual tapes or do not wish to retain their data, you have to cancel the pending exports and manually delete all of the virtual tapes in the library. Then you can delete the virtual library.

For this reason, it is a good idea to remove all virtual tapes from a virtual library before you delete it. If you are sure that you don’t need the data on the virtual tapes, you can delete the individual virtual tapes first.

Complete this task to delete virtual libraries:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Virtual Libraries* task category.
2. Click the *Delete Virtual Library* tab, located in the upper portion of the screen.

The Delete Virtual Library screen appears, and the NearStore VTL displays the following information:

Action—specifies the export tape(s)/remove library which triggers the export of any virtual tapes that are associated with the specified virtual library, and then deletes the virtual library specified.

Library Name—gives the name of a virtual library. Ensure that the correct library is selected.

Customer Name—(optional) provides the name of the customer to which the library is assigned. This field is displayed only if the Use Customer option has been enabled from Configuration Tasks >Advanced.

Capacity Used—specifies the amount of allotted disk space currently used by the virtual tapes in the specified virtual library.

Disk Used—specifies the amount of actual disk space currently used by the virtual tapes in the specified virtual library.

#Virtual Tapes—provides the number of virtual tapes associated with the virtual library.

3. Click in the *Action* field of the virtual library that you want to delete.
4. When prompted, Click *Apply* to delete the selected virtual library.

As noted, if there are virtual tapes currently in the virtual library, the NearStore VTL tries to export them before it deletes the virtual library. If there is a problem with the export, or if you do not want to save the data on these virtual tapes, you can delete/export these volumes manually.

Once the NearStore VTL exports any virtual tapes, delete the virtual library again.

Updating Virtual Libraries

After a virtual library is created, some properties of the library can be changed; for example, if an appliance is upgraded to one with hardware compression, you can update your libraries to take advantage of hardware compression.

Complete this task to update virtual tape libraries:

Note

NetApp recommends that you do not create virtual libraries with more than 1024 slots. You cannot complete some tasks using the GUI if there are more than 1024 slots in the library.

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Virtual Libraries* task category.
2. From the list of virtual libraries shown on the *Virtual Library List* screen, click the nickname of the library you want to update.

The *Update Virtual Library* screen appears.

3. Complete the following:

Note

Some fields are only displayed if *More Options* is selected (at the bottom of screen), or if a corresponding advanced option is selected from *Advanced > Options*. Additionally, some fields are gray because the value displayed cannot be changed.

Library Nickname—change the name of the virtual library.

Automatically assign 'First ...' values—select this to have the appliance automatically assign the first slot number, drive number, mailbox number, and transport number. Otherwise enter the number for the first slot, first drive, first mailbox, and first transport in the appropriate field.

Slot Count—enter the number of slots for the library. This should match the number of slots in the corresponding physical library.

Drive Count—enter the number of tape drives for the library. This should match the number of drives in the corresponding physical library.

Mailbox Count—(only displayed if *More Options* is selected.) Enter the number of mailboxes. This field is gray, if the library type does not support mailboxes.

Transport Count—(only displayed if *More Options* is selected.) The number of tape transports.

Disk Compression—select this check box to enable disk compression. This sets the default for the library, although the value can be overridden for individual tapes.

If you change the disk compression setting, a confirmation window opens, asking if you wish to change the compression setting for all tapes in the library. Click *Apply*, to apply the change to all tapes in the library. If you click *Cancel*, the change applies to the library, and so to any new tapes, but not to existing tapes.

Enable Shadow Tape—(only displayed if advanced option *Enable Shadow Tape* is selected) select this check box to enable the use of shadow tapes.

Shadow Tape Retention Time—(only displayed if advanced option *Enable Shadow Tape* is selected) enter a retention time. The retention time is the longest the NearStore VTL appliance keeps shadow tapes. The appliance can delete a shadow tape before the retention period expires, if the space is needed for current backups.

Tape Smart Sizing—select this check box to enable tape smart sizing. NearStore VTL samples the data that the backup application sends to see at which ratio it can be compressed when exported to physical tape. This option optimizes physical tape usage. This has no effect, unless you also set the tape smart sizing type.

Tape Smart Sizing Type—select from the drop down menu, a tape smart sizing tape. This value is used to determine the compression used for tape smart sizing, and should match the type of physical tape.

Automatically Move Tape from EEP to Slot—(only displayed if *More Options* is selected, and if the advanced option *Enable EEP* is selected.) selected by default. When selected, the virtual library automatically moves virtual tapes from the entry/exit port to an available slot when new virtual tapes are created or imported. Otherwise, virtual tapes will appear in the import/export slot one at a time and you can move them into the slots either manually or using the backup application.

Enable Tape Cloning—(only displayed if *More Options* is selected) NearStore VTL creates a physical copy of each virtual tape that has been modified as it is removed from the virtual tape drive. Unlike exporting, this process does not delete the virtual tape.

Disk Allocation Per Tape (GB)—(only displayed if *More Options* is selected) lets you set the maximum amount of disk space reserved for this virtual tape.

4. Click *Apply*.

The NearStore VTL updates the library and displays it on the Virtual Library List screen. You can manipulate the library from the Virtual Library screen available from Daily Tasks >Virtual Libraries.

NearStore VTL then publishes the updated virtual library on the SAN. It also displays it on the SCSI Addresses screen, available from Configuration Tasks >Virtual Device Access >SCSI Addresses.

Managing Virtual Device Access

The Managing Virtual Device Access screens include:

- “SCSI Addresses,” page 17
- “Listing Ports,” page 18
- “Assigning Device Access,” page 18
- “Working with Port Assignments,” page 19

SCSI Addresses

Although the SCSI Addresses screen is not specifically a monitoring screen, it provides SCSI address information for the NearStore VTL appliance and for each virtual library and virtual tape device, that you have added to its configuration.

You can use this screen to gain information, such as the Logical Unit Number (LUN) of a device. This information can then be used when you add one of these devices to the configuration of the backup application.

From the *Configuration Tasks* menu, located on the left side of the screen, click *Virtual Device Access*.

The SCSI Addresses screen appears and the following information is provided:

Customer—(only displayed if the advanced option *Use Customer* is selected) provides the name of the customer to which the device is assigned.

Host Name—(only displayed if the advanced option *Enable Host Access Control* is selected) provides the name of the assigned host.

Device Name—provides the name of the tape device.

Device Type—specifies the device type. If the device is the robotic arm of a library, Robot is displayed. If the device is a tape drive, Tape Device *N*, where *N* represents the number of the drive, is displayed.

Vendor ID—provides the vendor information for the tape device. This information is important because it is needed by the backup application when working with the device.

Product ID—provides the product information for the tape device. Along with the vendor information, the product identification is needed by the backup application when working with the device.

Port—specifies the port on which the device is available.

LUN—gives the LUN of the device. As already stated, this information is important when adding the device to the configuration of the backup application. Each physical Fibre Channel port in an system is a different target, but the virtual devices (possibly multiple libraries) are LUNs on that target.

Listing Ports

You can view a table of information about the ports. The information includes:

- Port name
- Port Role (either Frontend, or Backend)
- Port WWNN
- Port WWPN
- Topology
- Node ID
- Loop ID

Complete this task to view port information:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Virtual Device Access* task category.
2. Click the *Port List* tab, located in the upper portion of the screen.

The Port List screen appears.

Assigning Device Access

Once you have enabled the device access feature and added hosts and virtual libraries to the configuration of the NearStore VTL appliance, you can map these hosts to the virtual libraries.

Complete this task to assign hosts to virtual libraries.

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Virtual Libraries* task category.
2. Click the *Host Access* tab, located in the upper portion of the screen.

The Host Access screen appears and the virtual libraries that are configured for the system appear.

3. From the Library Name field, click the name of the virtual library you want to assign to a host.

The Host Access screen appears.

4. Select the type of access that the host or hosts will have to the virtual library, specified in the Library Nickname field.

Valid types are:

Dedicated Library—when in this state, the virtual library can be accessed only by the host that is displayed in the Host Name field.

Shared Library—when in this state, the virtual library can be accessed by only the hosts listed.

5. From the *Host* drop-down menu, select the name of the host that you want to map to the virtual library, specified in the Library Nickname field.

(Optional) You can also select *<New Host>* to invoke the Add Host screen.

6. Click *Apply* to map the selected host to the specified virtual library.

Working with Port Assignments

If the NearStore VTL appliance uses more than one front-end port, you can map virtual libraries and drives to specific ports. When you are using port mapping, only hosts that are connected to a specific port (directly or through a switch) can see its assigned virtual libraries and drives.

You can map virtual libraries to ports when you first create the virtual library or after you create it. This allows for maximum flexibility. See “Working with Virtual Libraries,” page 9 for more information on creating virtual libraries.

This subsection provides the following:

- [Viewing Existing Port Assignments](#)
- [Creating/Editing Port Assignments](#)

Viewing Existing Port Assignments

The NearStore VTL displays existing port mappings, including the name of the front-end port, the port World Wide Node Name (WWNN), World Wide Port Name (WWPN), topology, node ID, and the loop ID, on the Port List screen.

You can access the *Port List* screen from *Configuration Tasks > Virtual Device Access > Port List*.

Port Name—gives the name of the port.

Port WWNN—provides the WWNN of the port.

Port WWPN—gives the WWPN of the port.

Topology—provides the way in which the ports are connected to the SAN.

Node ID—gives the node identification for the port.

Loop ID—provides the loop identification for the port.

Creating/Editing Port Assignments

When using port assignments, you can either assign a complete library or the individual components (virtual tape drives and robots) of a library to specific ports. Making specific port assignments provides a more detailed mapping of logical devices and enhances the NearStore VTL load-balancing capabilities.

Complete the following to map front-end ports to virtual libraries:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Virtual Device Access* task category.
2. Click the *Port Assignment* tab, located in the upper portion of the screen.

The Port Assignment screen appears and the NearStore VTL displays the following:

Customer Name—(only shown if the advanced option Use Customer is selected) provides the name of the customer assigned to the library.

Library Name—provides the name of the virtual library that you can map to the front-end port.

Device—specifies the type of device that you can map to the port (the NearStore VTL displays Robot and Drives for each configured virtual library). If the virtual library has been broken down into its components, the NearStore VTL displays each component (drives and the robot) as individual devices.

Port—specifies the port to which the device is currently mapped.

3. From the *Library Name* field, click the name of the virtual library that you want to assign to a port.

By default, the NearStore VTL displays the single-port version of the Port Assignment screen. This version includes the option to keep the library as a single unit or to break it down into its components. It also includes a drop-down menu from which you can map the library to either a single or multiple ports.

4. (Optional) if you want to break the library into smaller components or assign it to multiple ports, select the Multi-Port option.
5. From the *Port* drop-down menu, select the port to which you want to map the virtual library.

If you selected the Multi-Port option, the NearStore VTL displays each drive and robot with a port drop-down. You can use this menu to map the component to a specified drive.

6. After you have made the selections, click *Apply* to map the library or library components to the specified drive or drives.

The NearStore VTL maps the selection to the port that you specified. The Port List screen reflects these changes.

Working with Virtual Tapes

Like physical tapes, virtual tapes are defined by their capacity and identified by a virtual barcode called a label. To the backup application virtual tapes appear and function exactly like physical tapes, with the exception that they support a much higher transfer rate and provide greater reliability.

Import/export

Because the NearStore VTL preserves the native format of the backup application when it writes data to disk, you can export virtual tapes to physical tape without the need of a conversion process. This gives you the ability to back up data to disk while still keeping the data offsite on physical tapes that are stored in the native format of the backup application.

You can also import data from any existing tape (either made by a NearStore VTL or some other application) into a NearStore VTL. When an import is successfully completed, the NearStore VTL creates a virtual tape that is the exact duplicate of the physical tape. The NearStore VTL also provides import features such as an enhanced pass-through mode and quick load.

See “Importing Virtual Tapes,” page 79 for more information about importing physical tapes into a NearStore VTL.

Export Status

Each virtual tape has an export status. This status tells the NearStore VTL whether it needs to copy the data from the virtual tape to the corresponding physical tape during an export. If the virtual tape contains data that has not yet been copied to tape, its status is Needs export. When this virtual tape is exported, the NearStore VTL copies its data to tape.

If the data on the virtual tape is already on physical tape, the NearStore VTL simply deletes the virtual tape when it is exported. The status of this type of virtual tape is Does not need export.

Generally, a blank tape has a status of Does not need export (since it has no data to copy). Likewise, a virtual tape that has already been exported (or cloned to tape) also has an export status of Does not need export because the NearStore VTL has already copied the data to physical tape.

You can change the export status of a virtual tape from Does not need export to Needs export. This allows you to force the export of data from virtual tape to a physical tape. Changing the export status of a virtual tape is useful in the event that the corresponding physical tape has failed or is not longer available.

Virtual Tape Library Association

Although virtual tapes are associated with a specific virtual library, they are not strictly tied to that library. You can move virtual tapes between compatible virtual libraries. In order for virtual libraries to be considered compatible, they must use the same virtual tape drive type.

See [Creating/Editing Virtual Tape Drive Types](#) for more information.

This subsection provides the following tasks:

- [Viewing Virtual Tapes](#)
- [Changing the Write-protected Status of a Virtual Tape](#)
- [Changing the Export Status of a Virtual Tape](#)

- [Moving Virtual Tapes](#)
- [Deleting Virtual Tapes](#)

Viewing the List of Virtual Tapes

The NearStore VTL provides a comprehensive list of virtual tapes on the Virtual Tape List screen. This list includes the label, virtual library association, number of tape files, export status, and size of each virtual tape.

From the *Configuration Tasks* menu, located on the left side of the screen, click the *Virtual Tapes* task category.

The Virtual Tape List screen appears. At the top of the screen the drop-down menu *Library* controls whether the virtual tapes for all libraries, or just a selected one, are listed. The screen displays the following information:

Label—displays the label (virtual barcode) of the virtual tape. If you click the label of a specific virtual tape, the NearStore VTL displays the Update Virtual Tape screen for the specified virtual tape.

Customer—(displayed if the advanced option *Use Customer* is selected) provides the name of the customer to whom the virtual tape belongs. This field is displayed only if the customer option is enabled under Configuration Options > Advanced.

Library—(displayed if *ALL* is selected in the *Library* drop-down menu) provides the name of the virtual library in which the virtual tape resides.

Files—specifies the number of tape files that are contained in the virtual tape. Tape files are not the individual files that are backed up by the backup application. Rather, they are data separated by file marks.

Write Protected—displays the write-protected status of the virtual tape. If the status is Read Only, the virtual tape cannot be written to. If the status of the virtual tape is Writable, the virtual can be written to. You can change the write-protected status of a virtual tape from Configuration Tasks > Virtual Tapes > Change Write Protected Status.

Need to export—specifies whether the virtual tape needs to be copied to a physical tape when it is exported. If the virtual tape needs to be copied, the value Needs Export is displayed. If the virtual tape does not need to be copied, the value Does not need export is displayed. A volume does not need to be exported if no changes have been made to it since it was created, imported, or cloned.

Raw Capacity—gives the specified capacity of the drive.

Data Written—specifies the amount of uncompressed data that the NearStore VTL has written to the virtual tape.

Space Remaining—provides the amount of disk capacity that is remaining.

Disk Used—provides the amount of disk being used by the virtual tape.

Tape Smart Sizing—lists whether the virtual tape uses tape smart sizing. If the virtual tape does, the field displays the algorithm used. If it does not, the field displays DISABLED.

Changing the Write-protected Status of a Virtual Tape

The NearStore VTL has a user-configurable option that you can use to set the write-protected status of virtual tapes. Virtual tapes that are in a protected state cannot be written to but data can be read from them.

Virtual tapes that are in a nonprotected state can have data written to and read from them.

Complete this task to change the write-protected status of a virtual tape:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Virtual Tapes* task category.
2. Click the *Change Write Protected Status* tab, located in the upper portion of the screen.

The Change Write Protected Status screen appears. At the top of the screen the drop-down menu *Library* controls whether the virtual tapes for all libraries, or just a selected one, are listed. The screen displays the following information:

Label—gives the label of the virtual tape. This label is used in the same way as the barcode of a physical tape.

Customer—specifies the name of the customer with which the virtual tape is associated. This field is present only if the Use Customer option has been enabled from Configuration Tasks >Advanced.

Library Name—provides the name of the virtual library in which the virtual tape resides.

Write Protected—displays the current status of the virtual tape. Valid states are Writable and Read Only. When a virtual tape is set to a protected state (Read Only), it can still be exported to physical tape.

3. Select one or more tapes by selecting the check box in front of the tape labels. To select all tapes, select the check box in the column heading
4. Click the *Set Read-only* button to set the protected status to read-only, or click the *Set Writable* button to set the protected status to writable.

Changing the Export Status of a Virtual Tape

Each virtual tape has an export status that tells the NearStore VTL whether to copy its data to physical tape during an export. If the export status is Needs export, the NearStore VTL copies the data from the virtual tape to physical tape. If the export status is Does not need export, the NearStore VTL deletes the virtual tape without copying the data.

The export status of a virtual tape depends on whether its data also exists on a corresponding physical tape. For example, if a virtual tape is the result of a tape import (and the backup application has not written data to the virtual tape), the virtual tape and the tape have the same data. In this case, the export status of the virtual tape is Does not need export. This is also true if the NearStore VTL cloned the virtual tape or if the virtual tape is new.

If, on the other hand, the backup application writes data to this virtual tape, The NearStore VTL changes its export status from Does not need export to Needs export. This is because the virtual tape now contains data that is not currently on the physical tape.

Forcing the export of data

When you export a virtual tape, it is important that the corresponding physical tape contains the most up-to-date information. This helps to ensure that no data is lost when you export the virtual tape.

As mentioned previously, if the Export status of the virtual tape is Does not need export, the NearStore VTL does not copy the data from the virtual tape to the corresponding tape when it exports the virtual tape. This can be a problem if corresponding physical tape is either lost or damaged.

For this reason, you can force the export of data from a virtual tape to physical tape. When you change the export status of a virtual tape from Does not need export to Needs export, the NearStore VTL copies the data from the virtual tape to physical tape during an export.

Changing the Export Status

Complete this task to change the export status of a virtual tape:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Virtual Tapes* task category.
2. Click the *Change Export Status* tab, located in the upper portion of the screen.

The Change Export Status screen appears. At the top of the screen the drop-down menu *Library* controls whether the virtual tapes for all libraries, or just a selected one, are listed. The screen provides a list of virtual tapes that do not have to be copied to physical tape when they are exported.

Label—gives the label/virtual barcode of the virtual tape. The label of a virtual tape can be thought of in the same way as the barcode label on a physical tape. If the virtual tape was imported from a physical tape, the label of the virtual tape is the same as the barcode of the physical tape.

Library Name—provides the name of the virtual library in which the virtual tape resides.

Customer—specifies the customer to which the virtual tape belongs. This field is displayed only when the Customer option is enabled from Configuration Tasks > Advanced > Options.

Data Written—gives the size of the virtual tape.

3. Select one or more tapes by selecting the check box in front of the tape labels. To select all tapes, select the check box in the column heading
4. Click the *Force Export* button to force the export of the selected tapes.

The selected virtual tape no longer appears on the Change Export Status screen. The status of the virtual tape, as listed in the Need to Export field of the Virtual Tape List screen, changes from Does not need export to Needs export.

Moving Virtual Tapes

At some point, you might want to move virtual tapes between virtual libraries. This is possible as long as both virtual libraries use the same virtual tape drive types, and storage pool. Moving virtual tapes is useful in the event that you want to consolidate virtual libraries or move virtual tapes into a virtual library of a different size.

If you have enabled the Customer option, you must ensure that both the source and destination virtual libraries are owned by the same customer account. This is a safeguard that prevents sensitive information from being accidentally moved between customer accounts. See “Working with Customer Accounts,” page 85 for more information.

Complete this task to move a virtual tape between compatible virtual libraries:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Virtual Tapes* task category.
2. Click the *Move Virtual Tape* tab, located in the upper portion of the screen.
3. Set the *Source Library* to the library containing the virtual tape you want to move.
4. Set the *Destination Library* to the destination library.
5. Select individual tapes to move by clicking the box next to the tape name, or select all tapes by clicking the box next to the column heading *Tape Label*.
6. Click *Move* to move the selected tapes.

Deleting Virtual Tapes

When you no longer need a virtual tape, you can delete it from the system. Deleting a virtual tape removes it from the system and frees up the associated disk space and memory.

Note

You cannot delete a virtual tape if the tape is “in use.” A virtual tape is in use if it is loaded into a drive or referred to in an import or export request.

One consideration when deleting a virtual tape is whether you might need the data in the future. If there is any chance that you will need the data, export the virtual tape to physical tape rather than delete it.

Note

After the physical tape is successfully written, the exported virtual tape is deleted.

See “Changing the Export Status of a Virtual Tape,” page 23 for more information.

Complete this task to delete a virtual tape:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Virtual Tapes* task category.
2. Click the *Delete Virtual Tape* tab, located in the upper portion of the screen.

The Delete Virtual Tape screen appears. At the top of the screen the drop-down menu *Library* controls whether the virtual tapes for all libraries, or just a selected one, are listed. The screen displays the following:

Tape Label—uniquely identifies each virtual tape. This corresponds to the barcode label on a physical tape.

Customer—provides the name of the customer with which the virtual tape is associated. This field is displayed only when the Use Customer option is enabled from Configuration Tasks > Advanced.

Data Written—displays the size of the virtual tape.

Disk Used—displays the amount of disk space in use by the tape.

Need to Export—displays either *Needs export* or *Does not need export*, depending on whether the physical tape and virtual tape contain the same data.

3. Select one or more tapes by selecting the check box in front of the tape labels. To select all tapes, select the check box in the column heading.
4. Click the *Delete* button.
5. When prompted, click *Apply* to delete the selected virtual tapes.

CAUTION

When you click Apply, the NearStore VTL permanently deletes the data on the virtual tape.

The NearStore VTL deletes the virtual tape, and the associated disk space is made available.

Working with RAID Groups

RAID groups are constructed from the NearStore VTL-attached physical disks, and provide a virtualization layer between the physical disks and the virtual tapes. This layer lets you add, remove, and replace the physical disks without affecting the structure of the virtual tapes or the data stored on the tapes.

The remainder of this section provides information on viewing, adding, and dropping RAID groups from the NearStore VTL.

This subsection contains the following tasks:

- Listing RAID Groups
- Creating RAID Groups
- Setting a Disk to Failed Status
- Importing RAID Groups
- Dropping RAID Groups
- Managing Hot Spares

Listing RAID Groups

The NearStore VTL displays all disks that have been added to its configuration on the RAID Group List screen. Simply connecting a disk to the NearStore VTL does not add it to the configuration of the system.

You must first connect the disk, as specified in the *NearStore VTL Installation and Setup Instructions*, and then you must add the disk to the configuration of the system. See *Creating RAID Groups* for more information on adding RAID groups to the configuration.

From the *Configuration Tasks* menu, located on the left side of the screen, click the *RAID Groups* task category.

The initial screen has the Shelf View radio button selected and shows an iconic view of the RAID groups. Placing the mouse over the disk icons shows the information also available in the List View. To change to List View, select the List View radio button.

The RAID Group List screen appears and the following is displayed for each disk that has been added to the system.

RAID Group Name—lists the name of the RAID group.

Storage Pool—(only displays if the advanced option *Use Storage Pools* is set) lists the storage pool used for the RAID group.

Capacity—lists the capacity of the RAID group.

Capacity Used—gives the amount of disk space currently in use.

RAID Group Status—lists the disk status.

Selecting the Show Detailed button when in List View, adds information on the physical disks used in the RAID groups:

Port Name—lists the port through which the physical disk is accessed.

Shelf—lists the shelf in which the physical disks are located.

Bay—lists the bay within the shelf for the physical disk.

Serial Number—lists the serial number of each physical disk.

Creating RAID Groups

When you create a physical disk, the NearStore VTL labels and includes the disk in its configuration. This means that a NearStore VTL can write virtual tape data to the disk. (NearStore VTL disks contain self-describing data, which can be used to import the disks from another NearStore VTL appliance for disaster recovery purposes.)

Complete this task to add RAID groups to a NearStore VTL appliance:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *RAID Groups* task category.
2. Click the *Create RAID Group* tab, located in the upper portion of the screen.

The Create RAID Group screen appears, and the NearStore VTL displays the disks that have been connected to it but are not yet assigned to RAID groups.

If you have added disks to the system since the last power cycle, click *Discover*. The NearStore VTL appliance scans for any physical disks that are connected to it.

3. If you want to let the VTL assign the name, leave the RAID Group Name field set to Auto Assign; otherwise, type in the name you want assigned to the RAID group.
4. If *Use Storage Pools* is set under the advanced options, you can use the *Storage Pool Name* drop-down list to select the storage pool from which the disks will be assigned.
5. Decide whether you want to select individual disks or have the VTL automatically assign all available disks to RAID groups. Typically, allowing the VTL to automatically assign disks results in the best possible assignment of physical disks to RAID groups. If you want to have the VTL automatically assign disks, click *Automatically Create RAID Groups*. Skip the remainder of the steps. If you want to select the disks, continue with step 6.
6. Select the disks to include in the raid group by clicking in the check box next to *RAID Group Storage Pool Name* field. You can select all disk by clicking in the check box at the top of the column.
7. Click *Apply* (clicking *Reset* removes your disk selections).

The NearStore VTL displays each disk that you successfully add to the system on the RAID Group List screen.

Setting a Disk to Failed Status

When you no longer need a disk or if you have a disk that is not functioning properly, you *fail* it from the system. (Note that if the disk actually fails, VTL automatically replaces it from the hot spares pool, and notifies you.) When you fail a disk, the NearStore VTL drops the disk and removes the NearStore VTL label. This means that once you have dropped a disk, you will not be able to access any virtual tapes that it might contain. For this reason export any virtual tapes that are on a disk before you drop it. Exporting the virtual tapes ensures that the corresponding physical tapes have the most-recent data on them.

See “Changing the Export Status of a Virtual Tape,” page 23 for more information.

Complete this task to fail RAID groups from a NearStore VTL appliance:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *RAID Group* task category.
2. Click the *Fail Physical Disk* tab, located in the upper portion of the screen.

The Fail Physical Disk screen appears, and the NearStore VTL displays the disks that have been added to it.

3. From the *Action* field of the disk that you want to drop, click *Fail*.

CAUTION

When you fail a disk, all of the data on that disk is lost.

The NearStore VTL fails the disk and no longer displays it on either the Fail Physical Disk or the RAID Groups List screens.

Importing RAID Groups

In the unlikely event that a NearStore VTL appliance fails, you can disconnect its back-end disks and then import both the configuration of the system and the user data (virtual tapes) into a new system. Restoring both the configuration and the user data to a new system is relatively simple because both the configuration of the old system and the user data are stored on the back-end disks that you are importing.

Note

Configuration data must be manually saved.

Note

Since user data is self-describing, the NearStore VTL does not actually have to retrieve all of the data from disk during a disk import. This enables the NearStore VTL to complete a disk import in a relatively short period of time.

The NearStore VTL has a feature that periodically auto-saves the configuration of the system to the back-end disks. These are the same disks on which the NearStore VTL saves user data. This means that you can load the auto-saved configuration from the back-end disks before you import the virtual tapes (user data).

CAUTION

Keep in mind, however, that when you import the configuration from a source to a destination system, the configuration of the destination system is overwritten.

In cases where you want to import the user data to a new system without overwriting the existing configuration, do not import the configuration of the source system. See *Managing the Appliance Configuration* for more information.

Complete this task to import a RAID group into a NearStore VTL appliance.

1. (Optional) Import the configuration of the source system from the disk.
See *Managing the Appliance Configuration* for more information on importing a configuration file from disk.
2. From the *Configuration Tasks* menu, located on the left side of the screen, click the *RAID Groups* task category.
3. Click the *Import RAID Group* tab located in the upper portion of the screen.

The Import RAID Group screen appears, and the NearStore VTL displays the following:

Import—use to select the RAID groups to import. Click in the check box to select a group.

Appliance—lists the identification of the system from which you import the disk. This is the name of the system that originally wrote the data to the disk that you are importing. You can also think of it as the name of the system that labeled the disk.

RAID Group Name—gives the RAID group name after importation. Leave this field to *Auto Assign* to have the appliance assign the name, or fill in a name.

RAID Group Uuid—lists the UUID of the group.

Status—provides the status of the RAID group; for example, whether all of the disks are available.

Shelf—lists the shelf containing the physical disks.

Bay—lists the bay within the shelf containing the physical disks.

Serial Number—provides serial numbers for the physical disks.

4. Select the RAID group to import. If a RAID group *Import* check box is gray, the group is not ready to be imported; for example, some of the disks might be missing.
5. Click *Apply* to begin the process of importing the selected disks.

The NearStore VTL begins importing the disks into the system.

6. To view the status of the import operation, click To view the list of importing RAID groups click *here* to view.

The Importing Physical Disk List screen appears and the NearStore VTL displays the following:

RAID Group Name—lists the RAID group name of the disk.

Status—provides the import status of the disk, including Scanning and Scan Complete.

Dropping RAID Groups

When you no longer need a RAID group or if you have a disk that is not functioning properly, you can drop it from the system. When a NearStore VTL drops a disk, it removes the NearStore VTL label. This means that once you have dropped a disk, you will not be able to access any virtual tapes that it might contain.

For this reason export any virtual tapes that are on a disk before you drop it. Exporting the virtual tapes ensures that the corresponding physical tapes have the most-recent data on them.

See “Changing the Export Status of a Virtual Tape,” page 23 for more information.

Complete this task to drop RAID groups from a NearStore VTL appliance:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *RAID Group* task category.
2. Click the *Drop RAID Group* tab, located in the upper portion of the screen.

The Drop RAID Group screen appears, and the NearStore VTL displays the disks that have been added to it.

3. From the *Action* field of the disk that you want to drop, click *Drop*.

CAUTION

When you drop a physical disk, all of the data on that disk is lost.

The NearStore VTL drops the disk and no longer displays it on either the Drop RAID Groups or the RAID Group List screens.

Managing Hot Spares

A NearStore VTL manages a pool of disks reserved to replace failed disks—this is the hot spare pool. When the VTL detects a disk failure or you manually mark a disk as failed

- The failed disk is removed from the RAID group
- A disk from the hot spare pool is added to the RAID group
- A repair process is started to rebuild the that RAID group

When the VTL automatically builds RAID groups, it assigns appropriate numbers of disks to the hot spare pool. However, you might want to add or remove disks from the hot spare pool either because your application requires more or fewer hot spares, or because you have added or removed disks from the system.

Note

If there are no spares in the spares pool, an action request is generated.

Adding Hot Spares

Complete this task to add disks to the hot spares pool.

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *RAID Group* task category.
2. Click the *Hot Spare Disks* tab, located in the upper portion of the screen.
The Hot Spare Disks screen appears, and the NearStore VTL displays the disks assigned to the pool.
3. Click Add Hot Spare Disk to display the Add Hot Spare Disk task screen.
4. (Optional) If you are using multiple storage pools, use the pull-down list to select the name of the storage pool for the added hot spare.
5. Select Add in the Action field for each disk you want added to the hot spare pool.
6. Click Apply to add the selected disks to the hot spare pool.

Removing Hot Spares

Complete this task to remove disks from the hot spare pool:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *RAID Group* task category.
2. Click the *Hot Spare Disks* tab, located in the upper portion of the screen.

The Hot Spare Disks screen appears, and the NearStore VTL displays the disks assigned to the pool.

3. Click Delete Hot Spare Disk to display the Delete Hot Spare Disk task screen.
4. Select Drop in the Storage Pool field for each disk you want removed from the hot spare pool.

Configuring a NearStore VTL Appliance to Use ACSLS

This section provides the introductory information that you need to configure a NearStore VTL appliance to use ACSLS-controlled tape libraries—that is, an ACS.

The NearStore VTL appliance can use an ACS. The ACSLS server and the VTL appliance communicate over TCP/IP, so before configuring the NearStore VTL to use ACSLS make sure the ACSLS server and the NearStore VTL appliance can communicate over network. The ACS tape drives communicate with the NearStore VTL appliance over the SAN, and so the SAN must be configured to permit this communication, for example, you might need to modify zoning. NetApp recommends that zoning be set so that the NearStore VTL only sees the specific drives it is going to be using.

The NearStore VTL appliance does not communicate directly with ACS robot arms.

In addition to the networking and SAN requirements, before using an ACSLS with a NearStore VTL appliance, you must set the Advanced Option *Use ACSLS to control physical libraries*.

Note

You can attach a SCSI library, or an ACSLS-controlled library to a NearStore VTL appliance, but not both. Before trying to configure the VTL appliance to use an ACSLS-controlled library, make sure that you do not have a SCSI library attached to the appliance.

Note

The VTL appliance discovers and controls the ACSLS library through the ACSLS server, so you must first specify the ACSLS server before configuring the VTL appliance to use the ACSLS library.

The NearStore VTL supports the ACSLS as a Backend Library Manager. The NearStore VTL presents the ACS to the backup applications, and so the backup applications only see the ACSs configured on the VTL. Typically this arrangement requires a SCSI jukebox license for the back up application.

Configuration sections include:

- “Working with ACSLS Servers,” page 33
- “Working with ACSLS Libraries (Physical Libraries),” page 35

Working with ACSLS Servers

Use the ACSLS Server screens to specify the name or IP address of the ACSLS server, monitor the state of the ACSLS server, and define a list of barcode ranges to be used by the VTL appliance.

Tasks for this subsection include:

- “Configuring a VTL Appliance to Use an ACSLS Server,” page 33
- “Checking on an ACSLS Server,” page 34
- “Configuring Barcodes Seen from an ACSLS Server,” page 34

Configuring a VTL Appliance to Use an ACSLS Server

Before using ACSLS tapes, you must define the ACSLS server controlling the ACS device, and optionally, an access control user ID.

Complete this task to define the parameters needed to connect to the ACSLS server:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *ACSLS Server* task category. The ACSLS Server screen appears.
2. Enter the fully qualified domain name, or IP address, of the ACSLS server.

Note

If using a fully qualified domain name, you must also set the DNS server in the Network Setup page (Configuration Tasks > Miscellaneous > Network Setup).

3. (Optional) Enter the user ID used for access control.

Note

This user ID is set up on the ACSLS server. If the ACSLS server is configured to use access control, on the ACSLS server, do the following:

- a. Create a user account. This is the user ID you enter on the VTL.
 - b. Give the account access to the physical tape cartridges assigned to the VTL (identified by a list of barcode ranges).
 - c. Give the user account permission to run ACSLS commands including query, mount, dismount, and eject.
4. Click *Apply*, or to reset the fields to their defaults, click *Reset*.

Checking on an ACSLS Server

Complete this task to check that the NearStore VTL is communicating with the ACSLS server and that the server is running:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *ACSL Server* task category.
2. Click the *ACSL Server State* tab, located in the upper portion of the screen.

The ACSLS Server State screen appears, showing the state of communication with the server, and whether the server is running. The valid states are the following:

INVALID	The NearStore VTL has not yet established communication with the ACSLS server. The component is not discovered yet.
DIAGNOSTIC	ACSLS admin is running the component in the diagnostic mode.
OFFLINE	Component is offline.
OFFLINE_PENDING	Component is going offline.
ONLINE	Component is working normally.
RECOVERY	The component is coming online.

Configuring Barcodes Seen from an ACSLS Server

You need to specify the volumes (identified by barcodes, also called Volume Serial Numbers) available to the NearStore VTL. ACSLS libraries are often shared by several applications. By configuring a list of barcode ranges to VTL, you indicate which volumes should be used by VTL. Note that not all the volumes in the range have to be present in the ACS at the time the barcode range is configured. For example, if the VTL is configured to use barcodes 1000 to 2000, all current and future volumes in this range can be used by VTL. Make sure that the ranges configured on the VTL do not overlap with ranges used by other applications. Additionally, make sure the specified barcodes represent tapes compatible with the libraries you add: a single VTL appliance can only support one media type and one tape drive type, and, the media must be compatible with the drive type. Note that this can also apply to different generations of the same drive, for example, the 9840A and 9840B write to tapes with different densities, and so cannot be mixed on the same VTL appliance.

Complete this task to add or delete ranges of volumes (barcodes) used by the NearStore VTL:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *ACSL Server* task category.
2. Click the *Barcode ranges* tab, located in the upper portion of the screen.

The Barcode ranges screen appears. The screen provides a row of fields for you to enter the barcode (Volume) ranges reserved for use by the NearStore VTL. If you have already entered barcode ranges, some rows show these barcode ranges.

3. To define ranges of barcodes to add, enter the starting and ending barcodes in the blank row and click *Add*.

To mark a range of barcodes for removal, click *Remove* at the end of the row displaying the barcode range you want to remove.

4. Click *Apply* to apply changes. Click *Reset* to reset the settings to the previously saved values.

Working with ACSLS Libraries (Physical Libraries)

After you have set up the communication link between the NearStore VTL and an ACSLS server, you can add, drop, and monitor the ACSLS server-controlled libraries that the NearStore VTL can use.

Tasks for this subsection include:

- “Viewing the List of ACSs,” page 35
- “Adding ACSLS Libraries,” page 36
- “Dropping ACSLS Libraries,” page 37

Viewing the List of ACSs

You can view the list of ACSs defined to the NearStore VTL, and you can view the list sorted in various ways.

Complete this task to view the list of attached ACSs:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Physical Libraries* task category.

The ACS List screen appears showing the following:

Nickname—gives the nickname of the ACS.

ACS ID—provides the ACS ID.

ACS State—gives the current state of the ACS. Valid state values are the following:

INVALID	The NearStore VTL has not yet established communication with the ACSLS server. The component is not discovered yet.
DIAGNOSTIC	ACSLS admin is running the component in the diagnostic mode.
OFFLINE	Component is offline.

OFFLINE_PENDING	Component is going offline.
ONLINE	Component is working normally.
RECOVERY	The component is coming online.

Drive Count—provides the number of drives in the device.

CAP Count—provides the number of CAPs in the device.

LSM Count—provides the number of LSMs in the device.

2. You can modify the presentation and show additional information using the radio buttons (ACS View, LSM View, Drive View, and CAP View) above the ACS list. For example, by selecting *Drive View*, the list expands to show the details for each drive in each listed ACS.

Note

Drives displayed in Drive View are all the drives the NearStore VTL sees through the ACSLS server (that is the control path). Individual drives might or might not be connected to the VTL (accessible over the data path). The drive status shows connected if the drive is connected.

Adding ACSLS Libraries

Before the NearStore VTL can use an ACS-controlled tape, the library containing the tape needs to be added. Note that before you can add a library, you need to add the ACS server.

Complete this task to add ACS-controlled libraries to the NearStore VTL:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Physical Libraries* task category.
2. Click the *Add ACS* tab, located in the upper portion of the screen.

The Add ACS screen appears, and the NearStore VTL displays the list of ACSs identified by the NearStore VTL. For each ACS the following is listed:

Nickname—gives the nickname of the ACS .

ACS ID—gives the ID for the ACS.

ACS State—gives the current state of the ACS.

INVALID	The NearStore VTL has not yet established communication with the ACSLS server. The component is not discovered yet.
DIAGNOSTIC	ACSLS admin is running the component in the diagnostic mode.
OFFLINE	Component is offline.

OFFLINE_PENDING	Component is going offline.
ONLINE	Component is working normally.
RECOVERY	The component is coming online.

LSM ID—gives the LSM ID or IDs associated with the ACS.

Serial Number—provides the serial number for the LSM.

Model—gives model information for the LSM.

- Click the check box to the left of the ACS you want to add. Click the check box at the top of the column to select all ACSs. You can click *Discover* to force the NearStore VTL to recheck for ACSs, if not all of the ACSs are displayed
- Click *Apply*.

The selected ACSs are added to the configuration of the NearStore VTL.

Click *Reset* to remove all selections you have made.

Dropping ACSLS Libraries

You can drop individual libraries from the system.

Complete this task to drop ACSLS libraries from the NearStore VTL appliance:

- From the *Configuration Tasks* menu, located on the left side of the screen, click the *Physical Libraries* task category.
- Click the *Drop ACS* tab, located in the upper portion of the screen.

The Drop ACS screen appears, and the NearStore VTL displays the list of ACSs identified by the NearStore VTL. For each ACS the following is listed:

Nickname—gives the nickname of the ACS.

ACS ID—gives the ACS ID for the ACS.

ACS State—gives the current ACS state of the ACS.

INVALID	The NearStore VTL has not yet established communication with the ACSLS server. The component is not discovered yet.
DIAGNOSTIC	ACSLS admin is running the component in the diagnostic mode.
OFFLINE	Component is offline.
OFFLINE_PENDING	Component is going offline.

ONLINE	Component is working normally.
RECOVERY	The component is coming online.

LSM ID—gives the LSM ID or IDs associated with the ACS.

LSM State—gives the current state of the LSM associated with the ACS.

Serial Number—provides the serial number for the LSM.

Model—gives model information for the LSM.

3. Click the check box to the left of ACSs you want to drop. Click the check box at the top of the column to select all ACSs.
4. Click *Apply*.

The selected ACSs are dropped from the configuration of the NearStore VTL.

Click *Reset* to remove all selections you have made.

Working with SCSI Physical Libraries

After you have set up the communication link between the NearStore VTL and an ACSLS server, you can add, drop, and monitor the ACSLS server-controlled libraries that the NearStore VTL can use.

Tasks for this subsection include:

- “Viewing the List of Physical Libraries,” page 38
- “Adding Physical Libraries,” page 39
- “Dropping Physical Libraries,” page 39

Viewing the List of Physical Libraries

You can view the list of physical libraries defined to the NearStore VTL, and you can view the list sorted in various ways.

Complete this task to view the list of attached physical libraries:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Physical Libraries* task category.

The Physical Library List screen appears showing the following:

Nickname—gives the nickname of the ACS.

Port WWPN—provides the port WWPN.

Lun Number—gives the LUN number for the library.

Serial Number—gives the serial number for the library

Model—gives the model number for the library

Total Slots—provides the number of slots in the device.

Total Drives—provides the total number of drives in the device.

Total Mailboxes—provides the number of mailboxes in the device.

Status—provides the device status

2. You can show additional information by clicking in the check box next to *Show Detailed*.

Adding Physical Libraries

Before the NearStore VTL can use an physical tape, the library containing the tape needs to be added.

Complete this task to add physical libraries to the NearStore VTL:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Physical Libraries* task category.
2. Click the *Add Physical Library* tab, located in the upper portion of the screen.

The Add Physical Library screen appears, and the NearStore VTL displays the list of physical libraries identified by the NearStore VTL. For each library the following is listed:

Nickname—gives the nickname of the library.

Port WWPN—gives the WWPN for the port.

Lun Number—gives the LUN value for the library.

Serial Number—provides the serial number for the library.

Model—gives model information for the library.

3. Click the check box to the left of the libraries you want to add. Click the check box at the top of the column to select all libraries. You can click *Discover* to force the NearStore VTL to recheck for libraries, if not all of the libraries are displayed
4. Click *Apply*.

The selected libraries are added to the configuration of the NearStore VTL.

Click *Reset* to remove all selections you have made.

Dropping Physical Libraries

You can drop individual libraries from the system.

Complete this task to drop libraries from the NearStore VTL appliance:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Physical Libraries* task category.
2. Click the *Drop Physical Libraries* tab, located in the upper portion of the screen.

The Drop Physical Libraries screen appears, and the NearStore VTL displays the list of libraries identified by the NearStore VTL. For each library the following is listed:

Nickname—gives the nickname of the library.

*Port WWP*N—gives the WWP

Lun Number—gives the LUN value for the library.

Serial Number—provides the serial number for the library.

Model—gives model information for the library.

Status—provides the current library status.

3. Click the check box to the left of library you want to drop. Click the check box at the top of the column to select all libraries.
4. Click *Apply*.

The selected ACS devices are dropped from the configuration of the NearStore VTL.

Click *Reset* to remove all selections you have made.

Working with Physical Tape Devices

Because copying data to physical tape for offsite storage is a part of most backup schemas, you will most likely want to export your virtual tapes to physical tape. You might also want to import data from a physical tape. To make this process as simple as possible, the NearStore VTL provides full support for most of the physical tape libraries.

Virtual and Physical Tape Libraries

A good way to understand the relationship between virtual and physical libraries is to look at the relationship between virtual tapes and physical tapes. Both of the virtual tapes and physical tapes that NearStore VTL creates are in the native format of the backup application. There is also a one-to-one correlation between virtual tapes and physical tapes. This means that for each virtual tape, there is a corresponding physical tape that has the same capacity and barcode.

This means that virtual and physical libraries must both use drives that are of the same type and capacity in order to be compatible with each other. This is important because you cannot export virtual tapes or import physical tapes if the drives are not compatible.

See the following for more information on virtual tapes and virtual tape drives:

- “Working with Virtual Tapes,” page 21
- “Working with Virtual Libraries,” page 9

Tape Smart Sizing

Most physical tape drives compress the data that they write to tape. But because not all data is compressible at the same ratio, the actual amount of data that a drive writes to tape varies from backup to backup. Because

you need to be able to export virtual tapes to physical tape, it is important that the data on the virtual tapes fits on the corresponding physical tapes. If it does not, the NearStore VTL cannot copy it to physical tape.

You can address this issue by making the capacity of the virtual tapes match the native capacity of the corresponding physical tapes. This, however, does not make the best use of the physical tapes. For example, if your physical tape drive compresses data at a 2:1 ratio, you are using only around half the capacity of your physical tapes when you export virtual tapes.

The NearStore VTL offers a virtual tape optimization feature called smart sizing that when enabled, samples the data that your backup application is sending to see at which ratio it can be compressed. This enables the NearStore VTL to dynamically adjust the size of the virtual tape to match the compressed capacity of the physical tape. This results in significantly better tape usage when you export the virtual tape.

The tape smart sizing is tuned for specific types of physical tape drives. The NearStore VTL comes preconfigured with configuration estimation algorithms set for each virtual tape drive type. You can use these default settings, or you can either update the drive type to use a new smart sizing algorithm or create a new virtual type.

Cloning

By default, NearStore VTL deletes a virtual tape after it successfully exports its data to the corresponding physical tape.

If you want NearStore VTL to maintain both physical and virtual copies of the volumes in a virtual library, you can enable the cloning feature for the virtual library.

Once you enable the cloning feature for a virtual library, the NearStore VTL copies the data from a virtual tape to its corresponding physical tape each time that the backup application sends data to the virtual tape and the virtual tape is ejected from the virtual tape drive.

Note

Although the NearStore VTL maintains both virtual and physical copies of a volume, the backup application sees only the virtual tape.

When you no longer wish to keep both virtual and physical copies of the volume, you can simply export the virtual tape to physical tape.

Because there might be times during which you do not want to clone (your backup window for example), you can specify a span of time during which the NearStore VTL does not clone. This is an advanced option that you can enable from Configuration Tasks>Advance >Options. Select Enable Differed Cloning and set the times during which you do not want the NearStore VTL to clone.

See “Advanced Configuration,” page 53 for more information.

Note

Although the tasks in this section are written for physical tape libraries, they also work for standalone tape drives. Task that apply only to physical tape libraries are marked as such. Furthermore, areas in which the tasks differ for a standalone device are so noted.

Tasks for this subsection include:

- [Viewing the List of Physical Tape Devices](#)
- [Adding Physical Tape Devices](#)
- [Enabling and Disabling Physical Tape Devices](#)
- [Dropping Physical Tape Devices](#)

Related tasks that are not in this section include:

- “Changing the Export Status of a Virtual Tape,” page 23
- [Importing Virtual Tapes](#)

Viewing the List of Physical Tape Devices

The NearStore VTL displays all the physical tape devices that you have added to its configuration on the Physical Tape Device List screen. Each device is listed by its name. The NearStore VTL gives information about the device path, LUN, model, device, loader type, and status.

If the device is a part of a physical tape library, the Loader Type field displays changer. If the device is stand alone, the loader type is manual.

Note

In the case of a library, the media changer itself is not displayed as a device.

Viewing the list of Attached Physical Tape Devices

Complete this task to view the list of attached physical tape devices:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Physical Tape Devices* task category.

The Physical Tape Device List screen appears, and the NearStore VTL displays the following for each physical tape device that has been added to its configuration.

Nickname—gives the nickname of the physical tape device.

Port Name/Address Information—provides the port name and the device address information for each attached SCSI/Fibre Channel device. The port name is the port on the VTL appliance.

Serial Number—gives the serial number of the device.

Model—provides model information for the physical tape device.

Loader Type—specifies whether the device is either stand alone or part of a library. Standalone devices are specified as manual and libraries as changer.

Status—gives the status of the device. The device can be either online (enabled) or offline (disabled). If the device is online, the backup application can access it. If the device is offline, the backup application cannot access it.

Adding Physical Tape Devices

Before a physical tape library can be added to the configuration of the NearStore VTL appliance, it must first be connected to the system and powered on as outlined in the *NearStore VTL Installation and Setup Instructions*.

Note

If no physical tape devices are displayed on the Add Physical Tape Devices screen, click *Discover* to scan for them.

A physical tape library is typically composed of a number of physical tape drives and a media changer. Before the NearStore VTL appliance can work with these devices, they must be associated with each other (as a library) and then added to the system's configuration.

When you add a physical tape library to the NearStore VTL appliance, the NearStore VTL automatically associates the drives and the media changer. If the physical tape library supports SCSI device serialization, this process is rapid. If the physical tape library does not support SCSI device serialization, this process can take some time to complete.

If you are adding a replacement physical tape drive to an existing physical tape library, the NearStore VTL associates the new drive with the media changer of the physical tape library in which it is installed.

Adding Physical Tape Devices

Complete this task to add physical tape libraries to the NearStore VTL:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Physical Tape Devices* task category.
2. Click the *Add Physical Tape Devices* tab, located in the upper portion of the screen.

The Add Physical Tape Devices screen appears, and the NearStore VTL displays the physical tape library as a number of individual tape (SCSI/Fibre Channel) devices.

Standalone tape devices are displayed as a single device.

Nickname—gives the nickname of the physical tape device.

Port Name/Address Information—describes the port to which the physical tape device is connected to the NearStore VTL appliance.

Serial Number—provides the serial number for the physical tape device.

Model—gives model information for the physical tape device.

3. Click the check box in front of each physical tape device that makes up the physical tape library, or click the box at the top of the column to add all of the tapes.
4. Click *Apply*.

The physical tape library is added to the configuration of the NearStore VTL. The time that it takes for the NearStore VTL to associate the selected physical tape devices and add them to its

configuration depends on whether the physical tape library supports SCSI device serialization. When added, the physical tape library will be displayed on the Physical Tape Device List screen.

Note

If device serialization does not work, you can manually associate a drive to a changer. Click here in “To manually associate a tape drive to a changer, click here.”

Enabling and Disabling Physical Tape Devices

At some point it might become necessary to perform maintenance on the tape drives that are connected to the system. Because the NearStore VTL enables tape drives when you add them to its configuration, you will have to disable a drive before you attempt to perform maintenance on it. When a tape drive is disabled, the NearStore VTL does not try to access it.

You can also disable a faulty drive that you do not want the NearStore VTL to use. Before the NearStore VTL can use the tape drive again, you will have to enable it. If you have to replace a tape drive, you must first drop it from the system. see [Dropping Physical Tape](#).

Note

A physical tape device cannot be disabled while it is in use.

Complete this task to enable or disable physical tape devices:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Physical Tape Devices* task category.
2. Click the *Enable/Disable Physical Tape Device* tab, located in the upper portion of the screen.

The Enable/Disable Physical Tape Devices screen appears, and the NearStore VTL displays the physical tape devices that have been added to its configuration.

The Status field displays the current state of the physical tape device.

3. From the *Action* field of the physical tape device that you want to enable or disable, click either *enable* or *disable*.

The physical tape device is either enabled or disabled. The status of the device is displayed on both the Enable/Disable Physical Tape Device and the Physical Tape Device List screens.

Dropping Physical Tape Devices

Before you can safely disconnect physical tape devices from the NearStore VTL appliance, you must first drop them from its configuration.

It is necessary only to drop the media changer when you drop a physical tape library. This is because the tape drives of a tape library are associated with its media changer. Dropping the changer also drops the associated drives.

You can also drop individual drives from the system. This is especially useful if a tape drive in a library with multiple drives fails. You can drop and replace the drive without having to take the library offline.

See [Adding Physical Tape Libraries](#) for information on adding physical tape drives to the NearStore VTL.

Complete this task to drop physical tape libraries from the NearStore VTL appliance:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Physical Tape Devices* task category.
2. Click the *Drop Physical Tape Device* tab, located in the upper portion of the screen.

The Drop Physical Tape/Changer Devices screen appears, and the NearStore VTL displays the physical tape devices that have been added to its configuration. The media changer of each virtual library is specified either by its auto-selected or user-defined name. It is also identifiable by its model information.

3. In the *Action* field of the media changer that is associated with the physical tape library that you want to drop, click *drop*.

The physical tape library is dropped from the configuration of the NearStore VTL appliance. The NearStore VTL no longer displays it on the Physical Tape Device List screen.

Configuring Miscellaneous Settings

Miscellaneous configurations include setting up an administrative account, configuring network connections, and setting the system time for the NearStore VTL appliance.

Miscellaneous tasks include:

- “Setting Up the Administrator Account,” page 46
- “Setting Up the Tape Operator Account,” page 46
- “Configuring Network Connections,” page 47
- “Setting the System Time,” page 48
- “Configuring SNMP,” page 49
- “Configuring E-mail,” page 49
- “Managing the Appliance Configuration,” page 50
- “Installing an SSH Public Key,” page 52
- “Viewing or Updating SSH Client Configurations,” page 53

Setting Up the Administrator Account

The NearStore VTL appliance is shipped with a default login name and password (admin/NetApp). You use these default settings initially to log in to the system. Change the login name and password as soon as possible.

Users who need to log in to the NearStore VTL with administrative privileges use the administrator account. Typically these individuals perform tasks such as adding RAID groups.

You do not create an administrator account for each person with administrative privileges. Rather, the administrator account is generic and is used by all individuals with administrative privileges.

Complete the following to create an administrator account for the NearStore VTL appliance.

1. From the menu, located on the left side of the screen, click the task category.
2. Click the *Administrator Account Setup* tab, located in the upper portion of the screen.
The Administrator Account Setup screen appears.
3. Complete the following:
Login Id—specify the name that people will use to log in to the system with administrative privileges.
Login Password—specify the password for the administrative account.
Re-enter Password—confirm the administrative password.
4. Click *Apply* to change the login information for the administrative account.

The administrative account has been set up. The next time that you log in to the NearStore VTL appliance with administrative privileges, you must use the new login identification and password.

CAUTION

Because there is no way to reset the login identification and password of the NearStore VTL appliance, it is important that you keep a record of them in a secure place.

Setting Up the Tape Operator Account

The NearStore VTL appliance was shipped with a default login name and password for both an administrator role (admin/NetApp) and a tape operator role (tape/NetApp). You use these default settings to initially log in to the system. You should change the login names and passwords as soon as possible.

Users who do not need to log in to the NearStore VTL with administrative privileges should use the tape account. Typically these individuals monitor the day to day operation of the VTL appliance.

You do not create a tape account for each person with operator privileges. Rather, the operator account is generic and is used by all individuals with operator privileges.

Complete the following to change the password for the tape operator account for the NearStore VTL appliance.

1. From the menu, located on the left side of the screen, click the task category.

2. Click the *Tape Operator Account Setup* tab, located in the upper portion of the screen.

The Tape Operator Account Setup screen appears.

3. Complete the following:

Login Id—gives the name that people will use to log in to the system with tape operator privileges.

Login Password—specifies the password for the account.

Re-enter Password—confirms the password.

4. Click *Apply* to change the login information for the tape operator account:

The tape operator account has been set up. The next time that you log in to the NearStore VTL appliance with tape operator privileges, you must use the new login identification and password.

CAUTION

Because there is no way to reset the login identification and password of the NearStore VTL appliance, it is important that you keep a record of them in a secure place.

Configuring Network Connections

After the initial setup of your system, you must complete the configuration of the network connections. This includes setting the netmask and the gateway address for the network.

Follow these steps to configure the network connections:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Miscellaneous* task category.
2. Click the *Network Setup* tab, located in the upper portion of the screen.
The Network Setup screen appears.
3. Complete the following information:

CAUTION

Invalid values can cause the system to be unreachable on the network.

Host name—(optional, used for ACSLS only) specify a host name for the NearStore VTL appliance.

IP Address—specify the IP address for the NearStore VTL appliance. This is a static IP address.

Note

Use care when changing the IP address of the system.

Netmask—specify the network mask for the NearStore VTL appliance. This is typically 255.255.255.0.

Gateway address—specify the IP address of the gateway for the default route.

Primary DNS server—(optional) specify the IP address of the primary DNS server.

Secondary DNS server—(optional) specify the IP address of the secondary DNS server.

Appliance ID—(optional) specify a name for the appliance. The appliance name is used to identify the appliance in AutoSupport and action notification e-mails.

4. After you are certain that the values are correct, click *Apply*.

Setting the System Time

When you first power on the NearStore VTL, the warning (orange) light on the Status Indicator bar might be on and the Action Required icon might be flashing. Typically, this is because the system clock on the NearStore VTL appliance is not set.

You can set the time from an NTP or browser host. The browser host in this case is defined as the computer that runs the Web browser from which you access the interface of the NearStore VTL appliance. This can be either a laptop or desktop computer.

When you synchronize the system clock of the system to an NTP server, the system acts like an NTP client and ensures that there is minimal time drift between the system clock of the system and the NTP server. When you synchronize the system clock of the system to that of the browser host, the synchronization is performed only once. This means that the two clocks can drift apart.

If the system has a connection to the internet, you can synchronize with an external NTP server. If the system does not have a connection to the internet, you can synchronize with a local domain server that is running NTP service.

Note

If you are using the browser host, ensure that its time is accurate before completing this task.

Complete the following to set the system date and time of the NearStore VTL:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Miscellaneous* task category.
2. Click the *Date Setup* tab in the upper portion of the interface.

The Date Setup screen appears and the NearStore VTL displays the following:

Use NTP Server—provides the option to select an NTP server and enter its IP address.

User Browser Host—gives the option to use the browser host.

Browser Host Date—displays the current date and time of the browser host.

Appliance Date—gives the current date and time of the system.

Time adjustment—displays the adjustment that the NearStore VTL will make to synchronize with the browser host.

3. From the *Date Setup* screen, select either the *Use NTP Server* or the *Use Browser Host* option.

4. Click *Apply*.

If you selected the Use NTP Server option, the NearStore VTL displays the status of the time synchronization against the NTP server.

If you selected the Use Browser Host option, the NearStore VTL displays the status of the time synchronization against the Web browser host.

Configuring SNMP

The NearStore VTL supports both SNMP versions I and II. This means that you can use the SNMP workstation to monitor the state of the NearStore VTL appliance. The SNMP agent on the NearStore VTL provides traps and managed information base (MIB) information to the management workstation.

Traps are generated when there is an event that requires an action. For example, if a physical tape needs to be loaded into a physical tape drive before an operation can continue, action 1101 is triggered. This action informs the user that a physical tape must be loaded into the specified drive before operations can continue.

Note

You can also send a test trap from the NearStore VTL to the SNMP Management-Station IP address to ensure that the SNMP configuration is operational.

Complete this task to configure SNMP for the system:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Miscellaneous* task category.
2. Click the *SNMP Configuration* tab, located in the upper portion of the screen.
The SNMP Configuration screen appears.
3. Enter the name of the SNMP management workstation into the Management-Station IP Address field.
This is the host that you use to manage the SNMP deployment.
4. Enter the name of the community to which the system will belong.
An SNMP Community is composed of a number of SNMP agents and managers. All members of the specified community have the same privileges.
5. Select the type version of SNMP traps that you want to use. The NetApp VTL supports both versions 1 and 2.
6. Click *Apply* to enable SNMP support for the system.

Configuring E-mail

You can enable e-mail notifications for a NearStore VTL appliance. When a system event triggers a required action, the NearStore VTL sends an e-mail to the addresses that you specify. This e-mail contains information that is pertinent to the required action, including the action number and a brief description.

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Miscellaneous* task category.
2. Click the *E-mail Configuration* tab in the upper portion of the interface.
The E-mail Configuration screen appears.
3. Enter the appropriate information into the following fields:
E-mail Server Address—provide the name or IP address of the SMTP server that you use to send the e-mail notifications.
Admin E-mail Address (from:)—provide the e-mail address of the NearStore VTL administrator. You can specify multiple e-mail addresses by separating them by commas.
Action Notification E-Mail Recipients List (to:)—list of e-mail addresses to which the NearStore VTL sends notifications. You can specify multiple e-mail addresses by separating them by commas.
Action Notification E-Mail Recipients List (cc:)—list of e-mail address to which the NearStore VTL sends a copy of the notifications. You can specify multiple e-mail addresses by separating them by commas.
4. Click Enable Action Notification to have the appliance send action notification message e-mails to the Action Notification recipients.
5. Click Apply to set up e-mail notifications.
If you have enabled action notification, clicking apply displays the message Send test message. Click on the message to send a test e-mail message.

Managing the Appliance Configuration

It is a good idea to save the configuration of a NearStore VTL appliance to your management workstation. In this situation the configuration of the system means all of the virtual libraries, physical libraries, network settings, and advanced options (such as customer accounts and device access) that you have set up for the system. This does not include the virtual tapes (backed up or imported user data) that the NearStore VTL has written to its back-end disks. User data is saved in the disks. The NearStore VTL can import the user data from these disks if needed.

For purposes in addition to disaster recovery, you can load a user-saved configuration from one system to another. For example, if you want to deploy multiple systems that have the same configuration you can configure the first system, save the configuration file to a management workstation, and then load this configuration file to new system.

The new system will have the same configuration as the source system. If the source system has virtual libraries and advanced features (such as device access enabled), you will want to fine-tune the configuration of the new system to fit your needs.

This section provides the following:

- [Saving the Configuration Manually](#)
- [Loading a Saved Configuration](#)

Saving the Configuration Manually

You should backup the VTL appliance configuration to the management workstation. This is especially useful if you plan to copy the configuration of one system to another.

Complete this task to save the configuration of a NearStore VTL appliance.

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Miscellaneous* task category.

2. Click the *Configuration Management* tab located in the upper portion of the screen.

The Configuration Management screen appears, and the NearStore VTL displays the following:

Action—provides a link to either the Save Configuration or Load Configuration screens.

Description—gives a description of the action field.

3. From the *Action* field, click the *Save Configuration* link.

Your web browser displays a Save as dialog (or equivalent). Follow the steps that are appropriate for your browser to select a destination.

4. Select the *Save to Disk* option and click *OK*.

The NearStore VTL saves your configuration.

Loading a Saved Configuration

When loading a configuration, you can choose between either an auto-saved or user-saved configuration file. The auto-saved file is on a disk that was connected to the system for which the NearStore VTL saved the configuration. This is the type of configuration file that you want to use if you are working in disaster recovery mode. In other words, use an auto-saved file when you are rebuilding or replacing a system after a catastrophic event.

Note

Loading either a default or a saved configuration overwrites the existing one.

If you are deploying multiple systems with the same configuration, use a user-saved configuration file when copying the configuration of one system to another.

Complete this task to save the configuration of a NearStore VTL appliance:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Miscellaneous* task category.

2. Click the *Configuration Management* tab located in the upper portion of the screen.

The Configuration Management screen appears, and the NearStore VTL displays the following:

Action—provides a link to either the Save Configuration or the Load Configuration screen.

Description—gives a description of the action field.

3. From the *Action* field, click the *Load Configuration* link.

The *Load Configuration* screen appears.

4. From the *Load Configuration* screen, decide
 - If you want to load a user-saved configuration, click the link with the *Load user-saved configuration (from file)* description field.
 - If you want to load an auto-saved configuration, click the link with the *Load auto-saved configuration (from disk)* description field.

The next step assumes you clicked on the Load auto-saved configuration (from disk) option.

5. From the action field, select the configuration that you want to load.

The system begins the process of loading the selected configuration.

6. When prompted, click Apply to confirm your desire to load the selected configuration.

CAUTION

Loading the selected configuration will overwrite the existing one.

After loading the configuration file that you have selected, the NearStore VTL reboots.

Note

If this is a disaster recovery, you will be able to import the virtual tapes (user data) from the back-end disks into the new system. This requires that you connect the back-end disks to the new system and complete the task for importing the data.

See “Working with RAID Groups,” page 26 for more information on importing physical disks.

Installing an SSH Public Key

NearStore VTL appliances support connecting from client systems to the VTL command line interface using SSH. You can login to the VTL using account/password pairs, but you can also configure the client system and the VTL appliance to use RSA or DSA public/private key pairs. After installing the SSH keys, the client system with the private half of the SSH key pair can connect to the VTL through SSH without you having to enter an account and password. This simplifies the use of VTL CLI scripts issued from the client system. You use the SSH Key Setup tab to install the public half of the key pair on the VTL.

Before starting the key installation, get or create the public and private keys. A common way to create the keys is to run the command `ssh-keygen` (for example, `ssh-keygen -t rsa`) on the client system, but see the SSH documentation for your client system.

Complete this task to install a key:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Miscellaneous* task category.

2. Click the *SSH key setup* tab located in the upper portion of the screen.

The *Install Ssh Key* screen appears.

3. Copy the complete public key (also called the key fingerprint) from the client system and paste it into the *Ssh Public Key (RSA/DSA)* field.

Note

When copying and pasting, be careful that extra characters, for example line feed characters, are not pasted into the field.

4. Copy and paste the client id, as shown on the client as part of the public key, to the *Client Id* field.
5. Click *Apply*. An alert window opens with the message, Key Added To Authorized key List. Click *Close*.

Viewing or Updating SSH Client Configurations

Use the *SSH Client List* tab to view the list of client systems with SSH public keys installed on the VTL, or to remove or update a key.

Complete this task to update or remove a key:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Miscellaneous* task category.
2. Click the *SSH Client List* tab located in the upper portion of the screen.
The *Ssh Authenticated Clients* screen appears.
3. Click *Update* in the *Action* column of the row for the client you are changing. The *SSH Key Setup* tab opens. Enter the new key into the *Ssh Public Key (RSA/DSA)* field, then click *Apply*. An alert window opens with the message, Key Added To Authorized key List. Click *Close*.

Click *Remove* in the *Action* column of the row for the client you want to remove. The entry is removed and the *SSH Key Setup* tab opens.

Advanced Configuration

This section provides information that you can use to perform a more advanced configuration of the NearStore VTL appliance. This includes those advanced configuration options that are referenced in the “Configuration Road Map,” page 7. You can also use the information provided in this section to fine-tune the configuration as your requirements change.

The configuration process for advanced features depends on the features that you choose. For example, if you are going to use physical tape validation, all you have to do is enable it. The NearStore VTL does the rest. If, on the other hand, you want to use customer accounts, you must enable the feature, create one or more accounts, and then add virtual libraries to them.

For this reason, this section provides a subsection that outlines a generic process that you can use to enable advanced configuration features. This also includes overview information for each feature, including whether additional setup is required after a given feature is enabled.

Advanced configuration subsections include:

- “Enabling Advanced Configuration Features (Options),” page 54
- “Working with Storage Pools,” page 58
- “Creating/Editing Virtual Tape Drive Types,” page 59

Enabling Advanced Configuration Features (Options)

The NearStore VTL provides the following advanced configuration features. Some of these features simply need to be enabled, while others require additional configuration after they are turned on. The preface to the task instructions for enabling advanced features provides a description of the feature, as well as a link to any further configuration that might be required.

The NearStore VTL advanced features follow:

Use Customer (Customer Accounts)

You can use the NearStore VTL to create and manage multiple customer accounts. Each account has an administrator, who can manage the resources (virtual libraries and volumes) that you associate with the account.

This feature requires additional setup after you enable it. See “Working with Customer Accounts,” page 85 for more information.

Use Storage Pools

The NearStore VTL supports the use of storage pools, which are groups of disks that you can organize into specific storage resources. When you use storage pools with the NearStore VTL you can decide which virtual libraries use which disks. You do this by assigning your virtual libraries to storage pools when you create them.

Storage pools are useful for guaranteeing a separation of data (such as accounting and engineering) as well as enabling you to create high and low performance groupings of disk resources.

The NearStore VTL dynamically load balances across the available disks in order to achieve optimal performance. When using storage pools, the NearStore VTL load balances only across the disks in a specific storage pool.

The default behavior of the NearStore VTL is to group all disks into a single (called the default) storage pool.

This feature requires additional setup after you enable it. See “Working with Storage Pools,” page 58 for more information.

Enable Physical Tape Validation

When you enable the Physical Tape Validation option, the NearStore VTL stores a checksum for each physical tape that it imports. When a virtual tape that was created as the result of a physical tape import

is exported, the NearStore VTL validates the stored checksum against the checksum of the physical tape to which it is being exported.

If the physical tape is the correct one, the export will continue. If it is not, the export will be paused and you will be prompted to load the correct physical tape into an available physical tape drive. This process helps to ensure that the wrong physical tape is not overwritten. Physical tape validation is the most useful when you are working with standalone tape drives.

This feature requires no additional configuration once you enable it.

Use Tape Pick List

Each time the NearStore VTL requires a tape that is not in the physical tape library, it will generate an action. This action requests that you load the physical tape, identified by a barcode, into an available physical tape drive or library.

When you enable the option to use physical tape picks lists, the NearStore VTL will also maintain a list of all physical tapes that need to be loaded into physical tape drives.

See “Using Physical Tapes (Loading Physical Tape Drives),” page 83.

Enable Host Access Control

If you want to restrict access to virtual libraries on a host-by-host basis, you can enable the host access functionality of the system. This will enable you to map hosts to virtual libraries. This function is also called Host access control.

These mappings can be either dedicated or shared. When the mapping is dedicated there is a one-to-one mapping between the virtual library and a host. This means that only this host can access the virtual library.

When the mapping is shared, multiple hosts share access to a single virtual library. You can separate the access control for the medium changer and each virtual tape drive when using shared access.

Enable Port Assignment

If the system has multiple front-end ports, you can map individual virtual libraries to one or more ports. You can also break a virtual library into its components (virtual tape drives and robots) and map each virtual device to one or more ports.

Enable this feature if you want to assign access to specific libraries to specific ports.

See “Working with Port Assignments,” page 19 for more information.

Enable Volume Set Addressing (HPUX)

Enable this feature if you are using an operating system that requires volume set addressing. For example, HP-UX requires volumes set address if it needs to see more than 8 LUNs. There is no further configuration required once you enable this feature. Note that Volume Set Addressing is a system-wide setting. If it is set, the NearStore VTL may no longer work correctly on hosts that do not support this mode of addressing.

Enable Shadow Tape

Enable this feature if you want to use the shadow tape feature. Once the feature is enabled, you can enable or disable the application of the feature on a per library basis. For libraries using shadow tapes, whenever a virtual tape is exported to a physical tape, the virtual tape is moved to the shadow tape pool. A tape in the

shadow tape pool is invisible to the backup application, and is not listed as part of a virtual library, but is available for quick access if the physical tape is later imported, and is available for reading if the physical tape is stored offsite, or is otherwise unavailable.

Enable Over allocation

Without over allocation, the NearStore VTL automatically reserves enough disk space for any virtual tapes that you create. For example, if you create a virtual tape with a 40GB capacity, the NearStore VTL will reserve 40GBs of space for the virtual tape.

Because the NearStore VTL performs dynamic load balancing, it does not actually allocate space on a particular disk(s). Rather, the NearStore VTL reserves space from either a user-defined or the default storage pool. This means that the NearStore VTL automatically reserves enough space for each virtual tape that you create. It also means that you must have enough space available for each virtual tape that you create.

If you would like to create virtual tapes, even when you don't have enough available disk space, you should enable the NearStore VTL over allocation feature. When this feature is enabled, the NearStore VTL allocates disk space to virtual tapes as needed, regardless of how many volumes you initially create. This feature is sometimes called Capacity on Demand.

Use Port 0d for Backend Devices

(Only displayed when a VTL700 or VTL1400 license is installed on the appliance.) When a VTL appliance has a VTL700 or VTL1400 license installed, the default configuration for port 0d is as a target port which you could connect to a host, but when you enable this option, and reboot the appliance, the port is configured as an initiator port, which you can then connect to a tape device.

Use ACSLS to control physical libraries

The NearStore VTL appliance can use ACSLS-controlled libraries. Set this option to enable the use of an ACSLS.

Note

You can attach a SCSI library, or an ACSLS-controlled library to a NearStore VTL appliance, but not both. Setting this option exposes a number of additional ACSLS related options, and hides options specific to SCSI-attached libraries. Before trying to configure the VTL appliance to use an ACSLS-controlled library, make sure that you do not have a SCSI library attached to the appliance.

The ACSLS server and the VTL appliance communicate over a LAN, while the ACS tape drives communicate with the NearStore VTL appliance over the SAN. The NearStore VTL appliance does not communicate directly with ACSLS robot arms. Before configuring to use an ACSLS, make sure the LAN and SAN settings are correct.

The follow options require you to first set *Use ACSLS to control physical libraries*:

- **Enable CAP**

When you enable CAP, the VTL can automatically move physical tapes to the ACS CAP, and to move tapes from the CAP to appropriate slots. The next options provide additional controls on the movement of tapes to and from the CAP.

- **Add to CAP Queue after Clone**

When you enable this option, after the NearStore VTL finishes cloning a virtual tape to a physical tape, the physical tape is automatically added to the batch CAP eject list.

- **Add to CAP Queue after Export**

When you enable this option, after the NearStore VTL finishes exporting a virtual tape to a physical tape the physical tape is automatically added to the CAP eject list.

Enable EEP

When you enable EEP, the VTL can automatically manage the physical tape library entry/exit port (EEP) to move physical tapes to the port, and to move tapes from the port to appropriate slots. The next options provide additional controls on the movement of tapes to and from the EEP:

- **Automatically Move Physical Tapes From EEP To Slots**

When you enable this option, the NearStore VTL automatically moves physical tapes from the entry/exit port to a slot, for example, when a tape is added to a library.

- **Move Physical Tapes to EEP after Cloning**

When you enable this option, after the NearStore VTL finishes cloning a virtual tape to a physical tape, the physical tape is automatically moved from the library tape drive to the library entry/exit port.

- **Move Physical Tapes to EEP after Virtual Export**

When you enable this option, after the NearStore VTL finishes exporting a virtual tape to a physical tape the physical tape is automatically moved from the library tape drive to the library entry/exit port.

Enable Deferred Cloning

When you create a virtual library (Configuration Tasks > Virtual Libraries > Create Virtual Library), you can set the Enable Tape Cloning option (click More Options to see this option). With tape cloning enabled for at least one library, you can set the Enable Deferred Cloning option to allow a delay between specifying a tape cloning operation, and when the clone is actually created. See “Using Physical Tapes (Loading Physical Tape Drives),” page 83.

When you set the Enable Deferred Cloning option, you specify a span of time, during which the NearStore VTL will not create clones. Any changes that are made to the virtual tapes during this period of time will be held in queue until the deferred cloning time period has expired. At this point, these changes will be copied to the appropriate physical tapes.

When turned on, deferred cloning is applied to every virtual library in the system for which cloning is enabled. You cannot enable deferred cloning for only a specific virtual library.

Enabling Configuration Options

Complete the following to set advanced configuration options for the system:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Advanced* task category.

The Options Screen appears and the NearStore VTL displays the advanced configured options that are available.

2. Select the advanced configuration option(s) that you want to enable. This example enables the *Use Customer* option.

If you are enabling deferred cloning, you must select the times during which you do not want the NearStore VTL to clone virtual tapes.

3. Click *Apply* to enable the advanced configuration option(s) that you selected.

Working with Storage Pools

A storage pool consists of one or more RAID group disks that are grouped together. Disk space for virtual tapes are drawn from storage pools. At its most basic level, a storage pool is created when the first RAID group is added to the NearStore VTL. This is called the default storage pool.

Unless the option to use storage pools is enabled, the NearStore VTL adds each additional disk to the default storage pool. Once you have added a disk to the NearStore VTL, you cannot move it to another storage pool.

When you enable the *Use Storage Pool* option, you can create multiple storage pools and then add physical disks to them.

Note

In order to use a storage pool, you must first associate at least one physical disk with it.

You must enable the *Use Storage Pools* option before you can create storage pools and add physical disks to them. See [Enabling Advanced Configuration Features](#) for more information.

Storage pool tasks include:

- Viewing the list of storage pools
- Adding storage pools
- Deleting storage pools

All storage pool tasks use the *Storage Pools List* screen.

Complete the following task to view information about the storage pools, add a storage pool, or delete a storage pool:

1. From the *Configuration Tasks* menu, click the *Advanced* task category.
2. Click the *Storage Pools List* tab.

For each storage pool, the *Storage Pools List* screen displays the following:

Name—provides the name of the storage pool. Clicking the name of a specific storage pool invokes the *Update Storage Pools* screen.

Capacity Allocated—specifies the total amount of physical disk space allocated to the storage pool.

Capacity Used—provides the total amount of physical disk space currently used by the storage pool.

Capacity Available—gives the total amount of physical disk space that has not yet been allocated to the storage pool.

Description—provides a text description of the storage pool.

3. You can choose from the following:
 - To add a storage pool, click *Add Storage Pool*.
 - To delete a storage pool, click *Delete Storage Pool*.

Creating/Editing Virtual Tape Drive Types

Virtual libraries use virtual tape drives. Like virtual libraries, virtual tape drives are defined by type. The type of virtual tape drive used defines the capacity of the virtual tape that can be supported. The capacity of the virtual tape drive should match the native capacity of the physical tape drive to which you will be exporting data.

Because most physical tape drives compress data, you might want to enable the NearStore VTL smart sizing feature. When this feature is enabled, you can set the virtual tape drive type to support either LZS (STAC) or ALDC compression. See “Using Physical Tapes (Loading Physical Tape Drives),” page 83.

Default and Custom Virtual Tape Drive Types

The NearStore VTL comes with a number of default virtual tape drive types. These types can be used in virtual libraries. They can also be modified and used as the basis for custom virtual tape drive types.

Note

A virtual tape drive type that is in use cannot be modified or used to create a custom virtual tape drive type.

Creating Virtual Tape Drive Types

Complete this task to create/edit virtual tape drive types:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Advanced* task category.
2. Click the *Virtual Tape Drive Types* tab, located in the upper portion of the screen.

The Virtual Tape Drive List screen appears and the NearStore VTL display the virtual tape drive types that are currently available.
3. Invoke the Add Virtual Tape Drive Type screen.

Click the name of a virtual tape drive to use it as a model for the creation of a new virtual tape drive type.

Note

When using an existing virtual tape drive type as a model, ensure that you change the name specified in the Virtual Tape Drive Type Name field. Failure to do this could overwrite the existing type.

Or

Select *Define New Virtual Tape Drive Type*.

The Add Virtual Tape Drive Type screen appears. If you selected an existing virtual tape drive type, the Update Virtual Tape Drive Type screen appears and the fields will be filled in with the parameters of that type. If you chose to define a new virtual tape drive type, the fields will be empty. This example uses the Add Virtual Tape Drive Type screen.

4. Complete the following configuration parameters for the new virtual tape drive type. You can also modify the parameters of an existing virtual tape drive type.

Virtual Tape Drive Type Name—specifies the name of the virtual tape drive type.

Raw Capacity—gives the capacity of the virtual tapes that are supported by the virtual tape drive type.

Note

You cannot mix media with different capacities.

Disk Allocation Per Tape—provides the maximum disk space (GB) reserved for this virtual tape.

Vendor Id—provides the vendor identification by which this type of virtual tape drive identifies itself on the SAN. The vendor identification is important because it is used by the backup application to identify the virtual tape drive.

Product Id—gives the product identification by which this type of virtual tape drive identifies itself on the SAN. The product identification is important because it is used by the backup application to identify the virtual tape drive.

(Optional) Smart Sizing—provides a drop-down menu from which you can select the type of smart sizing support that you want to enable for the virtual tape drive type.

If you select NONE, the virtual tape drive type will not support smart sizing. This means that any virtual libraries that use this drive type will not support smart sizing.

5. When you are finished defining the parameters of the new virtual tape drive type, click *Apply*.

The NearStore VTL adds the new virtual tape drive type. If you modified an existing virtual tape drive type, the NearStore VTL saves these changes. You can use them to create new virtual libraries.

Support Tools

The support tools include upgrading the firmware, performing a diagnostic download to NetApp and configuring AutoSupport, the automatic monitoring services.

Support tools tasks include:

- “Managing Licenses,” page 61
- “Updating the NearStore VTL Software Image,” page 61
- “Downloading Diagnostic Logs,” page 62

- “Setting Up AutoSupport,” page 63
- “Upgrading Disk Shelf Controller Firmware,” page 64
- “Upgrading Disk Firmware,” page 64

Managing Licenses

Some features, such as ACSLS, require an installed license. Use the this screen to install or remove licenses. (Typically, any required licenses are installed before a system is shipped, but you might need to add or remove a license if you rebuild, upgrade or downgrade a system.)

Complete this task to install a new license:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Support Tools* task category.
2. Click *Install License*. The *Install License* screen appears.
3. Type (or copy and paste) the license key text in to the *License Key* text box
4. Click *Apply*

Complete this task to remove a license:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Support Tools* task category.
2. Click *Uninstall License*. The *Uninstall License* screen appears. The *Uninstall License* screen displays the list of installed licenses, showing the feature name and license key.
3. Click the check box for the license key you want to remove, or to remove all license keys, click the check box at top of the column.
4. Click *Uninstall*.

Updating the NearStore VTL Software Image

The software image (operating system) of the NearStore VTL appliance can be upgraded from a host networked to the system.

Note

Before starting, verify that you have placed a copy of the new firmware in a location that can be accessed from web browser through which you are connected to the GUI..

Note

As a precaution, before installing the new software image this task creates and saves a copy of the appliance configuration. Additionally, verify that a serial console connection is available; if there is a problem with the reboot process, you use the console to collect diagnostics or restart the VTL.

Complete this task to save a backup of the NearStore VTL appliance configuration and then install new software image on the NearStore VTL appliance:

1. Login to the VTL appliance GUI as admin, making sure the software image you want to install is on the system you are logging in from.
2. Click the *Configuration Management* tab located in the upper portion of the screen.
The Configuration Management screen appears, and the NearStore VTL displays the following:
Action—provides a link to either the Save Configuration or Load Configuration screens.
Description—gives a description of the action field.
3. From the *Action* field, click the *Save Configuration* link.
Your web browser displays a Save as dialog (or equivalent). Follow the steps that are appropriate for your browser to select a destination.
4. Select the *Save to Disk* option and click *OK*.
The NearStore VTL saves your configuration.
5. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Support Tools* task category.
6. Click the *Software Image Upgrade* tab, located in the upper portion of the screen.
The Software Image Upgrade screen appears.
7. Click *To install software image from a downloaded file, click here*.
The Install Software Image screen appears.
8. Click *Browse* to navigate to the software image file.
9. Click *Install*, and follow the instructions that guide you to reboot the appliance.
The new software image is downloaded to the VTL appliance and installed.

Downloading Diagnostic Logs

You can copy configuration data, diagnostic logs, historical logs, and disk analysis results to a workstation or other network-attached system.

Complete this task to copy configuration data, diagnostic logs, historical logs, and disk analysis to another system:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Network Appliances Services* task category.
2. Click the *Diagnostic Download* tab, located in the upper portion of the screen.

The Diagnostic Download screen appears.

This screen displays the appliance name (if assigned), the appliance hardware serial number, type and size of the logs available for downloading (configuration, diagnostic, historical, and disk analysis). The size of each log is listed in parentheses after the log name.

3. Click the box after the log name to select (or if already selected, deselect) the data to download.
4. Click *Apply* to start the download.

Setting Up AutoSupport

The NetApp AutoSupport service can be set to notify NetApp support services about the status of NetApp systems. AutoSupport is sent every Sunday, shortly after 12:00 midnight GMT, with routine status information and when there are significant problems or indicators of pending problems. You can also configure AutoSupport service to send the same information to a local administrator.

Complete this task to configure AutoSupport:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Support Tools* task category.
2. Click the *NetApp AutoSupport* tab, located in the upper portion of the screen.
The AutoSupport Configuration screen appears.
3. Select the delivery mechanism, either HTTP or e-mail. If you select HTTP, the check box by *Secure* becomes available and is checked. When checked, HTTPS is used instead of regular HTTP. You can uncheck the box to use regular HTTP.
4. If you select e-mail, you can optionally:
 - Replace the default value in the AutoSupport E-Mail Recipients List (to): field with your own destination address. The default address is the address for NetApp AutoSupport service.
 - Fill in the AutoSupport E-Mail Recipients List (cc): field with any additional addresses you want to receive the AutoSupport e-mails.
5. Click *Apply*, or click *Reset* to return all values to their previous settings.

Note

You can disable the sending of AutoSupport by selecting “No AutoSupport Notification.”

Upgrading Disk Shelf Controller Firmware

You can use the Shelf Controller Firmware Upgrade screen to upgrade shelf controller firmware. New versions of shelf firmware can be included with NearStore VTL OS releases and can be supplied as separate files. When a VTL appliance boots, the version of the shelf firmware on the disks is compared to the release(s) included with the OS. Any shelf with outdated firmware is identified and an action is generated.

Before beginning a shelf controller firmware upgrade note that all I/O is stopped, and that power should remain on during the entire upgrade process.

Note

Do not start a disk shelf controller firmware upgrade while a disk firmware upgrade is in process.

Complete this task to upgrade the disk shelf controller firmware:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Support Tools* task category.
2. Click the *Shelf Firmware Upgrade* tab, located in the upper portion of the screen.
The Shelf Controller Firmware Upgrade screen appears.
3. To select a disk shelf controller for upgrading, click the box at the start of the row for that disk shelf controller. To select all controllers, click the box at the top of the column.
4. To install the latest version of firmware already on the VTL click *Apply*. Otherwise click *Browse*. The web browser opens a file select and upload window on your workstation. Navigate to, and select, the firmware file you want installed. On the Shelf Controller Firmware Upgrade screen, click *Apply*.

The upgrade takes about 10 minutes per shelf.

Upgrading Disk Firmware

Using the GUI you can initiate the upgrade of disk firmware, monitor the status of the upgrade process, and see if the process failed for any disks.

New versions of disk firmware can be included with NearStore VTL OS releases and can be supplied as separate files.

NearStore VTL firmware includes a list of recommended disk firmware levels. When a NearStore VTL boots, the version of the disk firmware on the disks is compared to the recommendations included with the OS. Any disk with outdated firmware is identified and an action is generated.

You can start an upgrade by directly going to the Disk Firmware Upgrade tab, or if there is an upgrade action, you can click this action to go to the action resolution page; on the action resolution page you can choose to either ignore the action, removing it, or resolve the action, which takes you to the Disk Firmware Upgrade tab.

This section provides the following tasks:

- “Starting a Disk Firmware Upgrade,” page 65
- “Monitoring a Disk Firmware Upgrade,” page 66
- “Canceling or Retrying Failed Disk Firmware Upgrades,” page 67

Starting a Disk Firmware Upgrade

The Disk Firmware Upgrade tab displays the list of all the connected disk models, the number of disks of that model with a different firmware version than the recommended one, and the recommended version for each model. Models with "N/A" for the recommended version do not require an upgrade.

Note

During the upgrade all I/O is stopped, and power must remain on. The upgrade process takes about four minutes per disk.

Note

Do not start a disk firmware upgrade while a disk shelf controller firmware upgrade is in process.

Complete this task to upgrade the disk firmware:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Support Tools* task category.
2. Click the *Disk Firmware Upgrade* tab, located in the upper portion of the screen.
The Disk Firmware Upgrade screen appears.
3. To select disks for upgrading, click the radio button in the Upgrade column in front of the entry for the disk model. To select all disks, click the box at the top of the column.

Selecting a disk that is attached to a VTL appliance, but not supported, disables both upgrade selections.

4. Select either Upgrade with the VTL copy of firmware image to use the version of the firmware included with the OS, or Upgrade with the recent firmware version available on NOW web site, to manually download the firmware images from the NOW web site, and then install those releases. (If there is no appropriate local firmware image, you cannot select Upgrade with the VTL copy of firmware image.)

If you select Upgrade with the recent firmware version available on NOW web site, the field Disk Firmware Binary File and a browse button displays, and, if required for the selected disk type, Disk Firmware Control File and browse button. Select the desired file.

5. Click *Apply* to start the upgrade process, or click *Reset* to remove your selections.

Before the actual firmware install starts:

- The firmware file is validated

Note

Validation depends on the file name, so do not change firmware file names.

- The discovery process is blocked. Discovery resumes after completion.
- The RAID groups are set offline. The RAID groups are put back online after completion.

The screen is replaced with the Disk Firmware Upgrade Status screen.

Once all the models which have mismatched firmware versions are upgraded, any upgrade action is removed.

Monitoring a Disk Firmware Upgrade

After starting a disk firmware upgrade page from the Disk Firmware Upgrade tab, the VTL displays the Disk Firmware Upgrade Status page. The Disk Firmware Upgrade Status page shows the detailed status for each model of disk undergoing an upgrade. The display is organized by disk model, and lists the recommended firmware version, the total number of disks selected for upgrading, the currently active upgrades, the number of upgrades that have failed, the number of pending upgrades and includes a status column. Upgrade status can be one of:

- Running

A status of Running indicates that some or all of the disks of that model are getting upgraded or are queued. Disks are queued because no more than five disks are upgraded in parallel, and no more than one disk per RAID group is upgraded at a time. It takes about four minutes to upgrade a disk.

Click on *Running* to go to the status page for that model.

- Pending and Failed

A status of Failed indicates one or more disks of that model have failed during the upgrade process. The status of all the other disks which are queued for upgrade are then changed to Pending.

Click on *Pending* or *Failed* to go to the Disk Firmware Upgrade Failure page.

- Idle

A status of idle indicates no disks of that model are being updated.

After a successful upgrade, if there are no mismatched disk firmware versions left, there will be no recommended column in the status list. If mismatched versions still exist, an upgrade action is generated. If the upgrade fails for any disk, all the other queued installations are stopped and a failed action is thrown once all the active installations are complete.

Canceling or Retrying Failed Disk Firmware Upgrades

Click on *Pending* or *Failed* from the Disk Firmware Upgrade Status page, or click a failed action, to go to the Disk Firmware Upgrade Failure Page. The Disk Firmware Upgrade Failure Page lists disks for which the firmware upgrade process failed (upgrade status field shows FAILED), or not yet completed (upgrade status field shows PENDING).

Click *Ignore* to cancel failed pending upgrades and to remove the failed actions. Click *Restart* to retry the upgrades and go to the Disk Upgrade Status page.

If an upgrade fails, try unplugging the disks with disk upgrade failures, and then plugging them back in, or power cycling the shelves with the disk upgrade failures.

Site Map

The Site Map screen provides a list of all tasks, grouped into Monitoring or Configuration, then organized by major category, and finally by individual task—which is the same structure by which the GUI is organized. The listed tasks include the advanced tasks that are available only after setting options from the Advanced screen, and so might show some tasks you do not otherwise see in the GUI.

Using a NearStore VTL Appliance

This chapter provides both conceptual and task information for the daily tasks that are available with NearStore VTL. Daily tasks are the activities that are the most common in the administration of NearStore VTL.

Daily tasks do not include the setup and configuration of the system. For example, monitoring the NearStore VTL appliance is a daily task, while adding a physical disk to the NearStore VTL appliance is a configuration task.

This chapter has the following sections:

- “Monitoring the NearStore VTL Appliance,” page 69
- “Using Virtual Libraries,” page 74
- “Using Virtual Tapes,” page 76
- “Using ACSLS Libraries (Physical Libraries),” page 81
- “Using Physical Tapes (Loading Physical Tape Drives),” page 83

Monitoring the NearStore VTL Appliance

Monitoring a NearStore VTL appliance and any attached devices includes viewing the amount of disk space used, data transfer rates, physical tape drive information, actions required, import/export requests, and event log information.

The following screens provide monitoring information for the NearStore VTL appliance:

Administrator Overview—provides information on the current state of the NearStore VTL appliance. This is the main monitoring screen. It includes the amount of disk space allocated to and used by the NearStore VTL, any actions that are required, the system event log, and so on. It also provides links to the Actions Required and Event Log screens.

Actions Required—gives a full list of required actions. It also provides an interface for acknowledging and resolving required actions.

Statistics—provides specific I/O statistics for each device in use by the NearStore VTL. This includes both virtual and physical devices.

Import/Export Requests—gives a list of all physical tapes that need to be mounted to physical tape drives.

Event Log—provides a complete list of events for the NearStore VTL. Event log information includes the time and code of the specified event.

Administrator Overview

The Administrator Overview screen is the first in the series of screens that can be used to monitor the NearStore VTL appliance. It is also the most important of the monitoring screens because it is the most generalized, providing information on the many aspects of the system.

It also provides the most-recent required actions and event log entries, as well as links to both the Actions Required and Event Log screens. In this way, the Administrator Overview screen is the central place from which you can monitor the NearStore VTL appliance.

From the *Daily Tasks* menu, located on the left side of the screen, click *Monitoring*.

The Administrator Overview screen appears and the following information is provided:

Capacity Allocated—specifies the total capacity of disk space allocated to the system.

Capacity Used—gives the capacity of disk space currently used by the system.

Total Disk Capacity—provides the total capacity of the physical disks that are connected to the system.

Total Virtual Disk Transfer Rate—specifies the current aggregate transfer rate for all physical disk drives that are configured for the system. Clicking this link displays the Statistics screen.

Active Physical Tape Drives—gives the number of physical tape drives that are currently active.

Physical Tape Usage—gives the current aggregate transfer rate for all physical tape drives that are configured for the system.

Actions Required—lists and gives the priority, code, and description of any required actions. This field also provides a link that you can click to acknowledge the action. The Actions Required screen provides a complete list of required actions.

Import/Export Requests—provides a list of the import and export requests. Clicking this link displays the Import/Export screen.

Event Log—displays the most-recent events.

This includes a link (Complete Event Log) which, when selected, provides access to the complete the NearStore VTL event log.

Actions Required

The Actions Required screen lists all system events requiring user action—an action, and provides the interface for you to resolve or acknowledge the actions.

Resolving an action means that the problem that generated the action has been resolved. Acknowledging an action lets the system know that you are aware of it. This, however, does not resolve the action.

There is also a corresponding Action Required icon that appears in the upper-right portion of the interface and flashes when there is a required action. As long as there is an unresolved action displayed on the Actions Required screen, this icon appears in the interface. If you have acknowledged each of the actions listed, or if there are no outstanding actions to be performed, the icon does not flash.



Clicking this icon displays the task that is required for resolving the action.

From the *Daily Tasks* menu, located on the left side of the screen, click *Monitoring > Actions Required*.

The Actions Required screen appears and the following information is provided:

Action—names the required action and provides a link that, when selected, displays the task appropriate for resolving the required action.

Priority—lists the priority of the action.

Code—gives the code of the action. The first digit of the code corresponds to the Status Indicator light displayed in the upper portion of the NearStore VTL interface: 1 = Good (green status), 2 = Warning (yellow status), and 3 = Error (red status).



Description—provides a description of the action that is required.

Age—specifies the elapsed time since the required action was triggered.

Acknowledge—provides a link, that when selected, acknowledges the action. This does not resolve the problem for which the action is required, but lets the system know that you are aware of it.

See the NearStore VTL Action Code reference for detailed descriptions of action codes.

Statistics

You can use the Statistics screen to monitor specific I/O statistics for both the physical and virtual devices that are in use by the NearStore VTL appliance.

For example, you can check the amount of disk space currently allocated to and used by a specific virtual library. This screen also provides the type of virtual tape drives that are being used by the virtual library.

This information is helpful in determining the state of the virtual library, including its compatibility with other virtual and physical media, based on the type of virtual tape drive being used.

From the *Daily Tasks* menu, located on the left side of the screen, click *Monitoring > Statistics*.

The Statistics screen appears. This screen is divided into three sections: Virtual Library I/O Load, Physical Disk I/O Load, and Physical Tape Device I/O Load.

Virtual Library I/O Load:

Library—gives the name of the virtual library.

Allocated—specifies the amount of disk space that is allocated to the virtual library.

Used—gives the total amount user data stored on the virtual tapes associated with the virtual library.

Data Written—provides the total amount of user data stored on the virtual tape.

Drive—provides the number of virtual tape drives in the virtual library.

Tape Label—if a virtual tape is currently loaded in the virtual tape drive, the NearStore VTL displays the label of the virtual tape. If there is no virtual tape loaded, the NearStore VTL displays *Empty*.

Mode—specifies the mode of the virtual tape drive. Valid modes are:

- *Write*—the host is either currently writing to the drive or it has not sent any commands since it last wrote to the drive.
- *Read*—the host is either currently reading from the drive or it has not sent any commands since it last read from the drive.
- *Idle*—the drive is not currently being used.
- *N/A*—the library is not loaded into the drive.

IO/Sec—provides the total number of operations per second for the drive.

MB/Sec—provides the data rate in megabytes per second for the drive.

Used—gives the amount of user data stored on the virtual tape loaded in the virtual tape drive.

Active Disk—specifies the disk from which the host is either reading or writing data.

RAID Group I/O Load:

Drive—provides the name of the back-end physical disks in the RAID group.

Capacity—specifies the capacity each disk.

Used—gives the amount of disk space that is currently used.

System Overhead—specifies the amount of disk space being used for system overhead.

IO/Sec—provides the number of operations per second for the disk.

MB/Sec—provides the data rate in megabytes per second for the disk.

Active Streams—specifies the number of streams between hosts and the disk. A stream is created when a host either writes data to or reads data from a virtual tape (disk).

Disk Status—provides the status of the disk. Valid disk states are:

- *Free disk*—the disk is not currently being accessed by a host.
- *Input limited*—the rate at which the NearStore VTL is writing data to disk is limited by the rate at which the host is sending the NearStore VTL the data. The NearStore VTL cannot increase the rate of data because the bottleneck is on the host end. When the disk is in this state, there is at least one active stream.
- *Output limited*—the rate at which the NearStore VTL is writing data to disk is limited by the rate at which it can move the data to disk. In this case, the bottleneck is on the NearStore VTL side. When the disk is in this state, there is at least one active stream.

Physical Tape Device I/O Load:

Drive—gives the name of the physical tape drive.

Tape—provides the barcode of the physical tape that is currently loaded in the drive.

MB/Sec—specifies the transfer rate of the physical tape drive.

Import/Export Requests

You can use the Import/Export Requests screen as a central place to monitor all of the import and export requests. This includes the status of any given import/export request, which can include possible issues that must be resolved before the import or export can continue.

From the *Daily Tasks* menu, located on the left side of the screen, click *Monitoring > Import/Export Requests*.

The Import/Export Requests screen appears and the NearStore VTL displays the following information:

Tape—specifies the name of the tape that is required.

Requester—gives the name of the account that requested the volume.

Library—specifies the name of the virtual library.

Age—provides the length of time since the request was issued.

Status—gives the state of the import/export request. Valid states are:

- *Pick List*—the name of the tape that must be loaded into the tape drive.
- *Waiting For Available Drive*—the tape is waiting for a tape drive to become available.
- *Ready to Load*—the retrieved tape should be loaded into the available tape drive.
- *Mounted*—the tape has been loaded into the requested drive.
- *Transferring Data*—the data transfer associated with the import/export is in process.
- *Complete*—the import/export request has been completed successfully.
- *Failed*—the import/export request was not completed. An action will be required.
- *Tape Not Found*—the physical tape could not be found.

In addition to monitoring import/export requests, you can select one of the following:

Direction—if import is selected, the data will be imported from the physical tape to the virtual tape. If export is selected, the data will be exported from the virtual library to the physical tape.

Delete Request—if cancel request is selected, the request will be canceled and deleted. If the request has been completed, click *acknowledge*.

Event Log

You can use the Event Log screen to monitor the complete list of historical events for the NearStore VTL. These events are useful in determining both the current and past states of the NearStore VTL appliance.

Event log information includes the time and code of the specified event. The most-recent event log entries are also available from the Administrator Overview screen. The upper right portion of the screen displays the time at which the data was last updated. You can update the data by refreshing the browser. If you do not have a disk connected to the back-end of NearStore VTL, the event log can only contain 1KB of data before NearStore VTL starts to overwrite earlier data.

From the *Daily Tasks* menu, located on the left side of the screen, click *Monitoring > Event Log*.

The Event Log screen appears and the following information is provided:

Time—specifies the time at which the NearStore VTL detected the event.

Code—gives the code for the event.

Description—provides a description of the event.

Click *Last Page* to move to the bottom of the listing. After navigating within the list, you also see *Next Page* and *Previous Page*, that you can use to move to the next page and previous pages. By default, SCSI-related messages are not listed. You can switch between whether SCSI messages are included or not by clicking *Show SCSI Messages* and *Hide SCSI Messages*.

Using Virtual Libraries

Once you have created the virtual tape libraries using either the default or custom virtual tape library types, you can use them to back up data. Because virtual libraries were designed with the look and feel of physical tape libraries, the backup application can use virtual libraries in much the same way as physical libraries.

For example, if the backup application requests information from a virtual tape that is currently in the virtual library, the media changer (virtual mechanical arm) of the virtual library retrieves the virtual tape from its slot and puts it in a virtual tape drive. The backup application can then access the data on the virtual tape. This task is nearly identical to that of a physical tape library.

In fact, a virtual tape library provides a backup application with the same functionality as a physical tape library, except of course that a virtual library is much faster and more reliable.

Each virtual library has an entry/exit port (EEP), virtual tape slots, virtual tape drives, and a robotic arm. Most of these components, with the exception of the robotic arm are displayed in the NearStore VTL GUI.

EEP

The one NearStore VTL component that is not shared by physical tape libraries is the entry/exit port (EEP), (although it is somewhat analogous to a physical library entry/exit port). This is the component that exports virtual tapes to physical tape and imports physical tape to virtual tapes. You can initiate imports and exports manually or via the backup application.

Virtual volume slots

Just as physical tape libraries have slots for cartridges, virtual libraries have slots for virtual tapes. The number of slots are defined by type of which the virtual library is based.

Virtual volume cart

Each NearStore VTL also has a virtual tape cart. This cart houses virtual tapes that have been created for, but not moved into, the virtual library. If the option to automatically move virtual tapes from the entry port to a slot is turned off, each newly created virtual tape is stored in the cart. This does not include volumes that are the result of a physical tape import.

Virtual tapes in the cart cannot be seen by the backup application.

When you create virtual tapes for a virtual library that is full, NearStore VTL stores these virtual tapes in the virtual volume cart. This means that it is possible to create more virtual tapes than can fit into the virtual library.

You cannot move virtual tapes directly from the cart to the virtual library. Any virtual tapes that are in the cart remain there until the mail slot (import/export) is available. Then the NearStore VTL moves the next virtual tape from the cart to the mail slot.

See “Working with Virtual Libraries,” page 9 for more information on enabling and disabling the Automatically Move Volume from Entry Port to Slot feature.

Virtual tape drives

Each virtual library has one or more virtual tape drives. Like physical tape drives, virtual tape drives have a native capacity. In addition, virtual tape drives can support tape smart sizing. See “Using Virtual Tapes,” page 76 for more information.

Virtual Tapes

Virtual tapes are the NearStore VTL equivalent of physical tapes. When you perform a backup, the data is sent to a virtual tape. The backup application identifies each virtual tape by its label. This label is a virtual barcode for the virtual tape. Because you can export virtual tapes to physical tapes, the NearStore VTL can match the labels of virtual tapes with the barcodes of physical tapes. This means the backup application can track the data that it exports whether it is contained in a virtual tape or a physical tape.

See “Using Virtual Tapes,” page 76 for more information.

Moving the cursor over a virtual tape enlarges the view of the volume and displays the virtual tape’s label.

Virtual volume vault

The vault in the upper left-hand corner of the NearStore VTL interface is a tool that you can use to manually export virtual tapes.

In order to export a virtual tape, you use the drag-and-drop technique to move the virtual tape to the vault.

Manually manipulating a virtual library

Aside from the automated manipulation initiated by the backup application, you can manually manipulate virtual tape libraries and volumes. This is equivalent to opening the front door of a physical tape library. For example, you can manually take the virtual tape out of the import/export slot and move it to a virtual tape drive during the import of a physical tape. This enables the backup application to access the data on the physical tape without having to import all of the data.

For example:

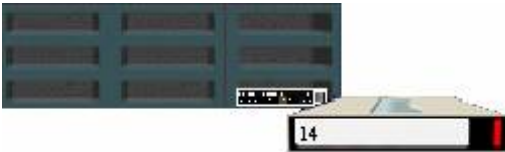
Virtual volume 14 is selected



Virtual volume 14 is being moved



Virtual volume 14 is in its new location



You select a specific virtual library using the drop-down pick list at the top of the page.

Using Virtual Tapes

A virtual tape is the logical equivalent of a physical tape. Virtual volumes are used in virtual libraries in much the same way that physical tapes are used in physical tape libraries.

When the NearStore VTL writes data to virtual tapes (disk), it preserves the native format of the backup application. Even the tape marks and record size changes are preserved. This means that the NearStore VTL can copy data to and from physical tape without the need of a conversion process. In fact, virtual tapes have a one—to—one correlation with physical tapes.

For example, the NearStore VTL takes the data that the backup application sends during a backup and stores it on a virtual tape that has the same capacity and barcode as its corresponding physical tape. Having a physical tape that corresponds to each of the virtual tapes is important if you plan to export the virtual tapes to physical tape for offsite storage.

You can create virtual tapes when you create a virtual library, or you can create them later. This section describes the way in which you can create virtual tapes manually.

This section provides the following tasks:

- Creating Virtual Tapes Manually
- Creating Virtual Tapes Using Barcodes
- Importing Virtual Tapes
- Importing Virtual Tapes Using Barcodes

Creating Virtual Tapes Manually

Virtual volumes can be created when a virtual library is created, when a physical tape is imported into the NearStore VTL, or by manual operation.

The capacity of the new virtual tapes matches the capacity of the virtual tape drives in the virtual library for which the virtual tapes were created.

Even if all the slots in a virtual library are full, additional virtual tapes can still be created for that virtual library. In this case, the virtual tapes appear in the virtual tape cart on the left side of the virtual library.

When you have disabled the option that moves virtual tapes from the entry port to a slot, the NearStore VTL keeps newly-created virtual tapes in the cart until the mail slot is available.

Note

Backup applications cannot see virtual tapes that are situated in the virtual tape cart.

Complete this task to create virtual tapes:

1. From the *Daily Tasks* menu, located on the left side of the screen, click the *Virtual Tapes* task category. The Create Virtual Tape screen appears.

2. Complete the following information:

Library—provides a drop-down menu from which a virtual library can be selected.

Starting Tape Label—provides an alphanumeric name for the first virtual tape in the sequence. It is important that the labels of the virtual tapes be chosen carefully. The preferred method is to label the virtual tapes with the barcodes of the physical tapes to which you will export them.

Note

If you have enabled the option to constrain volume labels, you have to ensure that your starting label falls within the label parameters that you have set up. See [Creating Virtual Libraries](#) for more information.

No. of Tapes—specifies the number of volumes to be created. The labels of each additional volume increment automatically based on the starting volume label. For example, if the starting volume label is abc123, additional volumes will be labeled abc124, abc125, abc126, and so on.

If there are no numbers in the starting volume label, the last letter of the label is incremented for each additional volume. For example, if the starting volume label is tapeA, additional volumes will be labeled tapeB, tapeC, tapeD, and so on.

(Optional) you can click *Reset*, to clear any configuration parameters prior to clicking *Apply*.

Check *More Options* to see the choice *Tape Smart Sizing*. Select *Tape Smart Sizing* to use tape smart sizing.

3. Click *Apply*.

The virtual tapes are added to the specified virtual library. If the option to move the new virtual tapes from the entry port to an available slot is enabled, each new virtual tape is moved to an available slot.

See “Working with Virtual Libraries,” page 9 for detailed information about the option to move new virtual tapes to an available slot.

If the virtual tapes need to be manually loaded into the virtual library, the Virtual Library Management screen appears.

Creating Virtual Tapes Using Barcodes

You can create virtual tapes based on the physical tapes in a physical tape library. Creating virtual tapes this way does not import the data from the physical tapes. Rather, it creates new (blank) virtual tapes with the same barcodes as the physical tapes. This is useful when you have a physical tape library that is populated with either blank (new) or scratch tapes, the data of which you no longer need.

Complete this task to create virtual tapes: using barcodes from a physical library:

1. From the *Daily Tasks* menu, located on the left side of the screen, click the *Virtual Tapes* task category.
2. Click the *Create Virtual Tapes Using Barcodes* tab, located in the upper portion of the screen.

The Create Virtual Tapes Using Barcodes Screen appears.

3. From the *Library* drop-down menu, select the virtual library for which you want to create the virtual tapes.
4. From the *Physical Library* drop-down menu, select the physical library corresponding to the virtual library.
5. Check the *Overwrite non-blank physical tape during export* option if you want your appliance to overwrite the corresponding physical tape, if it already has data on it, when the virtual tape is exported. If you do not check this, when the virtual tape is exported, the export fails.
6. Check the *Disk Compression* option if you want your appliance to use disk compression for the virtual tapes.
7. Check the *Tape Smart Sizing* option if you want your appliance to use tape smart sizing for the virtual tapes.

8. Click in the checkbox field next to the tape label for the tapes from which you want to copy barcodes, or click the checkbox field at the top of the column to select all displayed tapes, or click *Create All* to create virtual tapes for all barcodes in the physical library.
9. If you did not click *Create All* in the previous step, click *Apply* to create the selected virtual tapes with the labels that match the barcodes of the physical tapes in the specified physical tape library.

Importing Virtual Tapes

When you need to read, append, or overwrite data that is on a physical tape, you must first import that tape into the NearStore VTL appliance.

Depending on the needs, you can choose to import either all or just the first megabyte of data from the physical tape. Importing all of the data from the tape is useful if you are going to do multiple restores or append the tape. When you are going to overwrite an existing physical tape, you must import at least the first megabyte of data into the NearStore VTL. This enables the backup application to verify that it is the correct volume.

If the physical tape requested by the backup application is currently in a physical tape library that is connected to the NearStore VTL appliance, NearStore VTL uses the robotic arm of the physical tape library to move the physical tape into an available physical tape drive. If the physical tape is not in the physical tape library (or if the drive is a standalone device), the administrator is asked to load the physical tape into an available physical tape drive.

Once the physical tape is loaded, the NearStore VTL creates a virtual tape that has the same barcode as the physical tape. If you have enabled the option to automatically move volumes from the import/export port to an available slot, the virtual tape is moved directly into an available slot. If you have not enabled this option, the virtual tape remains in the import/export slot. As soon as the virtual tape is created it becomes both visible and available to the backup application.

While you are in the process of importing data from a physical tape, you can restore specific data, including data that has not yet been imported. This is made possible by putting the NearStore VTL into pass-through mode. Pass-through mode is initiated when you use the backup application to access data that is in the process of being imported.

If the requested data has already been copied to the virtual tape, the backup application can access it while the NearStore VTL continues to import data. If the requested data has not been copied to the virtual tape, the NearStore VTL pauses the import, locates the requested data, and copies it to the virtual tape. The backup application can then get the data from the virtual tape.

Once you have accessed the required data, you can either export the tape or have the NearStore VTL continue to import it.

The following must be taken into account when importing physical tapes:

Available Disk Space—there must be enough available physical disk space for the data that is being imported.

Complete this task to import physical tapes to virtual tapes:

1. From the *Daily Tasks* menu, located on the left side of the screen, click the *Virtual Tapes* task category.
2. Click the *Import Virtual Tape* tab, located in the upper portion of the screen.

The Import Virtual Tape Screen appears.

3. Complete the following information:

Tape—type the tape label (barcode) for the tape to be imported.

Library—select the name of the virtual library into which the physical tape is to be imported.

Special Instructions—select which special instructions are included with the import.

Valid special instructions are:

- *None*—the entire tape is imported. This method is useful when additional data is going to be append to an old tape or if the tape is required for multiple restores.
- *Read-only*—the physical tape is imported as read only.
- *Quick-load*—the beginning of a physical tape is imported. This method is useful when an old tape is required for overwriting. This option might not be compatible with all backup software.

(Optional) you can click *Reset* to clear all configuration parameters prior to clicking *Apply*.

4. Click *Apply*.

Once an import request has been applied, a volume mount request will be created. If the *Use Tape Pick List* option has been enabled from *Configuration Tasks > Advanced > Options*, a pick list action will also be created.

Importing Virtual Tapes from Physical Library

You can import all of the physical tapes from a physical tape library in one operation. Rather than the standard tape import, which imports physical tapes individually, importing virtual tapes from the media changer imports all of the physical tapes that are in the inventory of a physical tape library. When the physical tapes are imported into your appliance, virtual tapes that are the exact copies of the physical tapes (including the barcode) are created.

Complete this task to import all physical tapes in a physical library to virtual tapes:

From the Library drop-down menu, select the virtual library for which you want to import the physical tapes.

1. From the *Daily Tasks* menu, located on the left side of the screen, click the *Virtual Tapes* task category.
2. Click the *Import Virtual Tapes from Physical Library* tab, located in the upper portion of the screen.

The Import Virtual Tape from Physical Library Screen appears.

3. From the *Special Instructions* drop-down menu, select any special import instructions that you want to issue.

None—the entire tape is imported before its data becomes available. This method is useful when additional data is going to append an old tape or if the tape is required for multiple restores.

Read-only—the physical tape is imported as read only.

Quick-load—the beginning of a physical tape is imported. This method is useful when an old tape is required for overwriting. This option might not be compatible with all backup software.

4. Click the checkbox field of the physical library from which you want to import physical tapes. Or click *Select All* to select all listed libraries.

Tape Label—displays the labels of the physical tapes in the inventory of the specified physical tape library.

Physical Library—gives the name of the physical tape library from which the barcodes will be copied.

5. Click *Apply* to import the physical tape into the specified virtual library.

Using ACSLS Libraries (Physical Libraries)

This section describes on going administrative ACSLS workflows, and includes the following sections:

- “Viewing the ACS Inventory,” page 81
- “Viewing the Inventory of Tape Drives in an ACS,” page 82

Viewing the ACS Inventory

You can view the inventory of barcodes contained in an ACS.

Complete this task to view the inventory of tapes (barcodes) in an ACS:

1. From the *Daily Tasks* menu, located on the left side of the screen, click the *Physical Libraries* task category.
2. Click the *ACS Inventory* tab, located in the upper portion of the screen.

The ACS Inventory screen appears. The screen provides a drop down list of recognized physical libraries to select from, radio buttons to select how the inventory list is sorted, the total number of volumes represented by the barcodes, and the inventory of barcodes. The inventory is listed in a table showing the barcodes, location ID for the location of the barcode, the date cloned, date exported, the associated virtual library, the date the associated virtual library tape was written, whether the virtual and physical tapes are in sync and the status. Status can be one of the following:

- *NEW*—the physical tape is newly added to the NearStore VTL appliance
- *IMPORTED*—the physical tape is imported into the appliance
- *CLONED*—the physical tape is cloned
- *CLONE_PENDING*—the physical tape is waiting to be cloned
- *EXPORTED*—the virtual tape has been exported and is no longer in the virtual library
- *EXPORT_PENDING*—the virtual tape has been scheduled for exporting, but is not yet exported

- *EEP_PENDING*—the physical tape is waiting to be moved to the physical library entry/exit port

You can click *Query Volumes* to force an update of the data.

Because the list size can be very large, it can be difficult to find a specific barcode. You can search the list for a specified barcode. Enter the barcode in the Find Volume: field, and click Find. The specified barcode is highlighted.

Viewing the Inventory of Tape Drives in an ACS

You can view the list of ACSLS tape drives connected to the NearStore VTL appliance.

Complete this task to view the ACSLS-controlled, VTL-connected, tape drives:

1. From the *Daily Tasks* menu, located on the left side of the screen, click the *Physical Library* task category.
2. Click the *Drive Inventory* tab, located in the upper portion of the screen.

The Drive Inventory screen appears. The screen provides a drop down list of recognized ACSs to select from. The inventory is listed in a table showing the nickname, drive ID, port number, LUN number, the tape label, if a tape is in the drive, the drive model, and drive status.

Using SCSI Physical Libraries

This section describes ongoing administrative physical library workflows, and includes the following sections:

- “Viewing the Physical Library Inventory,” page 82
- “Viewing the Inventory of Tape Drives in a Physical Library,” page 83

Viewing the Physical Library Inventory

You can view the inventory of barcodes contained in a physical library.

Complete this task to view the inventory of tapes (barcodes) in a physical library:

1. From the *Daily Tasks* menu, located on the left side of the screen, click the *Physical Libraries* task category.
2. Click the *Physical Library Inventory* tab, located in the upper portion of the screen.

The Physical Library Inventory screen appears. The screen provides a drop down list of recognized physical libraries to select from, radio buttons to select how the inventory list is sorted, the total number of volumes represented by the barcodes, and the inventory of barcodes. The inventory is listed in a table showing the barcodes, nickname for the location of the barcode, the date cloned,

date exported, the associated virtual library, the date the associated virtual library tape was written, whether the virtual and physical tapes are in sync and the status. Status can be one of the following:

- *NEW*—the physical tape is newly added to the NearStore VTL appliance
- *IMPORTED*—the physical tape is imported into the appliance
- *CLONED*—the physical tape is cloned
- *CLONE_PENDING*—the physical tape is waiting to be cloned
- *EXPORTED*—the virtual tape has been exported and is no longer in the virtual library
- *EXPORT_PENDING*—the virtual tape has been scheduled for exporting, but is not yet exported
- *EEP_PENDING*—the physical tape is waiting to be moved to the physical library entry/exit port

You can click *Query Volumes* to force an update of the data.

Because the list size can be very large, it can be difficult to find a specific barcode. You can search the list for a specified barcode. Enter the barcode in the Find Volume: field, and click Find. The specified barcode is highlighted.

Viewing the Inventory of Tape Drives in a Physical Library

You can view the list of tape drives in a physical library connected to the NearStore VTL appliance.

Complete this task to view the VTL-connected tape drives:

1. From the *Daily Tasks* menu, located on the left side of the screen, click the *Physical Library* task category.
2. Click the *Drive Inventory* tab, located in the upper portion of the screen.

The Drive Inventory screen appears. The screen provides a drop down list of recognized physical libraries to select from. The inventory is listed in a table showing the nickname, drive ID, port number, LUN number, the tape label, if a tape is in the drive, the drive model, and drive status.

Using Physical Tapes (Loading Physical Tape Drives)

When connected to a standalone physical tape drive, the NearStore VTL appliance provides the ability to copy the data from virtual tapes to physical tapes for offsite storage. You can also use the NearStore VTL appliance to import physical tapes. When you import a tape, the NearStore VTL appliance creates a virtual tape that has the same barcode and data as the physical tape. (When the NearStore VTL appliance is connected to a physical library, this process is automatic.)

Because the NearStore VTL appliance preserves the native format of the backup application when it writes data to disk, you can export data to tape and import data from tape without the need for a conversion

process. In fact, the backup application can access the data from a physical tape while the NearStore VTL appliance is importing it.

When the backup application specifies a physical tape that is not in one of the virtual libraries, the NearStore VTL appliance generates an action prompting you to load the physical tape being requested. If you have enabled the physical tape pick list functionality of the system, the NearStore VTL appliance will also provide display the needed tape on the Physical Tape Pick List screen.

The Load Physical Tape Drive screen displays a list of physical tapes that need to be loaded into specific tape drives. Once the tapes have been loaded, you can use this screen to let the NearStore VTL appliance know that you have mounted the tapes to the appropriate drives. You can also let the NearStore VTL appliance know that you could not find the specified tapes.

Loading Physical Tape Drive

Complete this task to use the Load Physical Tape Drive screen:

1. From the *Daily Tasks* menu, located on the left side of the screen, click the *Physical Tapes* task category.
2. The NearStore VTL displays the *Load Physical Tape Drive* screen:

Select—select this check box to let the NearStore VTL appliance know that you have mounted the required tape.

Tape Drive—specifies the name of the physical tape drive on which the physical tape will be mounted.

Previous Tape—gives the name of the last physical tape that was mounted on the specified physical tape drive.

Tape to be Loaded—provides the barcode of the physical tape that needs to be mounted.

Write Protect—specifies whether the tape needs to be write protected before it is mounted. If the import request has been selected as a read-only request, set to yes.

3. Select the *Done* checkbox of each physical tape that has been mounted to the specified physical tape drive. If all physical tapes have been mounted, click *Select All*.
4. Click *Apply* when you have mounted the physical tape to the specified physical tape drive.

The NearStore VTL creates a virtual a virtual tape that has the same barcode as the physical tape that it is importing. The backup application can access the data on the physical tape as soon as this NearStore VTL starts the import. See [Importing Virtual Tapes](#) for more information.

The following options are also available:

- If you cannot locate the tapes, select *If the recommended tapes are not to be found, click here*.
- If you would like to specify a particular physical tape drive manually, then select *To load a tape into a specific drive, click here*.
- If you want to import additional tapes, select *To create a new tape import request, click here*. Selecting this option displays the Import Virtual Tape screen, available from Daily Tasks > Virtual Tapes. See [Importing Virtual Tapes](#) for more information.

4

Using Advanced Features

To use an advanced feature, you must enable the feature. Until the feature is enabled, you do not see the workflow in the Configuration list of the GUI. You enable an advanced feature from the Enabling Advanced Configuration Features (Options) screen.

- Working with Customer Accounts
- Managing Host Access

Working with Customer Accounts

When you enable the Use Customer option (Advanced > Options, and select Use Customer), the NearStore VTL appliance administrator can set up accounts for multiple customers. The administrator can then add virtual libraries to these accounts, based on the needs of each customer. The administrator of any given customer account can see only the virtual libraries that are associated with that account. This provides enhanced security.

When the administrator of a customer account logs in to a NearStore VTL appliance, he or she does not have access to the full functionality of the system. Rather, the administrator has access only to the functionality that is required for managing the virtual libraries and volumes that are associated with the customer account.

Customer functionality includes:

Monitoring—provides a screen from which the customer account can be monitored. This includes a list of all virtual libraries that are associated with the customer account and a list of virtual tape import/export requests.

Virtual Library Management—gives an interface from which the customer's virtual libraries can be managed.

Create Virtual Tape—provides an interface from which virtual tapes can be created. The number of virtual tapes that can be created is limited by the amount of disk space available to the customer account.

Import/Export Request—gives a screen on which import and export requests are displayed.

Import Virtual Tape—provides an interface from which physical tapes can be imported into a virtual library.

Move Virtual Tapes—gives an interface from which the customer's virtual tapes can be moved between compatible virtual libraries.

SCSI Addresses—provides a screen on which the SCSI/Fibre Channel addresses of the customer's virtual libraries are displayed.

Port List—provides a screen on which the front—end physical ports of the NearStore VTL appliance are displayed.

Change Write Protected Status—gives an interface from which the status of the customer's virtual tapes can be changed.

Change Export Status—provides an interface from which the export status of the customer's virtual tapes can be changed.

User Account Setup—provides an interface from which the login identification and login password of the customer can be changed.

Customer tasks include:

- Viewing Customer Accounts
- Adding Customer Accounts
- Deleting Customer Accounts

Viewing Customer Accounts

The NearStore VTL displays the customer accounts that you have added to the configuration of the NearStore VTL appliance on the Customer List screen. Information for each customer account includes the customer name and number, capacity allocated, capacity used, and contact information.

From the *Configuration Tasks* menu, located on the left side of the screen, click the *Customers* task category.

The Customer List screen appears, and the following is displayed for all customer accounts that have been added to the NearStore VTL appliance.

Customer Name—specifies the name of the customer account.

Customer Number—gives the number of the customer account. The customer number is a way of identifying the customer.

Capacity Allocated—gives the amount of disk space allocated to the customer.

Capacity Used—provides the amount of disk capacity currently used by the customer.

Data Written—lists the amount of data already written and “owned” by the customer.

Contact—specifies the name of the contact person for the customer account.

E-mail—gives the e-mail address of the contact person.

Phone—provides the phone number of the contact person.

Pager—gives the pager number of the contact person.

Adding Customer Accounts

When you add a customer account to the configuration of the NearStore VTL appliance, you create the login identification and password for the account. This includes contact information for the customer account. The account is displayed on the Customer List screen.

The Use Customer option must be enabled before you can add customers to the NearStore VTL appliance. See [Enabling Advanced Configuration Features](#) for more information.

Complete this task to add customer accounts to the NearStore VTL appliance:

- From the *Configuration Tasks* menu, located on the left side of the screen, click the *Customers* task category.
- Click the *Add Customer* tab, located in the upper portion of the screen.

The Add Customer screen appears.

- Complete the following information:

Customer Name—gives the name of the customer account. Each customer account should be easily identifiable.

Login Id—provides the login name for the customer account.

User Password—specifies the password that must be used to log in to the tape operator account. Use care in choosing this and other passwords.

Customer Number—(optional) gives the customer account number. This number helps to identify the customer account.

Contact Name—(optional) provides the name of the customer contact.

E-mail—(optional) gives the e-mail address of the contact person.

Day Phone Number—(optional) gives the day phone number of the contact person.

Night Phone Number—(optional) provides the night phone number of the contact person.

Mobile Phone Number—(optional) lists the mobile phone number of the contact person.

Pager Number—(optional) gives the pager number of the contact person.

(Optional) you can click *Reset* to clear the screen.

- Click *Apply* to add the new customer account.

The NearStore VTL adds the customer account and displays it on the customer list screen. You can now create virtual libraries and assign them to the customer account. See “Working with Virtual Libraries,” page 9 for more information.

Deleting Customer Accounts

When you delete a customer account, all virtual libraries and virtual tapes associated with that customer account are also deleted. The administrative account of the NearStore VTL appliance is also a customer account. It cannot be deleted.

Complete the following task to delete a customer from the NearStore VTL appliance:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Customers* task category.
2. Click the *Delete Customer* tab, located in the upper portion of the screen.
The Delete Customer screen appears.
3. From the *Action* field of the customer that you want to delete, click *delete*.
4. When prompted, click *Apply*.

Note

When a customer account is deleted, any associated virtual tapes are also deleted.

The NearStore VTL deletes the customer account and no longer displays it on the Customer List screen.

Managing Host Access

You can map specific hosts to specific virtual libraries.

These mappings can be either dedicated or shared. When the mapping is dedicated, only the host specified can see and use the virtual library. When the mapping is shared, multiple hosts can see and use the virtual library.

This feature can be useful in the event that you want to set up virtual libraries for each host that is going to back up data to the NearStore VTL appliance. This configuration is recommended because it eliminates the need for library sharing during backup windows.

For example, consider a situation in which each department in the organization is going to back up data to the NearStore VTL appliance. If the data of certain departments, for example human resources, is sensitive, you have to restrict access to it. You can do this by setting up a dedicated mapping between this department (host) and a corresponding virtual library.

Likewise, if there are multiple departments (hosts) that have to back up nonsensitive data, you can set up shared mappings between these departments and a single virtual library.

Note

Host access control is usually used to simplify the configuration at the host level because when host access control is enabled, each host sees only one virtual library.

This subsection provides the following tasks:

- Viewing Hosts
- Adding Hosts
- Deleting Hosts

Viewing Hosts

You can view a table of already defined host to WWPN maps.

Complete this task to view existing host to WWPN maps:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Hosts* task category.
2. Click the *Host List* tab, located in the upper portion of the screen.

The Host List screen appears.

Adding Hosts

Before you can create mappings between hosts and specific virtual libraries, you must first add these hosts to the configuration of the NearStore VTL appliance. A host is a device from which data will be backed up. You can add hosts only when the device access feature is enabled for the NearStore VTL appliance. See [Enabling Advanced Configuration Features](#) for more information. To “add” a host you associate a host name with a WWPN.

Complete this task to add hosts:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Hosts* task category.
2. Click the *Add Host* tab, located in the upper portion of the screen.

The Add Host screen appears.

3. Complete the following information:

Customer—specifies the name of the customer who owns the listed hosts. This field is present only if the Use Customer option has been selected under Advanced > Options.

Host Name—provides the name of the host.

WWN—gives the World Wide Name for the host. This must be entered as a 16-character hexadecimal value, or you can use the *WWN* drop-down menu to select the *WWN* of a host that is visible from the system.

4. Click *Apply* to save the changes.

Deleting Hosts

When a host is no longer needed, you can delete it from the configuration of the NearStore VTL appliance.

Complete this task to delete hosts from the NearStore VTL appliance:

1. From the *Configuration Tasks* menu, located on the left side of the screen, click the *Hosts* task category.
2. Click *Delete Host* tab, located in the upper portion of the screen.
The Delete Hosts screen appears and the hosts that are configured for the system are listed.
3. From the *Action* field, click the name of the host that you want to delete.
4. When prompted, click *Apply* to confirm that you want to delete the specified host.

Identifying Physical Tapes that Need Mounting (Tape Pick List)

The *Physical Tape Pick List* screen displays a list of all physical tapes that need to be mounted to physical tape drives. This screen is only available if the option *Use Tape Pick List* has been enabled. Once a tape is located and ready to be mounted, use the Physical Tape Pick List screen to indicate the tape change in status.

Mark a tape as ready for mounting by completing the following:

1. From the *Daily Tasks* menu, click the *Physical Tapes* task category.
2. Click the *Physical Tape Pick List* tab.

The *Physical Tape Pick List* screen displays the following information:

Found—marks a physical tape as found.

Tape—specifies the physical tape that is required.

Requester—provides name of the account from which the request was initiated.

Age—specifies length of time since the request has been issued.

3. Select all of the physical tapes that have been located by clicking the check box for each tape, or click *Select All* if all of the requested tapes have been located.
4. Click *Apply*, and then the *Load Physical Tape Drive* screen appears, or if you cannot find the requested tapes, click *If the requested tapes cannot be found click here*.

Using Shadow Tapes

When you set the advanced option *Enable Shadow Tapes* (and then enable shadow tapes for the library containing the virtual tape), whenever a virtual tape is exported to a physical tape, the virtual tape is moved to the shadow tape pool. A tape in the shadow tape pool is invisible to the backup application, and is not listed as part of a virtual library, but is available for quick access if the physical tape is later imported, and is available for reading if the physical tape is stored offsite, or is otherwise unavailable. If a physical tape with matching shadow tape is imported, the NearStore VTL automatically makes the read-only shadow tape available immediately—before the physical tape itself could be read into the appliance, but you can also manually import a shadow tape back into a virtual library using the *Import from Shadow Tape Pool* screen, described in the following section.

Shadow tapes have a retention period. Once the retention period expires, the shadow tape is marked expired and the space can be used for current backup operation; however, if more space is needed for a current back up operation than is free or marked expired, the NearStore VTL can delete a shadow tape and reclaim the space even if there is still time remaining in the retention period. Shadow tape space is not reclaimed when creating new virtual tapes.

Importing a Shadow Tape

Although automatically imported when the matching physical tape is imported into the NearStore VTL, you can also manually import a shadow tape, perhaps because the physical tape is offsite.

Complete this task to import a shadow tape:

1. From the *Daily Tasks* menu, located on the left side of the screen, click the *Virtual Tapes* task category, and then select the *Import from Shadow Tape Pool* tab. The *Import from Shadow Tape Pool* screen appears.
2. If you are using storage pools (the advanced option *Use Storage Pools* is set), there is a drop-down menu *Storage Pool* at the top of the screen that controls whether the shadow tapes for all storage pools, or just a selected one, are listed. Select the desired storage pool.
3. From the drop-down menu *Destination Library*, select the library to which you want to import the shadow tape.
4. Decide if you want the imported tapes to be read-only, or writable. The default is read-only. Change this by unchecking the *Import Read-only* check box.

The screen displays the following information:

Files—lists the number of files on the shadow tape.

Tape Label—displays the label (virtual barcode) of the shadow tape.

Originating Library—provides the name of the virtual library from which the shadow tape originated.

Raw Capacity—gives the specified capacity of the drive.

Data Written—specifies the amount of uncompressed data that the NearStore VTL has written to the tape.

Disk Used—provides the amount of disk being used by the tape.

Disk Compression—indicates whether disk compression is used on the tape.

Tape Smart Sizing—lists whether the tape uses tape smart sizing. If the tape does, the field displays the smart sizing algorithm used. If it does not, the field displays DISABLED.

Time Remaining (Days HH:MM)—lists the remaining retention time for the tape. A shadow tape can be deleted by the NearStore VTL if the space is needed for current backup operations, even if there is still time remaining in the retention period.

5. Select the tape or tapes to import using the check box at the start of the row for the tapes, or select all listed tapes by selecting the check box at the top of the column.
6. Click *Reset* to clear all of the tape selections, or click *Apply* to import the selected tapes into the selected destination library.

Viewing the List of Shadow Tapes

The NearStore VTL provides a comprehensive list of shadow tapes on the *Shadow Tape Pool* screen. This list includes the files, label, originating virtual library, and other properties for each shadow tape.

From the *Configuration Tasks* menu, located on the left side of the screen, click the *Virtual Tapes* task category, and then select the *Shadow Tape Pool* tab. The *Shadow Tape Pool* screen appears. If the advanced option *Use Storage Pools* is set, there is a drop-down menu *Storage Pool* at the top of the screen that controls whether the shadow tapes for all storage pools, or just a selected one, are listed. The screen displays the following information:

Files—lists the number of files on the shadow tape.

Tape Label—displays the label (virtual barcode) of the shadow tape.

Originating Library—provides the name of the virtual library from which the shadow tape originated.

Raw Capacity—gives the specified capacity of the drive.

Data Written—specifies the amount of uncompressed data that the NearStore VTL has written to the tape.

Disk Used—provides the amount of disk being used by the tape.

Disk Compression—indicates whether disk compression is used on the tape.

Tape Smart Sizing—lists whether the tape uses tape smart sizing. If the tape does, the field displays the smart sizing algorithm used. If it does not, the field displays DISABLED.

Time Remaining (Days HH:MM)—lists the remaining retention time for the tape. A shadow tape can be deleted by the NearStore VTL if the space is needed for current backup operations, even if there is still time remaining in the retention period.

Understanding Event Codes

Event codes are logged to the event log and cover a wide range of VTL events. Event code items do not require any action on your part, although they might indicate trends that you want to follow up on. Action Codes, described in Chapter 6 “Responding to Action Codes,” page 113, do require action by you. In some cases, the same event produces both an event code and an action code.

Accessing the System Event Log

The system event log is available from both the *Administrator Overview* and the *Event Log* screens. The *Administrator Overview* screen displays only the most-recent events. It also provides a link to the *Event Log* screen. The *Event Log* screen displays the complete event log.

To access the Administrator Overview screen:

From the *Daily Tasks* menu, located on the left side of your screen, click the *Monitoring* task category.

The *Administrator Overview* screen appears. The most-recent event log information is available from the *Latest Event Log* portion of the screen.

Time—provides the time at which the event was logged.

Code—gives the code of the event.

Description—provides a brief description of the event.

You can click the *Complete Event Log* link to display the *Event Log* screen.

To access the Event Log screen:

1. From the *Daily Tasks* menu, located on the left side of your screen, click the *Monitoring* task category.
2. Click the *Event Log* tab, located in the upper portion of your screen.

The *Event Log* screen appears, and the complete event log for your NearStore VTL appliance is displayed.

Time—provides the time at which the event was logged.

Code—gives the code of the event.

Description—provides a brief description of the event.

Event Code Classes

Each event that is entered in the event log file is identified by an event code. Event codes are organized into classes, with the classes shown in the following table.

Code Range	Class
100-199	Events in this range are import or export-related.
200-349	Events in this range are device-related.
350-399	Events in this range are storage pool-related events.
400-499	Events in this range are medium changer-related.
500-599	Events in this range are configuration store-related.
600-699	Events in this range are login-related.
700-709	Events in this range are start, stop, or restart-related.
720-729	Events in this range are compression card-related.
710-719	Events in this range are system utilization-related.
790-799	Events in this range are system health-related.
800-899	Events in this range are configuration-related.
900-999	Events in this range are license-related.
1300-1399	Events in this range are system time-related.
1600-1699	Events in this range are back-end I/O error-related.
1700-1799	Events in this range are miscellaneous.
1800-1899	Events in this range are event system-related.
1900-1909	Events in this range are RAID group status-related.
2000-2009	Events in this range are platform-specific hardware configuration-related.
2100-2109	Events in this range are notification-related (for example, AutoSupport e-mail notification failure)
2200-2299	Events in this range are PCI configuration-related events.
2300-2399	Events in this range are virtual library-related events.
2400-2499	Events in this range are shadow tape-related events.

Code Range	Class
2500–2599	Events in this range are entry/exit port (EEP) related events.
2600–2699	Events in this range are disk or shelf hardware related events
2700–2799	Events in this range are disk firmware installation related events.
9000–9099	Events in this range are action resolution-related events.

Import/Export Event Codes

The following table provides each import/export event code, its corresponding message, and a description of the message.

Code	Message	Description
100	Import of volume <i>BARCODE</i> into library <i>LIBNAME</i> is complete.	The virtual tape <i>BARCODE</i> has been successfully imported into the virtual library <i>LIBNAME</i> .
100	Exporting volume <i>BARCODE</i> . Volume was not modified after import. No transfer of data is required.	The virtual tape <i>BARCODE</i> was requested to be exported. Export will take place, but as no data was modified since import, contents of volume do not need to be copied. This behavior can be changed by using the Virtual Tapes/Change Export Status command.
100	Failed to migrate <i>VOLUME</i> from <i>SRC</i> to <i>DEST</i> library.	The migration of the virtual tape <i>VOLUME</i> from the source <i>SRC</i> to the destination <i>DEST</i> virtual library failed.
100	Volume <i>BARCODE</i> is already in library <i>LIBNAME</i> . No action was taken.	No action was taken because the virtual tape <i>BARCODE</i> was already in the virtual library <i>LIBNAME</i> .
100	Exporting quick-load volume <i>BARCODE</i> . No transfer of data is required.	No action was taken because the special import instruction to quick load was selected when the physical tape was imported into NearStore VTL.
100	Exporting new empty volume <i>BARCODE</i> . No transfer of data is required.	No action was taken because the virtual tape being exported is new and has no data on it.
100	Exported read-only volume <i>BARCODE</i> . No transfer of data is required.	No action was taken because the virtual tape was created from a virtual tape that was imported as read only; the data has not changed.

Code	Message	Description
100	Export of volume <i>BARCODE</i> from library <i>LIBNAME</i> is complete.	The export of the virtual tape <i>BARCODE</i> from the virtual tape library <i>LIBNAME</i> is complete.
101	Export of volume <i>BARCODE</i> from library <i>LIBNAME</i> failed.	The export of the virtual tape <i>BARCODE</i> from the virtual library <i>LIBNAME</i> failed.
101	Export of volume <i>BARCODE</i> from library <i>LIBNAME</i> failed. Request was aborted.	The export of the virtual tape <i>BARCODE</i> from the virtual library <i>LIBNAME</i> failed because it was aborted.
101	Import of volume <i>BARCODE</i> into library <i>LIBNAME</i> failed.	The import of the virtual tape <i>BARCODE</i> into the virtual library <i>LIBNAME</i> failed.
101	Import of volume <i>BARCODE</i> into library <i>LIBNAME</i> failed. Request was aborted.	The import of the virtual tape <i>BARCODE</i> into the virtual library <i>LIBNAME</i> failed because it was aborted.
102	Aborting the export of volume <i>BARCODE</i> .	The export of the virtual tape <i>BARCODE</i> is being aborted.
102	Aborting the import of volume <i>BARCODE</i> .	The import of the virtual tape <i>BARCODE</i> is being aborted.
102	Aborting the clone of volume <i>BARCODE</i> .	The cloning of the virtual tape <i>BARCODE</i> is being aborted.
102	Aborted the export of volume <i>BARCODE</i> .	The export of the virtual tape <i>BARCODE</i> has been aborted.
102	Aborted the import of volume <i>BARCODE</i> .	The import of the virtual tape <i>BARCODE</i> has been aborted.
103	The request to export volume <i>BARCODE</i> from <i>LIBNAME</i> was added.	An export request for the virtual tape <i>BARCODE</i> from the virtual library <i>LIBNAME</i> has been created.
103	The request to import volume <i>BARCODE</i> into library <i>LIBNAME</i> was added by <i>USERNAME</i> .	The user <i>USERNAME</i> has requested the import of the physical tape <i>BARCODE</i> into the virtual library <i>LIBNAME</i> .
104	Import of volume <i>BARCODE</i> into library <i>LIBNAME</i> added to pick list.	The import of the physical tape <i>BARCODE</i> into the virtual library <i>LIBNAME</i> has been initiated. If the option to use pick lists has been enabled from Configuration Tasks > Advanced, the volume is added to the pick list.

Code	Message	Description
104	Export of volume <i>BARCODE</i> from library <i>LIBNAME</i> added to pick list.	The export of the virtual tape <i>BARCODE</i> from the virtual library <i>LIBNAME</i> has been initiated. If the option to use pick lists has been enabled from Configuration Tasks > Advanced, the volume is added to the pick list.
105	Export of volume <i>BARCODE</i> from library <i>LIBNAME</i> is waiting for an available tape drive.	The export of the virtual tape <i>BARCODE</i> from the virtual library <i>LIBNAME</i> was initiated. The export is pending until there is an available physical tape drive.
105	Import of volume <i>BARCODE</i> into library <i>LIBNAME</i> is waiting for an available tape drive.	The import of the virtual tape <i>BARCODE</i> into the virtual library <i>LIBNAME</i> was initiated. The import is pending until there is an available physical tape drive.
106	Recommend loading physical tape <i>BARCODE</i> into tape drive <i>DEVNAME</i> .	The physical tape <i>BARCODE</i> should be mounted into the physical tape drive <i>DEVNAME</i> .
107	Physical tape <i>BARCODE</i> has been loaded into tape drive <i>DEVNAME</i> .	The physical tape <i>BARCODE</i> has been successfully loaded into the physical tape drive <i>DEVNAME</i> .
108	Physical tape <i>BARCODE</i> is being mounted into tape drive <i>DEVNAME</i> .	The physical tape <i>BARCODE</i> is in the process of being mounted into the physical tape drive <i>DEVNAME</i> .
109	Mount of <i>BARCODE</i> into tape drive <i>DEVNAME</i> failed.	The mount of the physical tape <i>BARCODE</i> into the physical tape drive <i>DEVNAME</i> failed.
110	Import of volume <i>BARCODE</i> into library <i>LIBNAME</i> is in progress.	The import of the virtual tape <i>BARCODE</i> into the virtual library <i>LIBNAME</i> is in progress.
110	Export of volume <i>BARCODE</i> from library <i>LIBNAME</i> is in progress.	The export of the virtual tape <i>BARCODE</i> from the virtual library <i>LIBNAME</i> is in progress.
112	Read encountered EOD because of quick-load.	A read has caused end of data to be reached on a tape imported with the quick-load feature. This can occur because quick load copies only the beginning of tape to disk. If this occurs, volume should be reimported without using quick load.

Code	Message	Description
112	Attempt to space to EOD on quick-load tape.	A space command has caused end of data to be reached on a tape imported with the quick-load feature. This can occur because quick load copies only the beginning of tape to disk. If this occurs, volume should be reimported without using quick load.
113	Physical volume <i>BARCODE</i> not found	The physical volume <i>BARCODE</i> was not found.

Device Event Codes

The following table provides each device event code, its corresponding message, and a description of the message.

Code	Message	Description
200	Changer <i>DEVNAME</i> not found after the system restarted.	The changer device <i>DEVNAME</i> which was previously part of the configuration can not be found after the system has been restarted.
200	Disk <i>DEVNAME</i> not found after the system restarted.	The disk device <i>DEVNAME</i> which was previously part of the configuration can not be found after the system has been restarted.
200	Tape drive <i>DEVNAME</i> not found after the system restarted.	The tape drive device <i>DEVNAME</i> which was previously part of the configuration can not be found after the system has been restarted.
202	Disk <i>DEVNAME</i> has a label from another system.	A disk <i>DEVNAME</i> has a valid NearStore VTL label from another system.
202	Disk <i>DEVNAME</i> has a label for this system, but none was expected.	The disk <i>DEVNAME</i> has a valid label for this system, but the disk was not expected to be there.
203	Changer <i>DEVNAME</i> is available for use.	The changer device <i>DEVNAME</i> is now ready and available for use.
203	Disk <i>DEVNAME</i> is available for use.	The disk device <i>DEVNAME</i> is now ready and available for use.
203	Tape drive <i>DEVNAME</i> is available for use.	The tape drive device <i>DEVNAME</i> is now ready and available for use.

Code	Message	Description
204	Missing tape drive <i>DEVNAME</i> was dropped from the system.	There was a tape device <i>DEVNAME</i> , which was previously part of the system configuration. The device is now missing and is therefore being dropped from the configuration.
205	Changer <i>DEVNAME</i> has reappeared.	A changer device <i>DEVNAME</i> , which was previously missing, has now appeared on the system.
205	Tape drive <i>DEVNAME</i> has reappeared.	A tape drive device <i>DEVNAME</i> , which was previously, missing has now appeared on the system.
207	Access to device <i>DEVNAME</i> is switched to path <i>PATHINFO</i>	The access to the device <i>DEVNAME</i> is switched to the path <i>PATHINFO</i> .
208	Disk <i>DEVNAME</i> has a different capacity than expected, marked as missing.	The disk device <i>DEVNAME</i> has reported a capacity smaller than previously reported. The disk is being marked as missing and will not be used.
209	Changer <i>DEVNAME</i> is not ready	An operation requiring a tape changer started, but the changer named <i>DEVNAME</i> is not ready.
210	Import or export waiting, but there are no physical tape devices enabled	An import or export operation started, but there are no physical tape devices enabled, and so the operation cannot proceed.
300	The device <i>DEVNAME</i> is in error.	An error was detected on device <i>DEVNAME</i> .
350	Disk usage is nearing capacity	Available disk space for use by virtual tapes is low.
352	Disk usage is at its capacity	There is no available disk space for additional virtual tape usage.

Media Changer Event Codes

The following table provides each media changer event code, its corresponding message, and a description of the message.

Code	Message	Description
400	Library <i>LIBNAME</i> : Volume <i>VOLUME</i> loaded into drive <i>DRIVENAME</i> .	The virtual tape <i>VOLUME</i> has been loaded into the virtual tape drive <i>DRIVENAME</i> in the virtual library <i>LIBNAME</i> .

Code	Message	Description
401	Library <i>LIBNAME</i> : Volume <i>VOLUME</i> unloaded from drive <i>DRIVENAME</i> .	The virtual tape <i>VOLUME</i> has been unloaded from the virtual tape drive <i>DRIVENAME</i> in the virtual library <i>LIBNAME</i> .
404	Library ' <i>LIBNAME</i> ' : Volume ' <i>VOLUME</i> ' Deleted	The virtual tape, or volume, named <i>VOLUME</i> in library <i>LIBNAME</i> was deleted.

Configuration Store Event Codes

The following table provides each configuration store event code, its corresponding message, and a description of the message.

Code	Message	Description
501	Configuration storage area is nearing capacity	The configuration area (flash) is nearing redundant capacity. The configuration area is a circular buffer containing multiple copies of configuration data. At this level there is space for the current and at least one previous copy of configuration data. Configuration data is stored in RAM as well as one or more copies in flash for persistency. In general, as long as there is at least one copy on flash, the system is fully protected after a reset. Current design has enough space for anticipated configurations. To reduce space in configuration area: delete empty volumes and libraries, export unneeded volumes to physical media, complete any outstanding requests or actions, and delete any unused customers.
502	Configuration storage area is full!	The configuration area (flash) is full. At this level there is enough space only for the current copy of the configuration data. You are fully protected unless there is a problem during consolidation processing (unlikely). See 501.

Code	Message	Description
503	Configuration storage area is dangerously close to capacity	The configuration area (flash) is nearing redundant capacity. At this level there is enough space for the current and possibly one previous copy of configuration data. You are still fully protected unless the current copy goes bad (very unlikely). See 501.
504	Configuration storage area has exceeded its capacity	The configuration area (flash) is full and data will be lost if the system is shut down. There is still a copy of configuration data in RAM; therefore there may still be time to rectify this situation. See 501.
505	Configuration storage area encountered an I/O error.	The configuration storage area has encountered an I/O error.

Login Event Codes

The following table provides each login event code, its corresponding message, and a description of the message.

Code	Message	Description
600	User <i>NAME</i> logged in to system.	The user <i>NAME</i> has logged in to the system.
601	User <i>NAME</i> logged out from the system.	The user <i>NAME</i> has logged out of the system.
602	User <i>NAME</i> failed to login to system.	The user <i>NAME</i> made a failed attempt to log in to the system.

Start, Stop, and Restart Event Codes

The following table provides each start, stop, or restart event code, its corresponding message, and a description of the message.

Code	Message	Description
700	Appliance starting.	Appliance is ready for use.
701	Appliance shutdown.	Appliance has been shut down.
702	Appliance reboot	Appliance has been rebooted.
703	Appliance restart	Appliance has been restarted.

System Utilization Event Codes

The following table provides each system utilization event code, its corresponding message, and a description of the message.

Code	Message	Description
710	Appliance's memory usage is normal at <i>USAGE</i> .	The system's memory is normal for the usage <i>USAGE</i> .
711	Appliance's memory usage is high at <i>USAGE</i> .	The system's memory is high for the usage <i>USAGE</i> .

Compression Card Event Codes

The following table provides each compression card event code, its corresponding message, and a description of the message.

Code	Message	Description
720	<i>NUM</i> compression cards are present on the system.	There are <i>NUM</i> compression cards installed in the appliance
721	No compression card has been detected after system rebooted.	The system is capable of supporting a hardware compression card, but no card is installed.
722	The number of the compression cards has been reduced from <i>PRENUM</i> to <i>NUM</i> after system rebooted.	Before the last reboot, the system had <i>PRENUM</i> number of compression cards installed. After the reboot only <i>NUM</i> cards, where <i>NUM</i> is less than <i>PRENUM</i> , were found.
723	The compression card is not up for a full performance.	The compression card is not optimally configured. Reboot the system. The reboot should automatically correct the problem .

Health Monitoring Event Codes

The following table provides each health monitoring event code, its corresponding message, and a description of the message.

Code	Message	Description
790	All the sensors are working normally.	All system sensors are functional.

Code	Message	Description
790	<i>NAME</i> is available and is working normally.	The device <i>NAME</i> is functional.
790	<i>NAME</i> is within normal range.	The device <i>NAME</i> is within normal range.
791	<i>UNIT</i> is below normal range: <i>VALUE UNITS</i>	<i>UNIT</i> is below normal values. <i>VALUE</i> is expressed in {C, mV, RPM}
791	<i>NAME</i> has failed.	The device <i>NAME</i> has failed.
792	<i>UNIT</i> is above normal range: <i>VALUE</i>	<i>UNIT</i> as above, <i>VALUE</i> is expressed in {C, mV, RPM}
793	Current reading for <i>UNIT</i> is unavailable.	<i>UNIT</i> is one of {CPU1, FAN1, FAN2, FAN3, FAN4, System, Vcore1, 3p3V, 5V, 12V}
793	Failed to find the LED controller.	The LED controller cannot be found.
793	Failed to open the device <i>NAME</i> for LED control.	The device <i>NAME</i> could not open the device for LED control.
793	Current reading for <i>NAME</i> is unavailable.	The NearStore VTL cannot get a current reading for the device <i>NAME</i> .
794	RAID, serial number <i>RAIDSN</i> , does not respond.	<i>RAIDSN</i> is the eight-character hexadecimal value for the RAID's serial number.
795	RAID, serial number <i>RAIDSN</i> , has a loose connection.	The RAID with the serial number <i>RAIDSN</i> has reported that it has a loose connection.
795	RAID, serial number <i>RAIDSN</i> , reports that <i>RAIDCOMPONENT</i> needs attention.	The RAID with the serial number <i>RAIDSN</i> has reported that the RAID component <i>RAIDCOMPONENT</i> needs attention.
795	RAID, serial number <i>RAIDSN</i> , reports a status of <i>RAIDSTATUS</i> .	The RAID with the serial number <i>RAIDSN</i> has reported a status of <i>RAIDSTATUS</i> .
798	RAID, serial number <i>RAIDSN</i> is ok.	The RAID with the serial number <i>RAIDSN</i> is functional.

Configuration Event Codes

The following table provides each configuration-related event code, its corresponding message, and a description of the message.

Code	Message	Description
800	Configuration initialized.	Brand new system with nothing configured.

License-Related Event Codes

The following table provides each license-related event code, its corresponding message, and a description of the message.

Code	Message	Description
900	The MAC address has been changed. The system is set to be read-only.	The MAC address of the Ethernet has been changed. Since the license of the system is tied to the MAC address, the system has been placed into read-only mode. A new license needs to be installed.
901	No valid license is available. The system is set to be read-only.	Because the license of the system is not valid, the system has been placed into read-only mode. A new license needs to be installed.
902	License doesn't support the current version of the product. The system is set to be read-only.	The license of the system is not valid for this version of the NearStore VTL firmware. The system has been placed into read-only mode. A new license needs to be installed.
903	The capacity reaches the maximum capacity allowed for this system.	The capacity of disk that has been added into the system has now reached the maximum capacity of the installed license. A new license needs to be installed.
904	The evaluation license is expired. Please install the valid license.	The system has a limited-time evaluation license installed, and the time period has expired. A new license needs to be installed.
906	License enabled for feature: <i>FEATURE</i>	The license for the feature <i>FEATURE</i> was just enabled.
907	License disabled for feature: <i>FEATURE</i>	The license for the feature <i>FEATURE</i> was just disabled.
908	The evaluation license will be expired in <i>NUM</i> days.	There is an evaluation license installed on the system. The license will expire in the number of days <i>NUM</i> . A new license needs to be installed.

System Time Event Codes

The following table provides each system time event code, its corresponding message, and a description of the message.

Code	Message	Description
1300	NOTICE: System time adjusted <i>DIRECTION</i> by <i>DIFF</i> seconds (<i>elapsed</i>)	The system time was adjusted forwards or backwards <i>DIRECTION</i> by <i>DIFF</i> number of seconds.
1301	Connected to NTP server: <i>SERVER_ADDR</i>	The system is connected to the NTP server <i>SERVER_ADDR</i> .
1302	WARNING: could not connect to the NTP server <i>SERVER_ADDR</i>	The NearStore VTL appliance could not connect to the specified NTP server.
1303	WARNING: lost synchronization with NTP server.	The NearStore VTL appliance is not synchronized with the NTP server.
1304	WARNING: unable to setup NTP synchronization event.	The NearStore VTL appliance was unable to synchronize with the NTP server.

Back-end I/O Error Event Codes

The following table provides each back-end I/O Error event code, its corresponding message, and a description of the message.

Code	Message	Description
1600	<i>OP</i> failed on <i>NAME</i> : <i>REASON</i>	The operation <i>OP</i> failed on the back-end device <i>NAME</i> . The reason for the failure is <i>REASON</i> .
1601	<i>OP</i> failed on <i>NAME</i> : <i>REASON</i> (repeated for <i>count</i> times.)	The operation <i>OP</i> failed on the back-end device <i>NAME</i> . The reason for the failure is <i>REASON</i> . The failure was repeated <i>count</i> times.
1601	<i>LAST</i> has repeated <i>NUM</i> times.	The last <i>LAST</i> operation has repeated number <i>NUM</i> of times.
1801	Previous event log corrupted. Re-initializing event log.	The previous event log has been corrupted. The NearStore VTL is reinitializing the event log.

Miscellaneous Event Codes

The following table provides each miscellaneous event code, its corresponding message, and a description of the message.

Code	Message	Description
1700	Firmware <i>VERSION</i> (<i>BUILDNUMBER</i>) is installed.	Specifies that the firmware version <i>VERSION</i> (<i>BUILDNUMBER</i>) has been installed on your system.
1701	Previous Event Log corrupted: Re-Initializing event log.	The event log was corrupted, so the NearStore VTL is reinitializing the event log.

Import Status Event Code

The following table provides the event system event code, its corresponding message, and a description of the message.

Code	Message	Description
1800	<i>OBJ_TYPE</i> - <i>OBJ_NAME</i> – <i>IMPORT_STATUS</i>	Gives the status of the disk/virtual tape <i>OBJ_TYPE</i> <i>OBJ_NAME</i> that the NearStore VTL is importing.

RAID Group Status Event Codes

The following table provides each RAID group status event code, its corresponding message, and a description of the event.

Code	Message	Description
1900	<i>DEVNAME</i> is missing.	The RAID group <i>DEVNAME</i> is configured, but cannot be accessed. You see this if all of the underlying physical disks are inaccessible, for example if the physical disks are not powered up or are not connected.
1901	<i>DEVNAME</i> is degraded.	The RAID group <i>DEVNAME</i> is degraded. This might be due to an underlying physical disk being not powered up or disconnected.
1902	<i>DEVNAME</i> is switched to offline.	The RAID group <i>DEVNAME</i> is offline if more than one of the underlying physical disks are not powered up or are disconnected.

1903	<i>DEVNAME</i> repair task started	A repair task has started for the RAID group <i>DEVNAME</i> .
1904	<i>DEVNAME</i> repair task completed.	The repair task on the RAID group <i>DEVNAME</i> is done.
1905	<i>DEVNAME</i> repair task stopped	The repair task on the RAID group <i>DEVNAME</i> is stopped.
1906	<i>DEVNAME</i> repair task completed with errors.	The repair task on the RAID group <i>DEVNAME</i> completed, but with errors.
1913	DISK at Port= <i>PORT</i> Shelf= <i>SHF</i> Bay=[<i>BAY</i>] SerialNo= <i>SERIAL</i> added to the spare disk pool	The disk on port <i>PORT</i> , shelf <i>SHELF</i> and drive bay <i>BAY</i> , with serial number <i>SerialNo</i> was added to the spare disk pool.
1914	DISK at Port= <i>PORT</i> Shelf= <i>SHF</i> Bay=[<i>BAY</i>] SerialNo= <i>SERIAL</i> taken out of the spare disk pool	The disk on port <i>PORT</i> , shelf <i>SHELF</i> and drive bay <i>BAY</i> , with serial number <i>SerialNo</i> was removed from the spare disk pool and used to replace a missing disk in a RAID group.
1915	DISK at Port= <i>PORT</i> Shelf= <i>SHF</i> Bay=[<i>BAY</i>] SerialNo= <i>SERIAL</i> dropped from the spare disk pool	The disk on port <i>PORT</i> , shelf <i>SHELF</i> and drive bay <i>BAY</i> , with serial number <i>SerialNo</i> was dropped from the spare disk pool.
1920	<i>DEVNAME</i> running in normal mode	Device is now running in normal mode. This could occur because it is newly created, or just repaired.
1921	<i>DEVNAME</i> created	Device was just created.
1922	Failed to create RAID group	The NearStore VTL attempted to create a RAID group, but did not succeed.
1923	RAID group <i>DEVNAME</i> dropped	A RAID group was removed.
1924	Error occurred while dropping RAID group <i>DEVNAME</i>	The NearStore VTL tried to remove a RAID group, but failed.
1925	<i>DEVNAME</i> is degraded. Auto repair is disabled	A device is degraded. By default auto repair would be started, but auto repair is disabled.
1926	DISK at Port= <i>PORT</i> Shelf= <i>SHF</i> Bay=[<i>BAY</i>] SerialNo= <i>SERIAL</i> added to maintenance disk pool	A disk has been moved to the maintenance pool.
1927	Hot spare disk pool needs disks of <i>DISK_CAPACITIES</i> sizes	The pool of disks kept in reserve as hot spares needs to be increased, but no disks of the right capacity are available.
1928	All disks are missing in the hot spare pool. Need disks of <i>DISK_CAPACITIES</i> sizes	There are no disks in the hot spare pool. Disks with capacity <i>DISK_CAPACITIES</i> should be added.

Platform-Specific Configuration Event Codes

The following table provides each platform-specific configuration event code, the associated message and additional information.

Code	Message	Description
2000	Unexpected NVRAM configuration. Please remove the NVRAM card. It is not required for VTL.	Either an unneeded or unsupported NVRAM card is installed. Remove the card.
2001	Unexpected NVRAM card location. The NVRAM card must be located on slot PCI1.	The NVRAM card must be installed in PCI bus slot 1, but there is an NVRAM card installed in another PCI slot. Move the card to slot 1.
2002	Unexpected Fibre Channel card location. The first Fibre Channel card must be in slot PCI4.	Fibre Channel cards must be installed starting in PCI bus slot 4, with additional cards installed in slot 5, and so on. The system found a Fibre Channel card in an incorrect slot. Move the card to slot 4 or to the first available slot.

Notification-Related Event Codes

The following table provides each notification-related event code, the associated message and additional information.

Code	Message	Description
2100	Failed to send the AutoSupport e-mail.	The system was unable to send an AutoSupport e-mail.
2101	Failed to send the e-mail Notification	The system was unable to send an event notification e-mail.

PCI Configuration Event Codes

The following table provides each platform-specific configuration event code, the associated message and additional information.

Code	Message	Description
2200	A PCI card is inserted in the wrong slot	Not all functions are supported on all PCI slots. You must match the functionality of a PCI card to the functions supported on a slot. In this case, a PCI card was inserted into a slot that does not support the cards functionality. Move the card to the correct slot.

Virtual Library-Related Event Codes

The following table provides each platform-specific configuration event code, the associated message and additional information.

Code	Message	Description
2300	Virtual Library <i>LIB</i> created	The virtual library <i>LIB</i> was created.
2301	Virtual Library <i>LIB</i> deleted	The virtual library <i>LIB</i> was deleted.
2302	Virtual Library <i>LIB</i> expanded; Slot count = <i>SLOTS</i> , Drive count = <i>DRIVES</i>	<i>DRIVE</i> drives were added to an existing virtual library. The drives are in slots <i>SLOTS</i> .
2303	Virtual Library <i>LIB</i> updated; Only first addresses changed	The virtual library <i>LIB</i> was updated; The only affect was to change the first address.

Shadow Tape Pool-Related Event Codes

The following table provides each platform-specific configuration event code, the associated message and additional information.

Code	Message	Description
2400	Removed Tape <i>BARCODE</i> from the Shadow Tape Pool	A tape with barcode <i>BARCODE</i> was moved from the shadow tape pool back to its library.
2401	Tape <i>BARCODE</i> added to the Shadow Tape Pool	A tape with barcode <i>BARCODE</i> was added to the shadow tape pool.
2402	Deleted Tape <i>BARCODE</i> from the Shadow Tape Pool	A tape with barcode <i>BARCODE</i> was deleted from the shadow tape pool.

Entry/Exit Port (EEP)-Related Event Codes

The following table provides each platform-specific configuration event code, the associated message and additional information.

Code	Message	Description
2500	Physical tape <i>BARCODE</i> is moved from EEP into <i>PLIB</i>	The physical tape <i>BARCODE</i> was moved from the entry/exit port to the physical library <i>PLIB</i> .

ACSLs—Related Event Codes

The following table provides each ACSLS—related event code, its corresponding message, and a description of the message.

Code	Message	Description
2550	The VTL ACSLS component failed - Retrying in <i>N</i> seconds	The VTL/ACSLs server connection failed and VTL will retry in <i>N</i> seconds.
2551	The VTL ACSLS component failed - All retries exhausted	The VTL/ACSLs server connection failed. The VTL will not retry.
2552	Communication with ACSLS server OK	The VTL/ACSLs server connection is OK.
2553	The communication with ACSLS server timed out	The ACSLS server is down.
2554	ACSLs server state changed from <i>STATE</i> to <i>NEWSTATE</i>	The ACSLS server state changed.
2555	ACSLs server denied permission to run this command: <i>CMD TYPE PARAM1 PARAM2</i>	VTL sent the specified command to the ACSLS server, but the ACSLS server denied access for those commands.
2556	ACSLs server denied access to this volume: <i>VOLUME</i>	VTL was denied access to the specified volume.
2557	ACS <i>ACSID</i> is full	There was a request for the VTL to unmount a tape, but all the slots are full in the ACS library and so the tape cannot be unmounted. The ID for the tape is listed.
2558	Volume <i>VOL</i> has an unreadable label	The label on the specified physical tape cartridge is unreadable
2559	Eject failed - CAP <i>CAP</i> in use	VTL could not eject a physical tape cartridge to the specified CAP, because the CAP is in use.

Code	Message	Description
2560	Eject failed for volume <i>VOL</i> : <i>STATUS</i>	The listed physical tape cartridge could not be ejected for the specified reason.
2561	ACSLS server rejected this command: <i>CMD TYPE</i> <i>PARAM1 PARAM2</i>	The listed command was rejected by ACSLS server.
2562	Volume <i>BARCODE</i> is mounted in an unknown drive	The ACSLS reports this volume as being mounted in a drive; however VTL could not determine which drive it is in.
2563	Volume <i>BARCODE</i> is mounted in <i>DRIVE</i> . This drive is offline or is not configured for use by VTL	A volume VTL is trying to access is loaded in a drive that is either offline or is not connected to the VTL.
2564	ACS with acs id = <i>ACSID</i> is available for use	An ACS library is now available to be added to the VTL.
2565	ACS with acs id = <i>ACSID</i> is missing	An ACS library that had been added to the VTL, is now missing.
2566	ACS with acs id = <i>ACSID</i> is added	VTL is currently using this ACS library, or this ACS library has just been added to the VTL.

Disk or Shelf-Related Event Codes

The following table provides each platform-specific configuration event code, the associated message and additional information.

Code	Message	Description
2600	Firmware upgrade started for Enclosure at Shelf= <i>ShelfNumber</i> , SerialNo= <i>Serial number</i>	A disk-shelf controller firmware upgrade started for a controller in shelf <i>Shelf Number</i> , with serial number <i>Serial Number</i> .
2601	Firmware upgrade failed for Enclosure at Shelf= <i>ShelfNumber</i> , SerialNo= <i>Serial number</i>	A disk-shelf controller firmware upgrade failed for a controller in shelf <i>Shelf Number</i> , with serial number <i>Serial Number</i> .
2602	Firmware upgrade completed for Enclosure at Shelf= <i>ShelfNumber</i> , SerialNo= <i>Serial number</i>	A disk-shelf controller firmware upgrade completed for a controller in shelf <i>Shelf Number</i> , with serial number <i>Serial Number</i> .

Disk Firmware-Related Event Codes

The following table provides each disk firmware installation-related event code, the associated message and additional information.

Code	Message	Description
2700	disk firmware start	Disk firmware upgrade installation started.
2701	disk firmware failed	The installation of a disk firmware upgrade failed.
2702	disk firmware complete	A disk firmware upgrade succeeded.

Action Resolution-Related Event Codes

The following table provides each platform-specific configuration event code, the associated message and additional information.

Code	Message	Description
9002	<i>ACTIONS</i> . Action <i>CODE</i> removed	The action <i>ACTIONS</i> was resolved. This removes action code <i>CODE</i> .

Responding to Action Codes

An action is generated when there is a change in the state of the NearStore VTL appliance that requires user intervention. These actions are displayed on both the Administrator Overview and the Actions Required screens.

As an example, when your system is initially powered on, an action to set the time of your system is generated. This action requires you to set the time and date of your system to that of the local host.

When a required action is generated, the Action Required icon appears in the upper portion of the NearStore VTL GUI. This icon blinks until the action is either acknowledged or resolved. If the action is acknowledged, the icon stops blinking but is still displayed. If the action is resolved, the icon is no longer displayed, unless there are other unresolved actions.



Clicking the Action Required icon brings you to the Actions Required screen.

Accessing Required Action Listings

A listing of required actions is available from both the Administrator Overview and the Actions Required screens. The Administrator Overview screen displays only the most recent required actions. The Actions Required screen displays a complete listing of actions that are required.

To access the Administrator Overview Screen:

1. From the *Daily Tasks* menu, located on the left side of your screen, click the *Monitoring* task category.

The Administrator Overview screen appears. The most-recent required action information is available from the Actions Required portion of the screen.

Action—provides a link, that when selected, displays the screen for the task you use to resolve the action.

Priority—lists the priority of the action that is required. Valid priorities are low, medium, and high.

Code—provides the code of the required action.

Description—gives a brief description of the issue that is causing the required action.

Age—displays the amount of time that has elapsed since the occurrence of the event that triggered the required action.

Acknowledge—provides the option to acknowledge the action. Acknowledging an action does not resolve it. Acknowledging an action stops the Action Required icon from blinking.

To access the Actions Required screen:

1. From the *Daily Tasks* menu, located on the left side of your screen, click the *Monitoring* task category.
2. Click the *Actions Required* tab, located in the upper portion of your screen.

The Actions Required screen appears, and the complete list of the actions that are required for your NearStore VTL appliance is displayed.

Action—provides a link, that when selected, displays the screen for the task you use to resolve the action.

Priority—lists the priority of the action that is required. Valid priorities are low, medium, and high.

Code—provides the code of the required action.

Description—gives a brief description of the issue that is causing the required action.

Age—displays the amount of time that has elapsed since the occurrence of the event that triggered the required action.

Acknowledge—provides the option to acknowledge the action. Acknowledging an action does not resolve it. Acknowledging an action stops the action required icon from blinking.

Action Codes

The actions generated by the NearStore VTL are displayed along with a message. Although informative, these messages tend to be terse. When required actions are listed in the interface, they are identified as low, medium, or high priority. They are also organized into classes that identify which part of the system has an issue.

The first digit of the action code represents the status of the action. They correspond to the GOOD (1), WARNING (2), and ERROR (3) lights on the STATUS INDICATOR in the upper portion on the interface.



GOOD—when the action code starts with the digit 1, your system is still fully functional. In this case, it is not necessary for you to resolve the action immediately. For example: action 1101 recommends that you load a physical tape into a physical tape drive.

WARNING—if the action code starts with the digit 2, either a specific operation has failed, some component of your system is not operational, or your attached disks are running out of space. For example, action 2300 warns that the disks attached to your system are nearing their capacity. This action should be resolved in the near future.

ERROR—when the action code starts with the digit 3, your system no longer functions properly. You must resolve the action immediately. For example: action 3501 specifies that your configuration storage area (vstore) is full. This means that no configuration information can be saved until this action is resolved.

Informational or Low-Priority Action Codes

The following table describes the informational or low-priority action codes. An action code in this range might be generated when an operation is blocked, but the system is still fully functional. These codes are in the range 1000–1999.

Code	Message	Description
1000	Trap meant for testing SNMP configuration.	The trap was meant for testing the SNMP configuration of the system.
1000	Test mail meant for verifying E-Mail configuration.	The e-mail was meant for testing the E-mail notification feature of the system.
1001	Manually triggered AutoSupport EMAIL	The AutoSupport e-mail was triggered by a user.
1002	Weekly AutoSupport EMAIL	The AutoSupport e-mail is the automatically generated, weekly e-mail.
1003	The evaluation license will be expired in <i>NUM</i> days.	The evaluation license installed on the system expires in <i>NUM</i> days.
1100	Export of volume <i>BARCODE</i> from library <i>LIBNAME</i> added to pick list.	The virtual tape <i>BARCODE</i> associated with the library <i>LIBNAME</i> has been added to the pick list. The associated physical tape needs to be mounted before the export can continue.
1100	Import of volume <i>BARCODE</i> into library <i>LIBNAME</i> added to pick list.	The physical tape <i>BARCODE</i> associated with the library <i>LIBNAME</i> has been added to the pick list. This physical tape needs to be mounted before the import can continue.

Code	Message	Description
1101	Recommend loading physical tape <i>BARCODE</i> into tape drive <i>DEVNAME</i> .	The physical tape <i>BARCODE</i> needs to be loaded into the physical tape drive <i>DEVNAME</i> .
1200	Import or export waiting, but there are no physical tape devices enabled.	The import or export cannot be completed because there are no physical tape devices enabled for your NearStore VTL appliance. Ensure that any connected tape devices have been added to your system configuration and that they have been enabled.
1300	Disk usage is nearing capacity	The RAID group is nearing its capacity.
1400	Maintenance disk pool is not empty	A disk has been moved into the maintenance pool.
1450	There are <i>NUMBER</i> EEP pending requests	There are a total of <i>NUMBER</i> pending requests waiting to be sent to the physical library entry/exit port.
1460	Shelf firmware needs upgrade. New firmware is available for upgrade	During the installation of a NearStore VTL software release, the appliance determined that a newer version of disk shelf firmware than is currently installed in the disk shelf controllers is available, and included with the release. You can install the new firmware by resolving the action. The installation takes approximately 10 minutes for each shelf. I/O is stopped during installation, but is automatically restarted when the installation completes. When the installation starts on a controller, the appliance issues event code 2600. Event code 2601 indicates the installation failed. Event code 2602 indicates installation is complete. See the description for each event code for more information.

Code	Message	Description
1461	Shelf firmware needs upgrade. New firmware needs to be downloaded for upgrade	During the installation of a NearStore VTL software release, the appliance determined that a newer version of disk shelf firmware is currently installed on at least one of the disk shelf controllers, and that this version is newer than the version included with the software release. You should check if there is newer firmware available, and if there is, whether to install it. To install the new firmware do the following: 1. Download the new firmware 2. Resolve the action The installation takes approximately 10 minutes for each shelf. I/O is stopped during installation, but is automatically restarted when the installation completes. When the installation starts on a controller, the appliance issues event code 2600. Event code 2601 indicates the installation failed. Event code 2602 indicates installation is complete. See the description for each event code for more information.
1470	disk firmware auto upgrade	The appliance compared the current recommended disk firmware versions to the installed versions and found an upgrade is required.
1472	disk firmware upgrade failed	The installation of upgraded disk firmware failed.
1907	<i>DEVNAME</i> at Port= <i>PORT</i> SerialNo= <i>SERIAL</i> Shelf= <i>SHF</i> Bay= <i>BAY</i> added to maintenance disk pool	The specified disk has been moved to the maintenance pool. This happens after a degraded, manually failed, or failed disk has been successfully replaced. The replaced disk is moved to the maintenance pool for actions such as removing and returning to the factory.
1908	<i>DEVNAME</i> at Port= <i>PORT</i> SerialNo= <i>SERIAL</i> Shelf= <i>SHF</i> Bay= <i>BAY</i> selected to return to factory	The specified disk has been marked for removal and return to factory

Code	Message	Description
1909	<i>DEVNAME</i> at Port= <i>PORT</i> SerialNo= <i>SERIAL</i> Shelf= <i>SHF</i> Bay= <i>BAY</i> returned to factory	The specified disk that had been marked for return to the factory, has been removed.
1910	<i>DEVNAME</i> at Port= <i>PORT</i> SerialNo= <i>SERIAL</i> Shelf= <i>SHF</i> Bay= <i>BAY</i> selected to return to service	The specified disk has been selected to be moved out of the maintenance pool, and into the hot spares pool.
1911	<i>DEVNAME</i> at Port= <i>PORT</i> SerialNo= <i>SERIAL</i> Shelf= <i>SHF</i> Bay= <i>BAY</i> returned to service	The specified disk has been returned to service.

Warning Action Codes

The following table describes the medium priority action codes. An action code in this range might be generated when an operation fails, a component fails, or your attached disks are nearly full. These codes are in the range 2000–2999.

Code	Message	Description
2100	Import of volume <i>BARCODE</i> into library <i>LIBNAME</i> failed. Request was aborted.	The import of the physical tape <i>BARCODE</i> into the virtual library <i>LIBNAME</i> failed because the request was aborted.
2100	Import of volume <i>BARCODE</i> into library <i>LIBNAME</i> failed.	The import of the physical tape <i>BARCODE</i> into the virtual library <i>LIBNAME</i> failed.
2100	Mount of <i>BARCODE</i> into tape drive <i>DEVNAME</i> failed.	The mounting of the physical tape <i>BARCODE</i> into the physical tape drive <i>DEVNAME</i> failed.
2101	Mount of <i>BARCODE</i> into tape drive <i>DEVNAME</i> failed.	The mounting of the physical tape <i>BARCODE</i> into the physical tape drive <i>DEVNAME</i> failed.
2101	Export of volume <i>BARCODE</i> from library <i>LIBNAME</i> failed.	The export of the virtual tape <i>BARCODE</i> from the virtual library <i>LIBNAME</i> failed.
2101	Export of volume <i>BARCODE</i> from library <i>LIBNAME</i> failed. Request was aborted.	The export of the virtual tape <i>BARCODE</i> from the virtual library <i>LIBNAME</i> failed because the request was aborted.
2200	Tape drive <i>DEVNAME</i> not found after the system restarted.	The tape drive <i>DEVNAME</i> was not found after the system restarted. Check to ensure that the tape drive is both powered on and displayed on the Physical Tape Device List screen. If it is not displayed, you might have to add it to the system configuration.

Code	Message	Description
2201	Changer <i>DEVNAME</i> not found after the system restarted	The media changer <i>DEVNAME</i> was not found after the system restarted. You might have to add this physical tape library to the configuration of your system.
2202	Changer <i>DEVNAME</i> is not ready.	The media changer <i>DEVNAME</i> is not ready. Ensure that the device is online.
2500	Configuration storage area is nearing capacity.	The configuration storage area is nearing its capacity. If the configuration area gets dangerously close to capacity, some of your configuration information might not be saved.
2501	Configuration storage area is dangerously close to capacity.	The configuration storage area is close to capacity. In this state, some of your system configuration information might not be saved.
2502	Post install vstore, Need to import boot disk.	You need to the import the boot disk from your previous vstore.
2790	The hardware monitor has detected a value that is out of the normal range. Please examine the event log for details.	One of the values for your system is out of the normal range. See the system event log for more detailed information.
2791	The hardware monitor has detected a voltage which is out of the normal range. Please examine the event log for details.	The voltage of your system is out of the normal range. See the system event log for more detailed information.
2792	The hardware monitor has detected a temperature which is out of the normal range. Please examine the event log for details.	The temperature of your system is out of the normal range. See the system event log for more detailed information.
2793	The hardware monitor has detected a fan speed which is out of the normal range. Please examine the event log for details.	The speed of one of the fans in your system is out of the normal range. The system event log contains more detailed information concerning this problem.
2794	A disk array in use by this system needs attention.	There is a problem with one of the physical disks connected to your system.
2795	The hardware monitor has detected a power supply which is not functioning. Please examine the event log for details.	One of the power supplies for your system is not working. The system event log contains more detailed information concerning this problem.

Code	Message	Description
2798	The hardware monitor has detected an LED control that is not responding. Please examine the event log for details.	One of the LED controls in your system is not responding. The system event log contains more detailed information concerning this problem.
2920	Failed to send the AutoSupport e-mail.	The system attempted to send an AutoSupport e-mail, but the operation failed.
2921	Failed to send the e-mail notification.	The system attempted to send a notification e-mail, but the operation failed.
2950	Setup system date and time.	The system date and time need to be set to that of the local host.
2951	Hardware change detected; set up system time	The system detected a hardware change that requires you to reset the system time.
2952	Negative time change at startup; setup system time.	There was a negative time change when NearStore VTL was turned on. Set the system time.
2960	A PCI card is inserted in the wrong slot. Please examine the event log for details.	A PCI card has been detected and the card is either not in a slot supporting that card, or the card is not supported. Check the event log and take appropriate action.
2970	Hot spare disk pool is empty.	There are no disks in the hot spare pool. Add a disk to the pool.
2970	All disks are missing in the hot spare pool.	The disks assigned to the hot spare pool cannot be found. The disks might be off-line or have failed.
2971	<i>DEVNAME</i> is degraded. Auto repair is disabled.	The RAID group <i>DEVNAME</i> is running in degraded mode and autorepair is disabled.
2972	<i>DEVNAME</i> is degraded.	The RAID group <i>DEVNAME</i> is degraded. This might be due to an underlying physical disk being not powered up or disconnected.
2973	All disks are missing in the hot spare pool. Needs disks of <i>size</i> sizes.	There are no disks in the hot spare pool, but spares are needed. Add disks of size <i>size</i> .

Error Action Codes

The following table describes the high-priority action codes. An action code in this range might be generated when the system is no longer functioning properly. These codes are in the range 3000–3999.

Code	Message	Description
3200	Disk <i>DEVNAME</i> not found after the system restarted.	Your system could not find the attached physical disk <i>DEVNAME</i> after it restarted. Ensure that the disk is turned on.
3300	Storage device: <i>DEVNAME</i> is in error.	There is a problem with one of the storage devices <i>DEVNAME</i> attached to your system.
3301	Disk usage is at its capacity.	An attached RAID group is at its capacity.
3350	<i>DEVNAME</i> is missing.	The RAID group <i>DEVNAME</i> is configured, but cannot be accessed. You see this if all of the underlying physical disks are inaccessible, for example if the physical disks are not powered up or are not connected.
3351	<i>DEVNAME</i> is switched to offline.	The RAID group <i>DEVNAME</i> is offline if more than one of the underlying physical disks are not powered up or are disconnected.
3500	Configuration storage area has exceeded its capacity.	The configuration storage area has exceeded its capacity. When your system is in this state, no configuration information is saved. Existing configuration information is in danger of being lost.
3501	Configuration storage area is full.	The configuration storage area is full. When your system is in this state, no configuration information is saved.
3503	Configuration storage area encountered an I/O error.	When your NearStore VTL appliance is in this state, it has encountered an I/O error that might be caused by a loose cable connection to either the firmware disk or flash card. It might also have been caused by an unrecoverable hardware error.
3550	Appliance's memory usage is high at <i>USAGE</i> .	The amount of configuration memory. The value is <i>USAGE</i> .
3780	The VTL ACSLS component failed - All retries exhausted	This action is generated when the connection between the ACSLS sever and at the VTL appliance fails and the VTL reaches the maximum number of retries.
3791	No compression card has been detected after system rebooted.	After generating this action, the VTL appliance hardware compression card, but no card is installed.

Code	Message	Description
3792	The compression card is not up for a full performance.	The compression card is not optimally configured. Reboot the system. The reboot should automatically correct the problem .
3900	No valid license is available The system is set to be read-only.	Because the license currently installed on the NearStore VTL appliance is not valid, the system has been set to read only. Install a valid license to correct this condition.
3901	The evaluation license is expired. Please install the valid license	The evaluation license currently installed on the NearStore VTL appliance expired. Install a valid license to correct this condition.
3902	License doesn't support the current version of the product. The system is set to read only.	Because the license currently installed on the NearStore VTL appliance does not support the installed version of firmware, the system has been set to read only. Install a valid license to correct this condition.
3903	The MAC address has been changed. The system is to be set to read only.	The MAC address of the system has been changed, and the system has been set to read only. Update your license to reflect the new MAC address.

A

Setting the IP Address from the Command Line

Follow these steps to set the NearStore VTL IP address using the VTL CLI:

1. Connect to the VTL appliance.

Attach a monitor and keyboard directly to the system or connect a laptop or another computer via the serial port of the system, using a program such as HyperTerminal.

Use the following parameters to connect.

Parameter	Value
Speed	9600
Data	8
Parity	N
Stopbits	1

2. Enter the following command to show the current network configurations of the system:

network show

The VTL displays the following (the values displayed below are for illustrative purposes only).

Note

If there is no IP address set for the system, the values are blank, with the exception of the MAC address.

IP address	192.168.1.39
Netmask	255.255.255.0

Appendix A — Setting the IP Address from the Command Line

Gateway	192.168.1.1
MAC	00:11:25:19:32:6e

3. Enter the following command, using values that are appropriate for your network, to set the values for the network:

network set *ip_addr netmask gateway_addr*

For example:

network set 192.168.1.39 255.255.255.0 192.168.1.1

4. Enter the following command to ensure that the values are correct:

network show

The NetApp VTL displays the network values that you entered into the command line interface. The table shows the values for this example.

IP address	192.168.1.39
Netmask	255.255.255.0
Gateway	192.168.1.1
MAC	00:11:25:19:32:6e

B

Replacing a NearStore VTL Head

Use this procedure to rebuild the library configuration if it becomes necessary to replace the VTL head, including the compact flash. Some of the necessary data is kept on the physical disks, but before that data can be imported into the new system, you must reload or recreate some basic configuration data. You need to save this basic configuration data ahead of time. The information includes the names of all the virtual libraries, their types, and the order in which they were created in the original system. In addition to the VTL appliance configuration data, the WWPNs of the host facing ports change, so be prepared to revise the zoning configuration for your SAN.

Advanced preparation

There are two basic ways to save the basic configuration data: create a configuration file copy of the data by using the Save Configuration task (Configuration Tasks > Miscellaneous > Configuration Management, click Save Configuration, and follow the instructions to save a file), or by creating a printable copy of the data, which you can save as either a file or printout. Typically, the saved configuration file is both faster to create and easier to reload, but you might additionally want a printable copy for your records. A convenient way to keep the necessary details is by printing out the SCSI addresses of all libraries (Configuration Tasks > Virtual Libraries > SCSI Addresses) and the Virtual library list (Configuration Tasks > Virtual Libraries > Virtual Library List). The order of the LUNs reflects the order in which the libraries were created. The table shows the values for the example.

Virtual Library List

Library name	Capacity allocated	Capacity used	Library type	#Virtual tapes	#Slots	#Drives	Storage pool
red	35.00 GB	8.00 GB	NETAPP 7220	1	20	2	Default Storage Pool
blue	70.00 GB	11.29 GB	NETAPP 7220	2	20	2	Default Storage Pool

SCSI Addresses

Library	Device	Vendor ID	Product ID	LUN
red	Robot	EXABYTE	EXB-440	0
	Tape Device 0	QUANTUM	DLT7000	1
	Tape Device 1	QUANTUM	DLT7000	2
blue	Robot	EXABYTE	EXB-440	3
	Tape Device 0	QUANTUM	DLT7000	4
	Tape Device 1	QUANTUM	DLT7000	5

Rebuilding the configuration

Note

Although a similar procedure is used to move a configuration when upgrading systems, NetApp recommends that you contact NetApp technical support, rather than upgrade a system yourself.

To rebuild the VTL configuration, do the following:

1. Remove and replace the VTL head. Cable the new head to the same configuration as the old head. Make sure the new head has the same revision of firmware as the old head.
2. Connect and power on all disks.
3. From the serial console, bring up the server and set the IP address.
4. From the web browser, log in as admin.
5. If you have a saved configuration file, navigate to Configuration Management (Configuration Tasks > Miscellaneous > Configuration Management) and click Load Configuration. The screen updates; click Load user-saved configuration (from file); browse to the location of the saved configuration file; click Apply.

If you do not have a saved configuration file, but do have the saved configuration data, create all libraries with same names, types, and order as the original. Using the example, the correct order is to create red followed by blue. Both libraries are of type NETAPP 7220.

6. Go to Configuration Tasks >RAID groups. In the Import RAID groups screen, the disks show the notation “labeled by another system”.
7. Select Import RAID groups.
8. Select all the disks that belong to this system and click Apply. Scanning of these disks starts.
9. Select the link To view the list of importing physical disks, click here.

View the status of the scanning. This screen is not automatically updated. Use your browser refresh button to update the screen. Scanning can take quite a long time (even hours, depending on the total size of all the disks).

10. When the scanning is complete (and the screen has been refreshed), a new message is displayed:
The RAID groups have been imported to this system, click here to assign the virtual tapes to libraries
Click this link.
11. Assign the virtual tapes to the appropriate virtual libraries. The GUI displays the library name in which the disk was originally used.
12. Add disks back to the hot spares pool.
13. The WWPNs of the ports changed; reassign all host-facing ports to the correct libraries.
14. As necessary, adjust the SAN zoning.
15. After you have completed this step, the system is operational.

C

Recovering Data Guarantees

NearStore VTL appliances buffer both disk and compact flash writes for improved performance (as do tape devices). After data is on the NearStore VTL disks and compact flash, user data can be recovered in the event of failures such as reboot, power failure, disk failure, or compact flash failure. The differences in the nature of the information written to disk and compact flash results in two different types of data recovery guarantees: the ability to recover data after a reboot, including ones due to power failure, and recovery of data after the failure of the compact flash.

Recovering Data after a Reboot

The SCSI standard defines a number of SCSI commands that are required to flush the buffers to media before the device can return a successful status. NearStore VTL appliances comply with these requirements. The commands are: `WRITE_FILEMARKS`, `SPACE`, `LOCATE`, `LOAD/UNLOAD` and `REWIND`. After receiving one of these commands, all “tape-image” data received by the VTL appliance before the command, is available in the event of a power failure or reboot (but might not be recoverable after a compact flash failure. See “Recovering Data after a Compact Flash Failure,” page 129)

Until one of the SCSI commands trigger a flush, the data in the current file is *not guaranteed* to be available in the event of a power failure or reboot.

Recovering Data after a Compact Flash Failure

In the unlikely event of a Compact Flash failure, you might not be able to import any virtual tapes that are loaded into virtual drives at the time of the failure, into a new system or the original system with a replaced Compact Flash card.

Glossary

Because the NearStore VTL appliance operates in an environment that is specific to its function, some of the terms that are used in this guide do not necessarily follow the standard dictionary definition that you might expect. This section provides the NearStore VTL-specific definitions of these terms.

action

An action is an activity that requires manual intervention. When the NearStore VTL Appliance cannot proceed without manual intervention, an entry is created in the Action Required list. The action is usually part of the normal operation, e.g., loading a physical tape into a tape drive, but it may also be an exceptional condition, such as a tape drive that is not working correctly. The condition that caused the action must be resolved before the action required entry will be deleted.

administrator

The administrator account is the privileged account. Only the administrator can manage the system configuration. The administrator can perform such tasks as adding disks, physical tape devices and new users; managing the import/export tapes; setting the various system preferences and the like.

ageing policy

Ageing policies are set and managed by backup applications. The NearStore VTL does set or manage ageing policies (but see shadow tapes).

clone

Transfer of data from virtual tape to physical tape (occurs after unload of a changed tape). Key difference with export is that after the clone is done, the virtual tape stays in the virtual library.

customer

This is an optional feature that is enabled in the Configuration Tasks >Advanced >Options page. If the administrator chooses to use customers, then every virtual library belongs to a customer. An account is created that allows the customer to log in to NearStore VTL. The Customer can manage jukeboxes that belong to the customer.

delete (a virtual tape)

Deletes the virtual tape from the VTL (using menu Configuration Tasks -> Virtual Tapes -> Delete Virtual Tape). Virtual tapes are also deleted (blocks freed up on disk) after the completion of an Export.

eject

Moving of virtual tape to entry/exit port - this will start the export process.

events

Events are recorded in the Event log when an item of interest to the administrator occurs. An event may or may not have an associated Action Request.

export

Transfer of data from virtual tape to physical tape (occurs when you eject a virtual tape from the virtual library). After the export has been completed, the virtual tape is deleted from the VTL

export request

An export request is created when a virtual library exports a virtual tape. A virtual tape may be exported by sending a SCSI command to the virtual library (usually from a backup application) or by using the NearStore VTL web interface. The export request tracks the process of exporting the data from the virtual tape.

import request

An import request can be created by either the administrator or a customer. A virtual tape can be imported by sending a SCSI command to the virtual library or by using the NearStore VTL web interface. The import request will track the process of importing the data from the physical tape.

NearStore VTL appliance

The NearStore VTL appliance refers to the NearStore VTL controller and all of the physical disks and physical tape drives used by the NearStore VTL controller.

pass through mode

When data is imported from a physical tape to a virtual tape, the data can be accessed shortly after the importing starts. This is invoked by moving the virtual tape into a virtual tape drive.

physical disk

Physical disks are connected to the NearStore VTL controller. All of the data stored in the virtual system is stored on the physical disks.

physical tape drive

Physical tape drives are connected to the NearStore VTL controller. They can be connected either through the Fibre Channel or through the parallel SCSI. The physical tape drives are used to transfer the data from the virtual tape to a physical tape. The data is read during import and written during export.

physical tape

A physical tape is a physical piece of tape media. It is called physical tape to clearly differentiate it from a virtual tape.

quick load

When the data on a physical tape is imported to a virtual tape using the quick-load option, only the first 1 MB of data is transferred. This is useful if the virtual tape will immediately be overwritten with new data. The first 1 MB allows the data management application to verify the virtual tape before it is overwritten. If an attempt is made to read or position beyond the 1 MB of data actually imported, then an I/O error is returned. The virtual tape may be reimported in a normal mode to permit access beyond the 1 MB.

RAID group

RAID groups are constructed from the NearStore VTL-attached physical disks, and provide a virtualization layer between the physical disks and the virtual tapes. This layer lets you add, remove and replace the physical disks without affecting the structure of the virtual tapes or the data stored on the tapes. If a physical disk in a RAID group fails, the disk can be replaced, and the data on the failed disk is reconstructed on to the new disk.

shadow tape

When a virtual tape is exported to a physical tape, the virtual tape is removed from the virtual library, but an option is available when a virtual library is created, to store virtual tapes in the shadow tape pool after a virtual tape is exported. A tape in the shadow tape pool is called a shadow tape.

The NearStore VTL manages the space used by shadow tapes, and can delete a shadow tape if the space is needed for new backup data. An administrator can set a preferred retention time for shadow tapes; if space is needed, but the retention period has not expired, the NearStore VTL sends a notification before deleting the shadow tape.

smart sizing

When tape smart sizing is enabled, NearStore VTL estimates the rate at which the data being sent to it from a backup application can be compressed. This allows NearStore VTL to send an end of tape signal to the backup application only when the compressed size of the incoming data fills the tape.

storage pool

Storage pools are an optional feature of NearStore VTL that allow the administrator to partition a group of disks. When virtual libraries are assigned to a storage pool, the volumes created in the library are stored only on disks that belong to that storage pool.

tape operator

The tape operator is a special account with limited privileges. The tape operator is responsible for getting physical tapes, loading them into physical tape drives, and unloading the drives when the NearStore VTL appliance is finished with the tape.

tape optimization

see smart sizing

tape pick list

Tape pick lists are an optional feature of NearStore VTL. A tape pick list is a list of physical tapes required by NearStore VTL. It is used by the tape operator to get all of the tapes that NearStore VTL needs. NearStore VTL then recommends that the tapes are loaded into specific drives.

virtual library

A virtual library is a logical representation of a physical tape library. It exhibits all the behaviors of a physical tape library. It appears to have a robotic arm, one or more tape drives, tape cartridge slots, mailbox (entry/exit) slots, and a barcode reader. It responds on the bus in exactly the same way as a physical tape library.

virtual library type

A virtual library type determines how many slots, how many virtual tape drives, and what type of virtual tape drives are in a virtual library. NearStore VTL has several predefined virtual library types. The administrator can create additional virtual library types if required.

virtual tape

A virtual tape is a logical representation of a physical tape. Virtual tapes are used inside virtual libraries and written to by virtual tape drives in the same way as are physical tapes.

[virtual tape drive](#)

A virtual tape drive is a logical representation of a physical tape drive. Virtual tape drives are configured within virtual libraries. A virtual library can have one or more virtual tape drives. Each virtual tape drive emulates a standard tape drive.

[virtual tape drive type](#)

A virtual tape drive type determines how a virtual tape drive responds to SCSI inquiries and the capacity of the tapes written by the virtual tape drive. NearStore VTL has several predefined virtual tape drive types. The administrator can create additional tape drive types if required.

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