

## MANAGE DATA SMARTER™

### StorFirst Altus Administration Guide

***Note to StorFirst Altus users:***

**This manual provides instructions for an end-user to install, configure, and use StorFirst Altus software. For supported storage subsystems and latest updates, see the StorFirst Altus Hardware Compatibility Guide and StorFirst Altus Release Notes.**

**This administration guide assumes that you are familiar with your server hardware, Windows operating system, and your basic system administration.**

**Unless otherwise specified, references to Windows refer to all supported Windows operating systems.**

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## Altus Summary

With Centera, EMC has introduced a class of storage device that is specifically designed for archiving. Centera has many new, important, and award winning features like authentication, retention management, and elimination of redundantly stored copies. Centera also carries the hallmark availability and disaster recovery capabilities that EMC has marketed with their block level storage products.

Centera has a native API for application integration and full utilization of all the new features as well as several filesystem-based gateways for easy and transparent application integration; including StorFirst Enterprise Archival Storage (EAS) from Seven Ten Storage Software.

Altus is designed to complement Centera independently of how data is stored and retrieved on Centera. Altus is auditable and preserves the authentication and retention functionality of Centera. Altus is completely invisible to archiving applications, possible Centera gateways, and works directly with the native Centera API.

The key functions in Altus are C-Clip replication to and C-Clip restoration from tape and virtual tape libraries (VTL). Altus preserves not only the data but also the complete meta-data descriptors used in the implementation of Centera.

A single Altus instance may serve multiple Centera units. A single Centera may simultaneously be served by several Altus instances. Connections may be LAN or WAN, providing freedom of location. Altus will simultaneously use a set of tape or VTL devices, ranging from a single-drive autoloader to a set of multi-drive tape or VTL libraries. Altus is a complete tape library and VTL management solution and manages tape and VTL data in all possible locations: in drive, in library slot, and offline (on-shelf or in-vault).

Altus hereby enables these key additions to any Centera user:

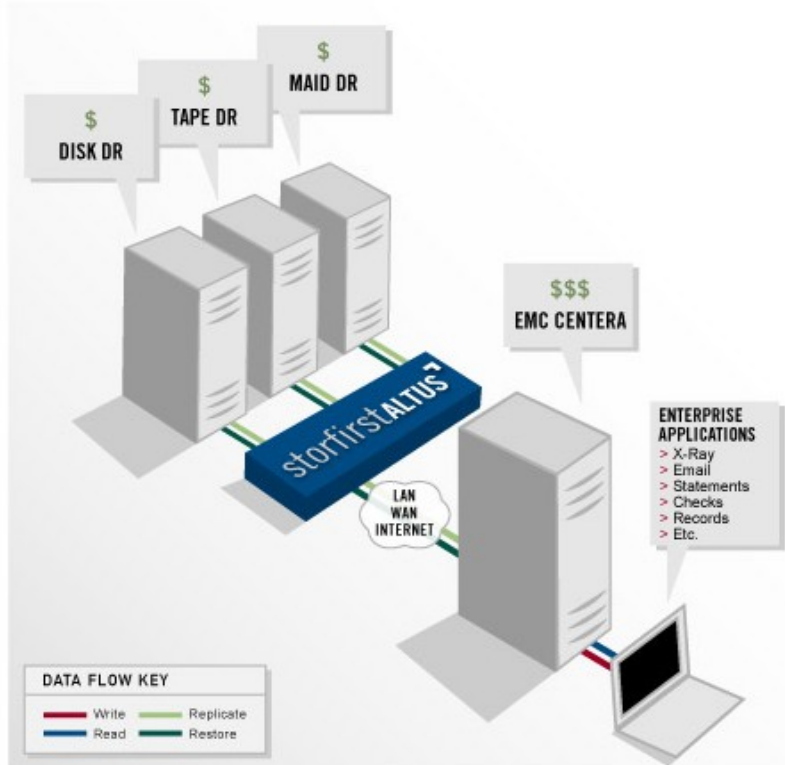
1. **Cost:** Cost-effective replication by using tape or VTL for disaster recovery purposes
  - a. Full site and/or device disaster recovery at much reduced cost
2. **Compliance:** Regulations calling for replication to removable media; including WORM tape
3. **Comfort:** Leveraging customary procedures for tape/VTL usage and offsite storage utilizing true, efficient Centera replication, not "typical" backup jobs
4. **Consolidation:** Offering "many-to-one" replication
5. **Migration:** Migration of older C-Clips to tape or for the transition of data to new Centera units

# CHAPTER 1

## PLANNING ALTUS

### Product Concept

This simplified picture of a single Altus instance serving Centera will make it easier to read this book. Altus replicates all information stored – either on a single EMC Centera or multiple Centera units (even in multiple virtual pools) – to tape/VTL while the Centera units are simultaneously being used by applications on the network (this is configurable). *Altus replication is customized and optimized for Centera in sharp contrast to any standard backup.* Altus is installed on a Windows server and communicates with Centera over TCP/IP using the native Centera API provided by EMC.



### Centera Basics (disclaimer)

The purpose of the following section is to present the most basic Centera concepts necessary for managing Altus. The reader is encouraged to take advantage of the official and complete Centera documentation from EMC that in all cases takes precedence over the information presented here. The reader should also take note of Centera version changes because Centera has evolved since its introduction.

## Centera Basics

Centera is a storage device for fixed content archiving that is specialized by offering Content Addressed Storage or CAS. In Centera, data is known as C-Clips; these are written to Centera and stored with a code that is computed from content. The C-Clip is only known by that code, its Content Address, from then on. In common file systems you declare a file name and write data to it; with Centera you write data and its Content Address is returned to you. The intention and purpose of the Content Address is to ensure authentication of the data. You can change the content of a file in a file system but the equivalent operation in Centera is intentionally impossible. You can read a C-Clip back from Centera, change it, and write the new C-Clip to Centera which will return a separate Content Address; the two C-Clips are separate and unrelated in Centera. C-Clips in Centera are organized by time of creation and retrieved by their Content Addresses. There is no hierarchy or any other form of organization so Altus uses sequential time-based scanning to find new C-Clips incrementally.

Each C-Clip in Centera also contains a specific retention period or a retention class allowing changes in retention policy for large numbers of C-Clips without changing every single one. A C-Clip is hereby either current or expired. In compliance mode only expired C-Clips may be deleted; otherwise C-Clips may be deleted at any time. Deletion is initiated by the client application as a specific operation and not automated by Centera. The Content Address of a deleted C-Clip is retained in Centera as a so called "reflection". Altus will find these "reflection" C-Clips and mark its database accordingly, allowing "deleted" status as selection criteria for restoration and for retention management in Altus after storage in Centera has ended. Centera has a background garbage collection process that reclaims capacity freed by deletions; this process does not delete expired C-Clips as explained above.

Centera is accessed from client applications that have been integrated with the SDK (Software Development Kit) provided by EMC, such applications are often referred to as "native" Centera applications. Applications without native integration will often use a gateway; gateways are specialized applications providing a file system interface to Centera. With a gateway, users and applications may create files on Centera using familiar methods, while the gateway maintains the map between file names and the C-Clip codes in Centera. StorFirst EAS from Seven Ten Storage Software supports Centera in this fashion as one of many, simultaneously available tiers of possible storage.

Altus replicates complete C-Clips to tape, regardless of what application created them and how, including all Centera created metadata that is available through the SDK, like Content Address, creation time, and retention. In case of restoration by Altus to some Centera; the C-Clips are not simply written, they are restored using a specialized function that provides complete reinstatement, authentication and validation. This ensures that the special Centera capabilities for authentication and retention management are preserved by Altus.

Physically, Centera is accessed using standard TCP/IP based networking. Typically, Centera has four or more access nodes, each with its own IP address; those nodes are used for availability protection and load balancing. Networking allows for interesting disaster recovery options, for example, by placing Altus and Centera at separate sites. Altus configuration is often as simple as entering the Centera IP addresses into its Centera configuration wizard.

The Altus UI reports the Centera capacity and free space numbers returned to it by Centera and Altus does not use or process these numbers in any way. The definitions of these numbers vary by Centera version and their interpretation is not intuitive so consult with EMC for a detailed explanation.

## Altus vs. Backup

Altus is tightly integrated with Centera as the optimal solution to preserve all authentication and retention management even through a complete site disaster. Conventional backup may be available in some configurations. However, using existing backup solutions may invalidate the authentication capabilities that differentiate Centera as a storage device. Further, applying recurring backup schedules to fixed content data is wasteful.

Altus replication is fundamentally different from traditional backup; there is no distinction in Altus between incremental and full. Altus replication builds a single, complete, and always-synchronized copy of all the information in Centera by incrementally capturing new C-Clips. C-Clips cannot change so there is no need to replace old with new; simple accumulation is automatically synchronized. Initially, Altus may have to catch up (in the case of use with a pre-existing Centera), but eventually each replicate session will efficiently replicate only the new C-Clips since the last session.

## Tiered Archiving

Centera represents a single tier of valuable disk storage for long term archiving. Altus adds several and much less expensive tiers behind Centera. Altus adds several new storage tiers: online tape in the library (tier two) offline tapes that are cataloged and known by Altus (tier three); and tapes no longer known to Altus but with the latent capability for possible re-introduction or destruction (tier four). C-Clips may reside in both Centera and Altus; removed in Centera and only retained by Altus on online or offline storage systems; and finally removed entirely. For details, see the retention management section later.

## Support Services

StorFirst Altus comes with certain support offerings depending on how the product was purchased. Contact your supplier or Seven Ten Storage Software if you have any questions. These services could include pre-installation planning, installation and training, systems management support, and software maintenance.

## Tape and VTL Capacity

Altus works with most popular brands of tape libraries, virtual tape, drives, and physical tape formats; please consult the release notes and Hardware Compatibility Guide for up-to-date details. These choices should be made independently of Altus with your particular vendor of choice. Tape or VTL selection is influenced by the following important characteristics:

The total online capacity should meet or exceed the Centera storage. This calculation will be an estimate and impacted by some rather unpredictable factors, such as content, on-line versus off-line tape volume operation, storage habits, and Centera redundancy. In configurations where retention on tape or VTL exceeds retention in Centera, additional capacity will be required over time. Fortunately, Altus allows for

easy expansion.

✦ *A simplified rule of thumb: use a library that has a raw capacity exceeding the raw capacity of the Centera storage.*

## Tape or VTL Bandwidth

The minimal number of drives should be equal to the number of Centera units, plus one (optional) drive for redundancy. A single-drive library or autoloader is supported, but at least two drives are recommended. Many current tape drives have sufficient bandwidth to keep up with the average bandwidth of a single Centera. Net Centera bandwidth is lower for small C-Clips and increases with C-Clip size; it is conceivable that with consistent use of large C-Clips and fast networking, the bandwidth of a single Centera could exceed the bandwidth of a single tape drive. Altus also supports the use of multiple drives in parallel when working with a single Centera; driving them at higher speeds (provided the network and Centera are able to keep up).

✦ *A simplified rule of thumb: make sure that aggregate tape or VTL drive bandwidth exceeds your measured archiving bandwidth to Centera; thereby tape or VTL speed will not be a bottleneck.*

## Networking Selection

The connections between the Altus server and the Centera units are TCP/IP based. Both LAN and WAN may be used and should provide capacity of several tens of MB's per second per Centera; anything less than a Gigabit network backbone may be flooded to the point of becoming unusable to everything else attempting to share the network. A robust and high performance network is therefore strongly recommended.

## Server Selection

Altus requires a dedicated Windows system; please consult the release notes for the precise and up-to-date minimum specification. It is strongly recommended to use a system with a mirrored pair of disk drives for improved availability and protection of the Altus database.

## The Altus Database

Altus keeps a database on hard disk of all C-Clips stored on tape; the entries are created during replication from Centera to tape, one for each C-Clip. The database controls both replication and restoration; an old or blank database that is out of synchronization with the tape set will have undesirable results, and backup is therefore not a viable option. This is the principal reason for recommending disk mirroring and/or additional protection of the Altus server. The database must be on directly attached hard disk; DAS or SAN.

If the database is lost, for example due to a disk crash on the Altus server, it can be recreated by scanning the tapes from end to end. It can also be recreated from Centera by re-formatting the tapes or VTL and repeating the complete replication, but that could potentially take much longer, especially if the data set is large.

## High Availability

Altus operates completely asynchronously and often delayed from the Centera archive applications, so High Availability of Altus is not usually a strong requirement. Altus is often passive during peak client use of Centera and therefore designed to catch up during low-usage periods. The Altus availability requirement is normally defined by sufficient uptime to keep up with average archiving volumes and maintain less than 24 hours of latency between archiving to Centera and replication to Altus. Even after extended downtime, Altus will automatically “catch up” to synchronize with a Centera that has not been replicated in some time.

## CHAPTER 2 INSTALLING ALTUS

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### Getting Ready

Physically install your storage devices and test that Windows can see them using the instructions provided by their manufacturer. Make sure to use unique and otherwise unused SCSI addresses; a SCSI address is made up of a SCSI port number, SCSI bus number, SCSI ID, and a SCSI LUN. If your device allows, you may physically open the device and place media directly into the slots before turning on the device.

On the StorFirst Altus server, create the software distribution folder and copy the files from the release media or the Seven Ten FTP site; there will be both software files and a set of documentation in PDF format. Make sure to have a PDF reader installed for access to digital documentation and online help. Read the enclosed License; installing Altus constitutes acceptance of its terms. Read the Release Notes for up-to-date product requirements. The installation of StorFirst Altus software will require a license key that must be entered to complete installation.

### Welcome to StorFirst

Log in as an administrator, open the distribution folder, and begin installing by double clicking on Altus.exe or StorFirst.msi. This will be the first window to appear: Click Next.



## License Acceptance

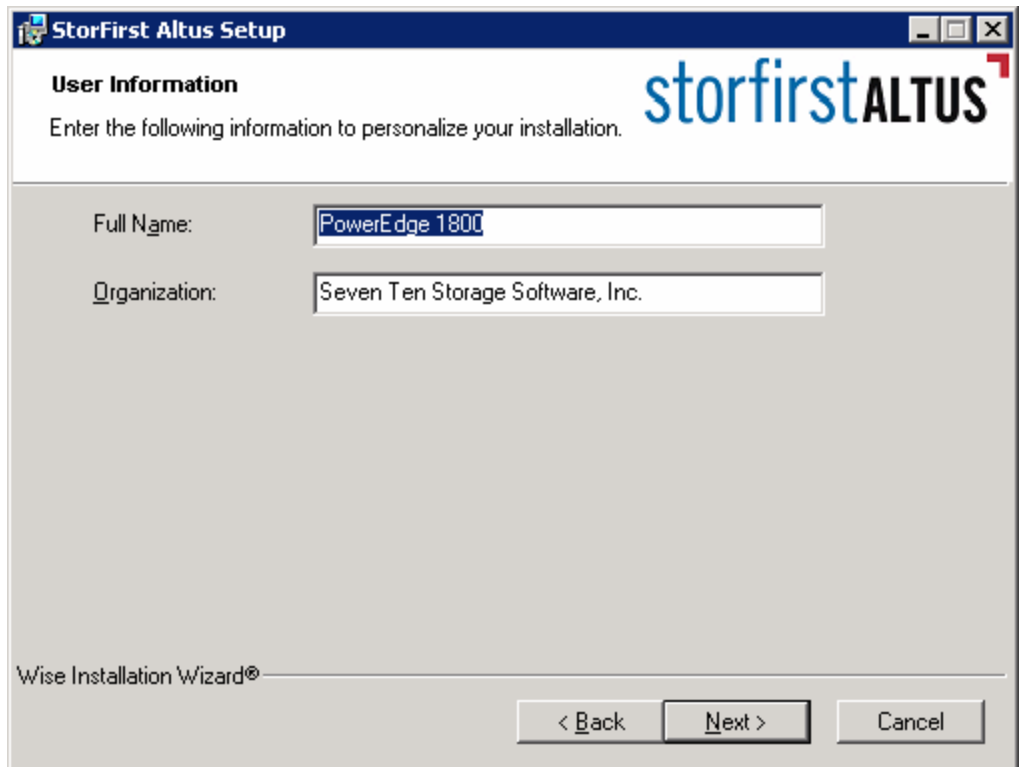
Next, you will see the StorFirst Altus License Agreement. Please read through the agreement and select "I accept the StorFirst license agreement" to continue the installation. Click Next.

**Note:** If you select "I do not accept the StorFirst license agreement" you can not continue the installation.



## User Information

Enter name and organization:

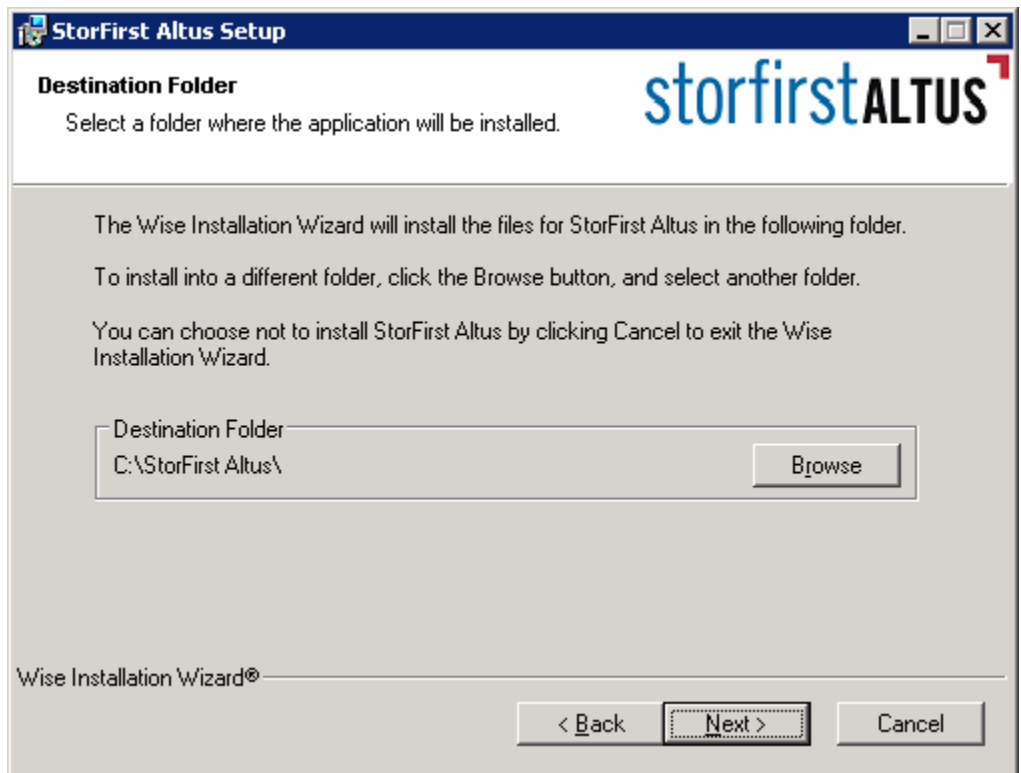


## Destination Folder

This will be the location of the installed software, the logs, the help files, and the database.

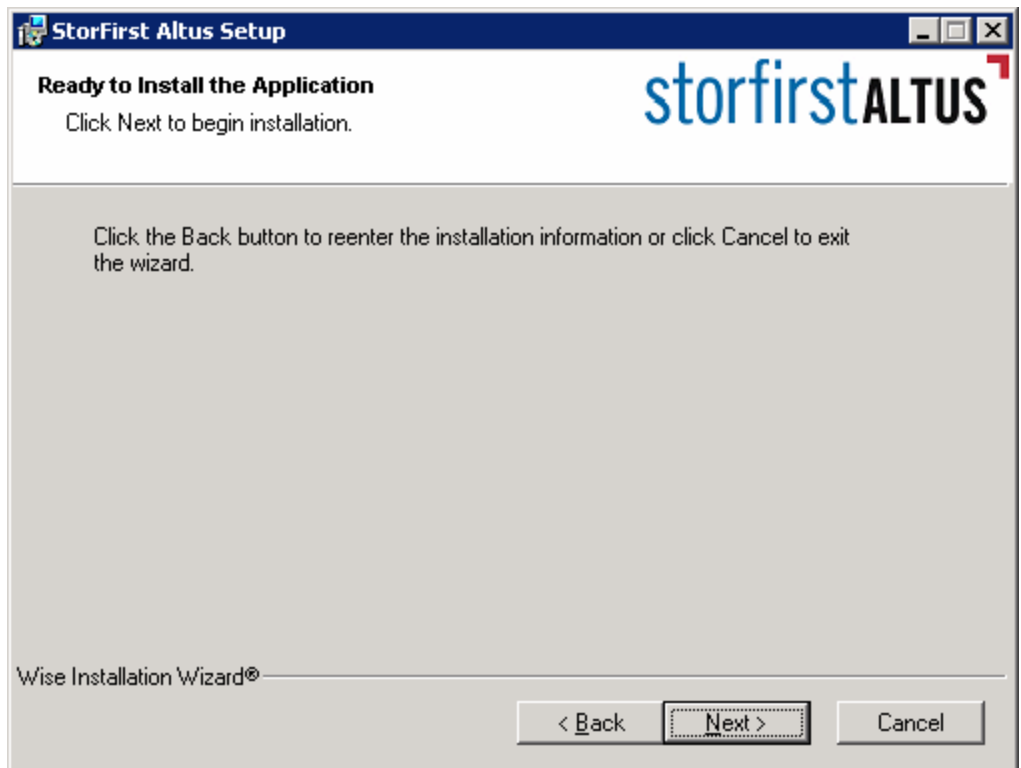
The default is a StorFirst Altus folder at the root of the drive letter with the most free disk space and you may browse to select another drive letter. It is a good idea to keep folder name unchanged.

The install process automatically creates the destination folder and copies everything needed for proper operation to it. The source folder is unnecessary after completing the installation.



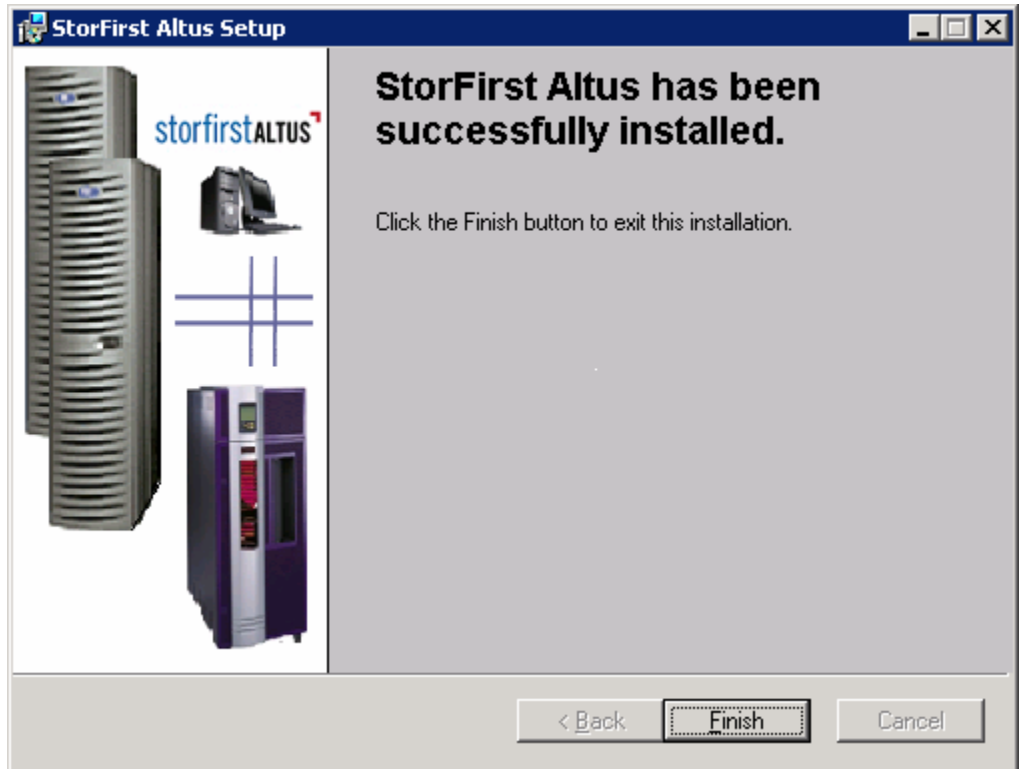
## Ready to Install

You are now ready to install the application. Click Next to begin installation.



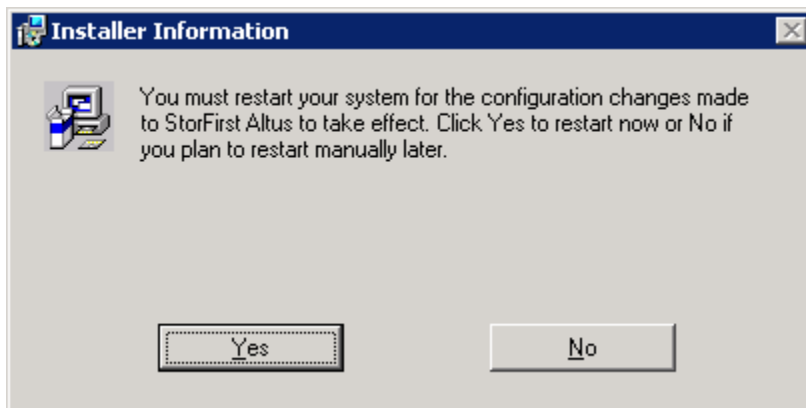
## StorFirst Successfully Installed!

The application has been successfully installed. Click Finish.



## Reboot

You must now reboot in order to complete the installation process. This will load the StorFirst driver and start the background service.



## Done

When the system returns after re-booting, you will find:

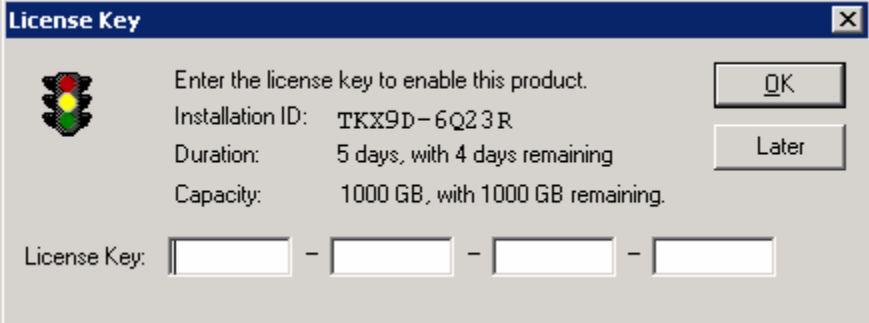
1. StorFirst Altus shortcut icon on your desktop
2. Documentation and shortcut in Windows Start ⇒ Programs ⇒ StorFirst Altus
3. The StorFirst Altus service in Microsoft Services
4. In the Task Manager under the Processes tab see:
  - a. the service: AltusSvc.exe
5. The Destination folder named StorFirst in you location of your choice containing:
  - a. The StorFirst database
  - b. The software modules
  - c. The Job Log folder containing the logs of jobs that you have run and not yet deleted
  - d. The user interface log: StorFirst Altus.log (StorFirst\Service Logs\StorFirst Altus.log)
  - e. The service log: altusvc.log (StorFirst\Service Logs\altusvc.log)
  - f. The help files (StorFirst Altus\Doc)
  - g. The text file "errmsgeng" containing error numbers and their messages (StorFirst Altus\Bin)

**PLEASE NOTE:** It is very import that you run the "export poolprofilesetup" command from the Centera CLI (using Centera Viewer) for any and all pools that Altus will replicate. This file should be stored somewhere safe. The information in this file can be used to rebuild any and all pools and profile information on a recovered Centera.

## StorFirst Administrator

Now, start the StorFirst Administrator using the StorFirst Altus icon on your desktop. The first time you run the Administrator the system will prompt you for a License Key that you will need to enter before proceeding to use StorFirst. Please Note: You can continue in evaluation mode for 5 days with capacity up to 1000GB by clicking "Later".

You must now contact Seven Ten support for a license key. You can contact the Seven Ten Customer Support Center on Phone 978.725.5525, Fax 978.725.8808 or via email at [support@seventenstorage.com](mailto:support@seventenstorage.com). Support is available M-F from 9:00AM to 5:00PM EST.



**License Key**

Enter the license key to enable this product.

Installation ID: TKX9D-6Q23R

Duration: 5 days, with 4 days remaining

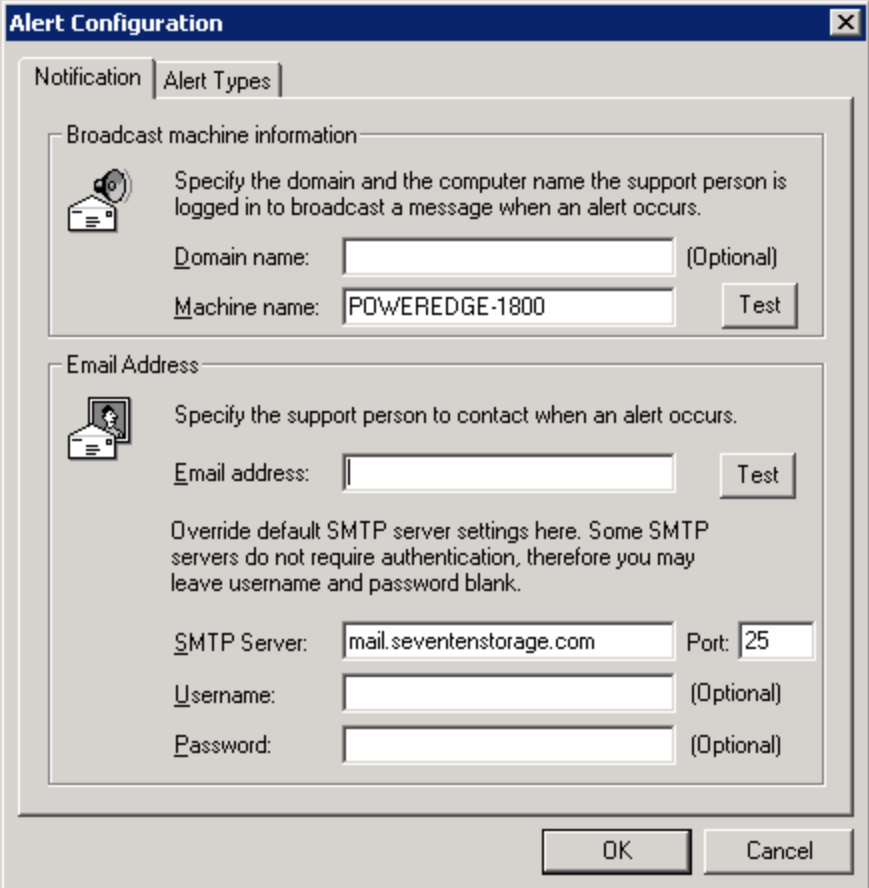
Capacity: 1000 GB, with 1000 GB remaining.

License Key:  -  -  -

Buttons: OK, Later

## Alert Configuration

Next, administrators are asked how they would like to be notified when StorFirst reports an alert. Administrators can choose two different methods to receive alerts, which are configurable on individual alerts, either through a broadcast message or via email.



**Alert Configuration**

Notification | Alert Types

Broadcast machine information

Specify the domain and the computer name the support person is logged in to broadcast a message when an alert occurs.

Domain name:  (Optional)

Machine name:  Test

Email Address

Specify the support person to contact when an alert occurs.

Email address:  Test

Override default SMTP server settings here. Some SMTP servers do not require authentication, therefore you may leave username and password blank.

SMTP Server:  Port:

Username:  (Optional)

Password:  (Optional)

Buttons: OK, Cancel

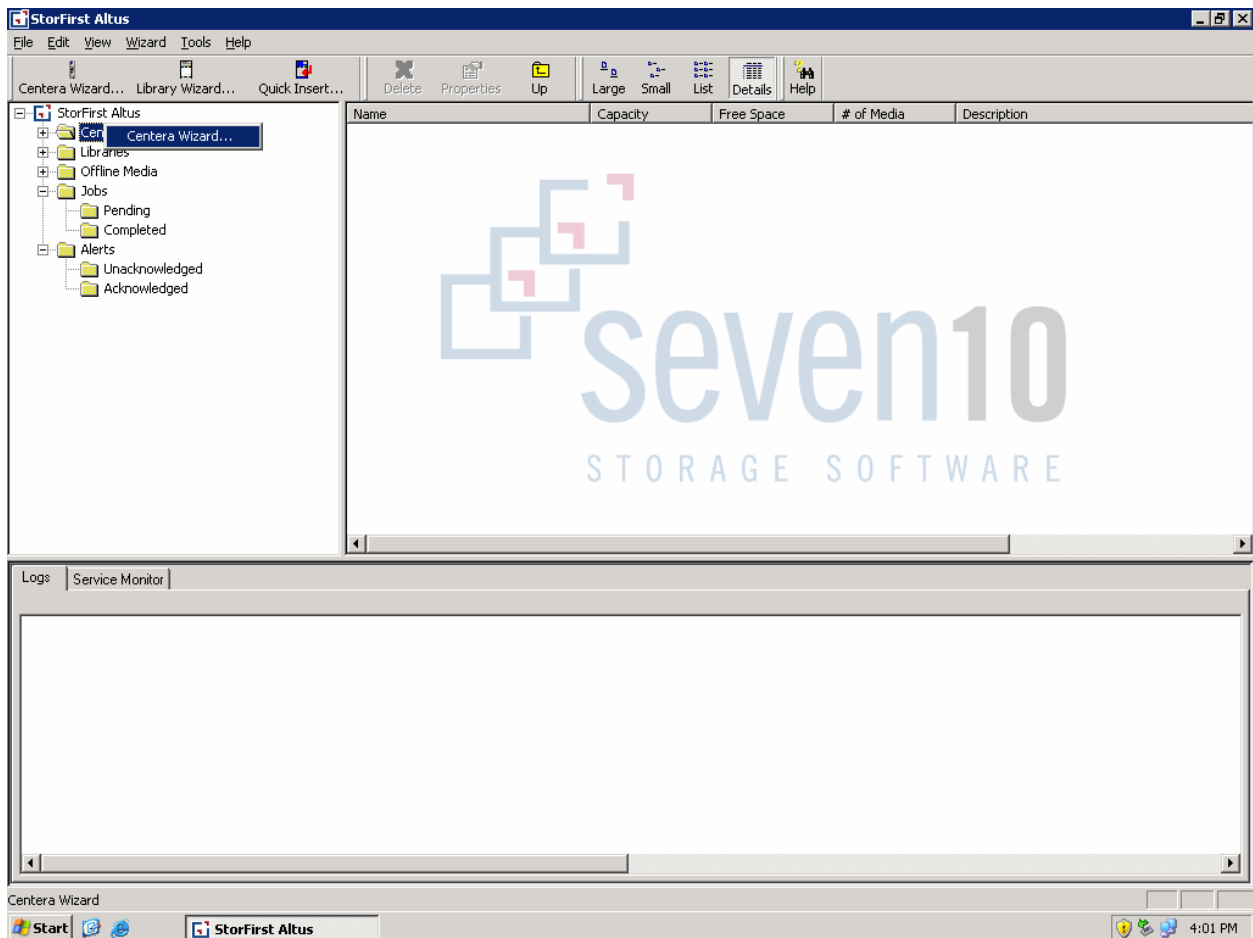
# CHAPTER 3

## CONFIGURING STORAGE DEVICES

### Library and Centera Configuration

The wizards may be activated from the top menu at any time or by right clicking on individual folders in the tree window. See examples below:

- Adding a Tape Library → Click the Library Wizard icon or right click Libraries in the tree window and click "Library Wizard..."
- Adding a Centera → Click on the Centera Wizard icon or right click Centera in the tree window and click "Centera Wizard..."



## The Library Wizard

The library wizard is used to configure new tape libraries and it is automatically activated after starting the Administrator. It may also be activated from the top menu at any time. When activated, the library wizard re-scans the buses so any hot pluggable device may be added while the system is running. A list of supported tape libraries is available in the StorFirst Altus Hardware Compatibility Guide.

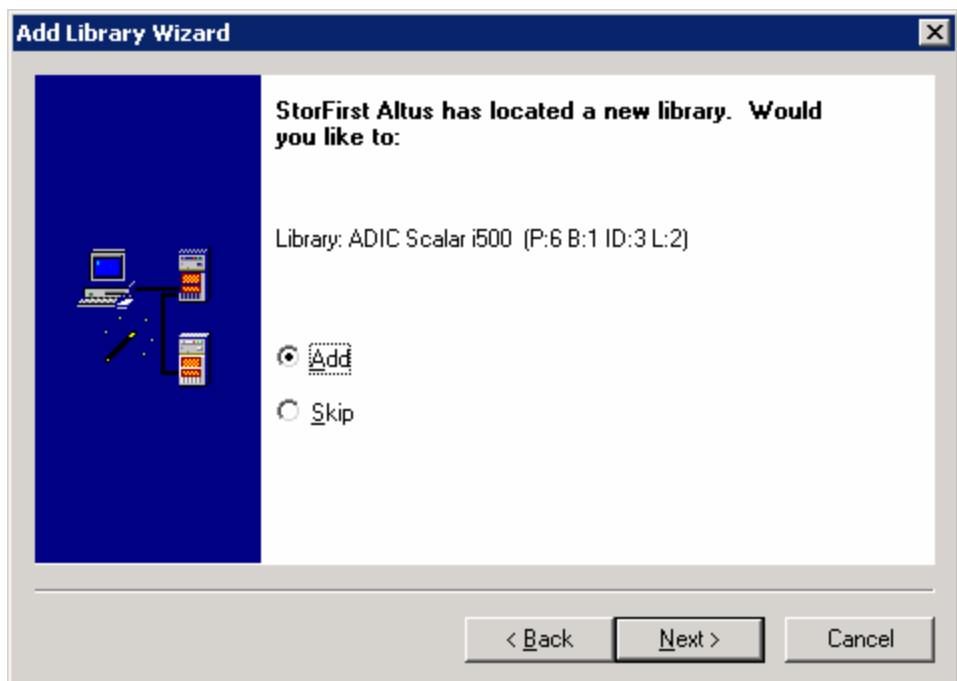


## Configuring Storage Libraries

You can now configure the storage devices in the StorFirst system using the Library wizard.

You may select to add or skip this device. If added, the device will be completely controlled by StorFirst and may not be used in any other way. If skipped, it will be ignored by StorFirst but may be added later.

Note: Do not add any Microsoft drivers for the library or drives.

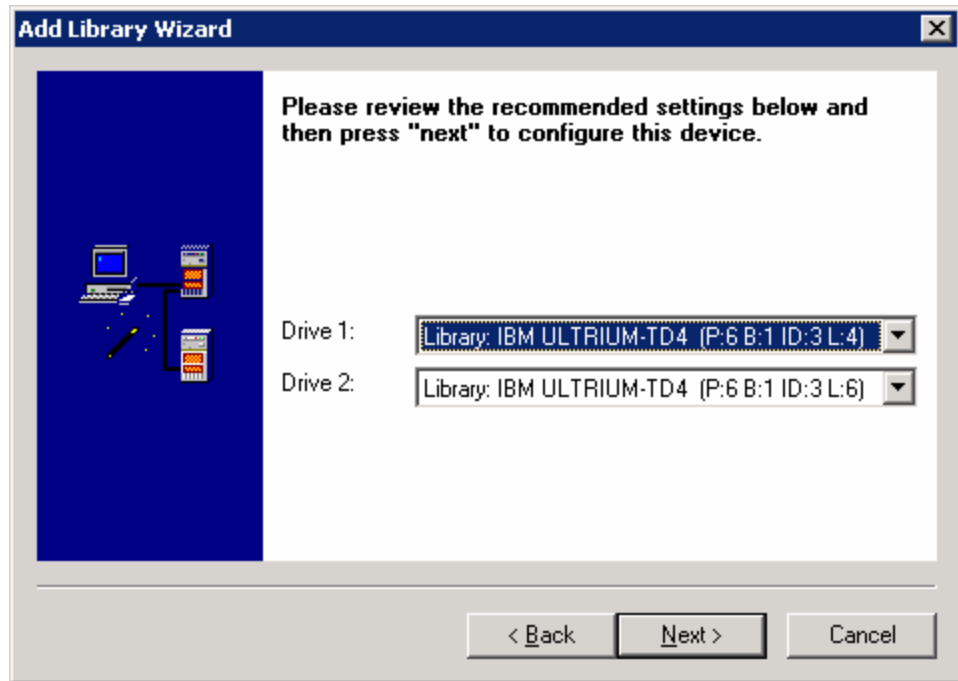


For ACSLS, please see Appendix C of this guide.

## Drives in Libraries

Drives are connected to the StorFirst server using standard SCSI over direct cables or Fibre Channel. The library changer identifies the number of drives, type, and their location by slot number. Altus will normally auto-recognize the relationship between the SCSI addresses of the drives and their slot numbers. The following screen is for confirmation and selection.

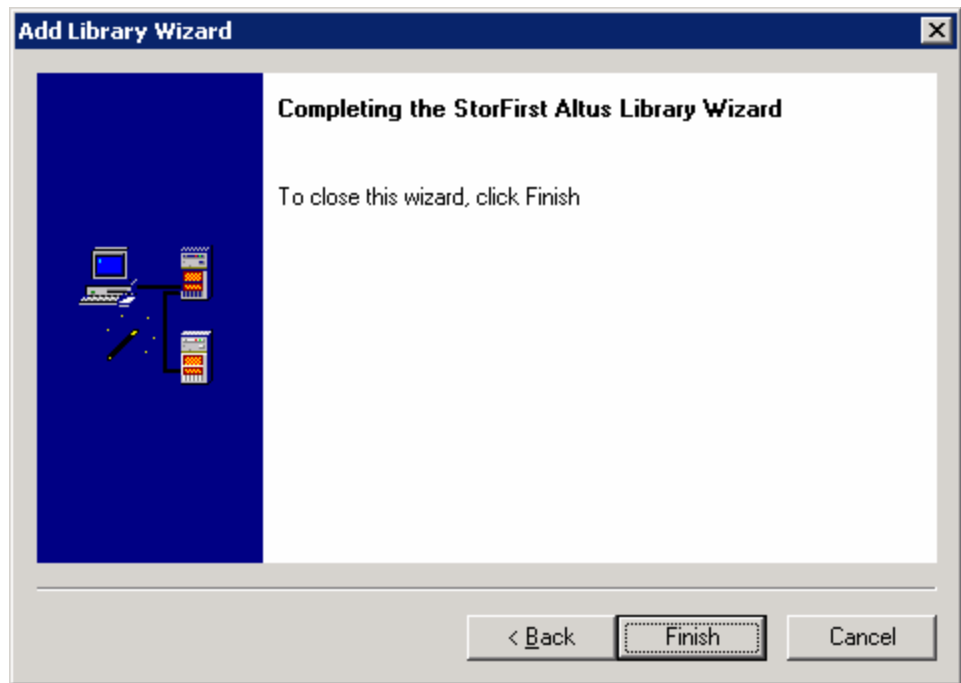
If Altus cannot map drives automatically, the drive boxes below will read "unknown" and you should contact your service representative who will help you through manual association of drive numbers with the drives found by scanning the busses.



A drive can be excluded from use by StorFirst by selecting "unknown" in the drop-down menu at this time or by disabling it later. This enables sharing of a library between multiple applications.

All drives used by StorFirst must be interchangeable and compatible with all media in the assigned slots. Two separate libraries may use different drives and types of tape.

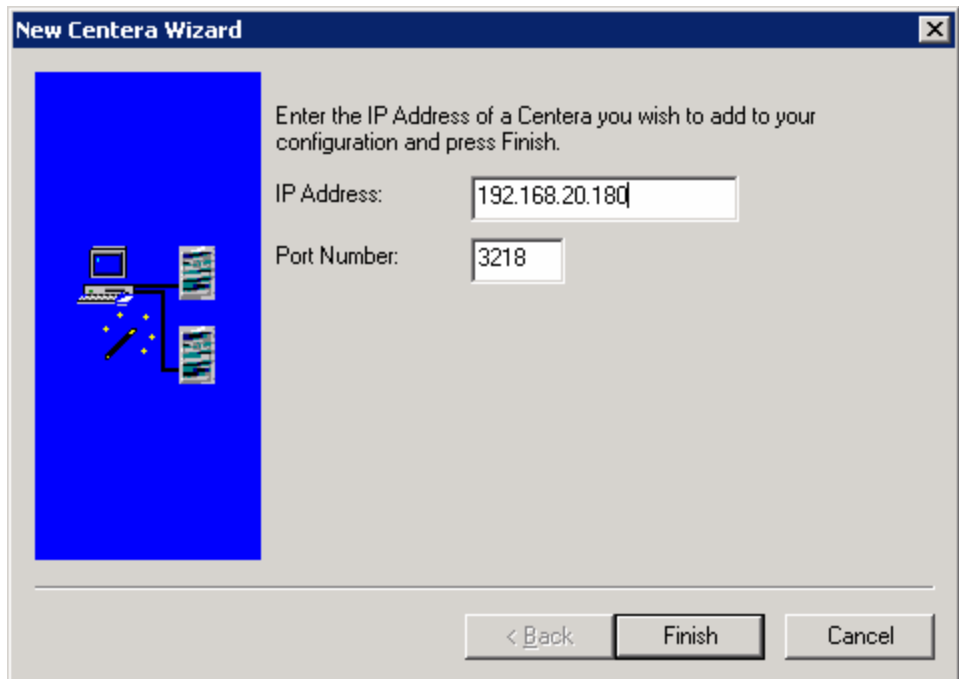
Library Configuration Complete  
Click Finish.



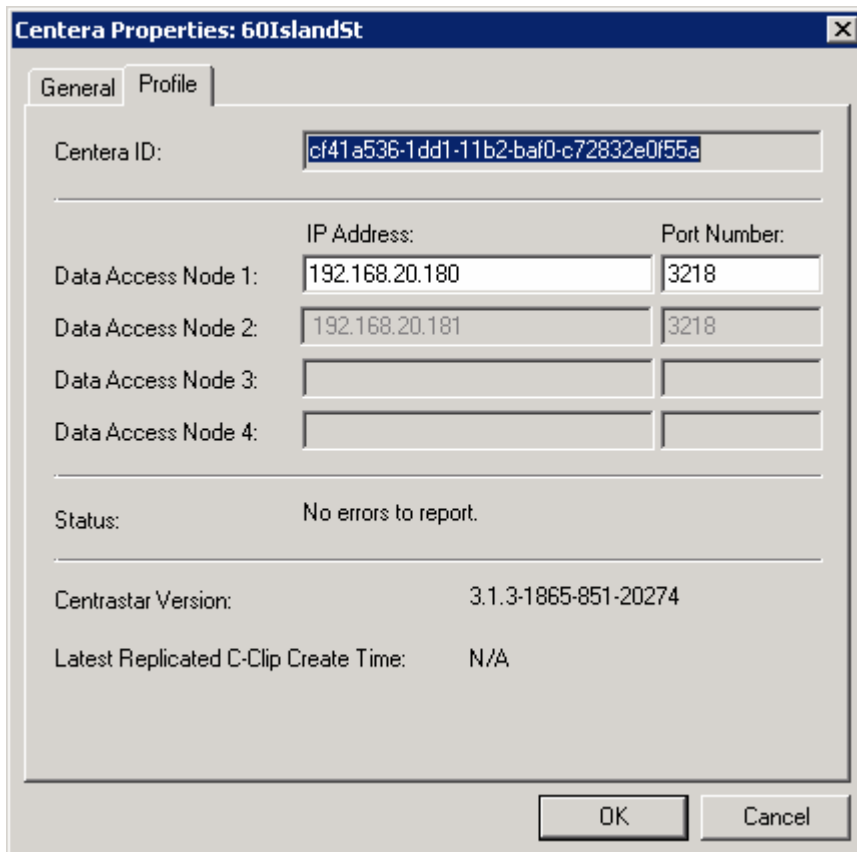
## Configuring Centera

Use the Centera wizard once per Centera Cluster. For each, enter one of its IP addresses and, in rare cases if the standard "3218" is not used, change the port number:

Click "Finish" and wait a minute while Altus connects and queries the Centera for its name and additional IP addresses; after the box disappears, the connection is complete.



The information that was retrieved becomes attributes of the Centera; select the Centera folder, right click, and view its properties:



Note the timestamp of the latest replicated C-Clip; in this case it is N/A indicating that replication has not started yet. This is a very important indicator of how well replication is keeping up with archiving volumes and there is no alternative way to gauge this in Centera or Altus; this is the only available measure.

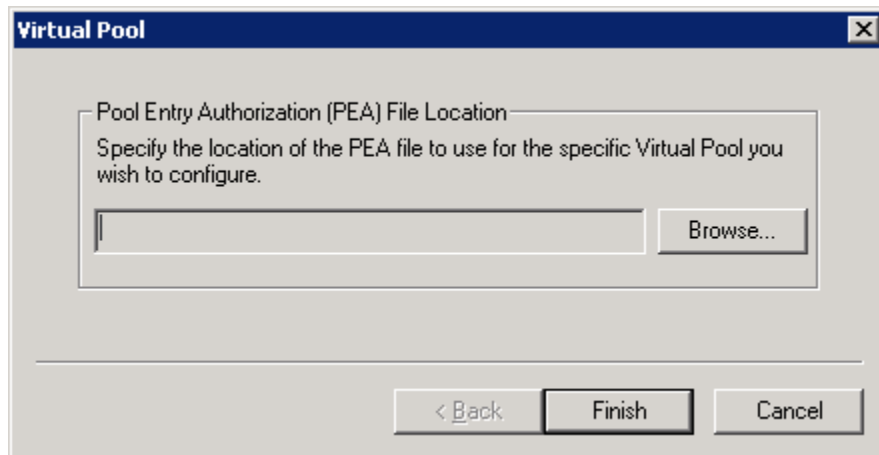
**Note:** If the timestamp is lagging, then replication should be given more time or resources.

## Configuring a Virtual Pool

To configure a virtual pool for replication, place the Profile Entry Authorization (PEA) file for that virtual pool in the StorFirst Altus install directory.

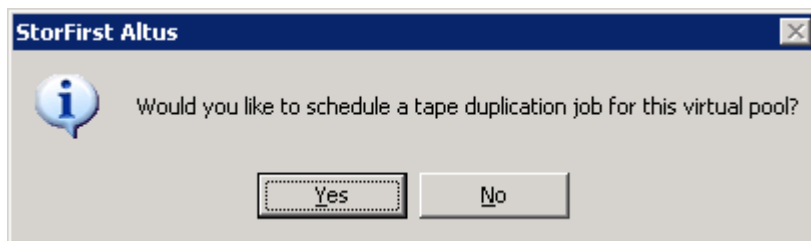
Right click on the Centera and choose "New Virtual Pool..."

Browse to the StorFirst install directory and choose the PEA file that matches the pool you want Altus to manage. Click Finish.



**Note:** For more information about Centera Virtual Pools please see Appendix A of this guide.

Next, you will be asked if you would like to schedule a tape duplication job for this virtual pool:



Clicking "No" will finish the creation of the virtual pool.

Clicking "Yes" will begin the creation of a tape duplication job for the pool.

## Duplication Options

When automating the duplication process you can select one of two modes:

**Append** – The purpose of Append mode is to incrementally write to one duplicate tape until the primary tape is full, at which point both tapes are finalized and become read-only.

**Incremental** – The purpose of Incremental mode is to incrementally write to 2 or more duplicate tapes until the primary tape is full, at which point one final duplicate is created, both tapes are finalized and any incrementals are returned for reuse.

**Eject Notification** – If this option is checked, a Duplication Alert will be issued by the system if action is to be taken by the administrator.

**Tape Rotation (Day to always create a full duplicate)** – This option can either be set to Rotation Only or can be set to a certain day of the week.

**Tape Rotation (Number of Tapes in Set)** – This

option specifies how many tapes to use in an incremental set *per primary tape*.

**Options**

**Duplication Mode**

Full Duplicate entire contents of primary tape.

Append Duplicate new C-Clips since last duplication to same tape.

Incremental Duplicate new C-Clips since last duplication using multiple tapes.

**Target Tape Partition**

Not applicable for this type of job.

**Eject Notification**

Enabling this option makes this job notify the administrator each day via email which tapes should be ejected or inserted each day.

Enable Eject Notification

**Tape Rotation**

Select a day to always perform a full duplicate, regardless of tape rotation. Saturday and Sunday are available for 7 tape sets only.

Friday Day to always create a full duplicate.

5 Number of incremental tapes to use per primary tape.

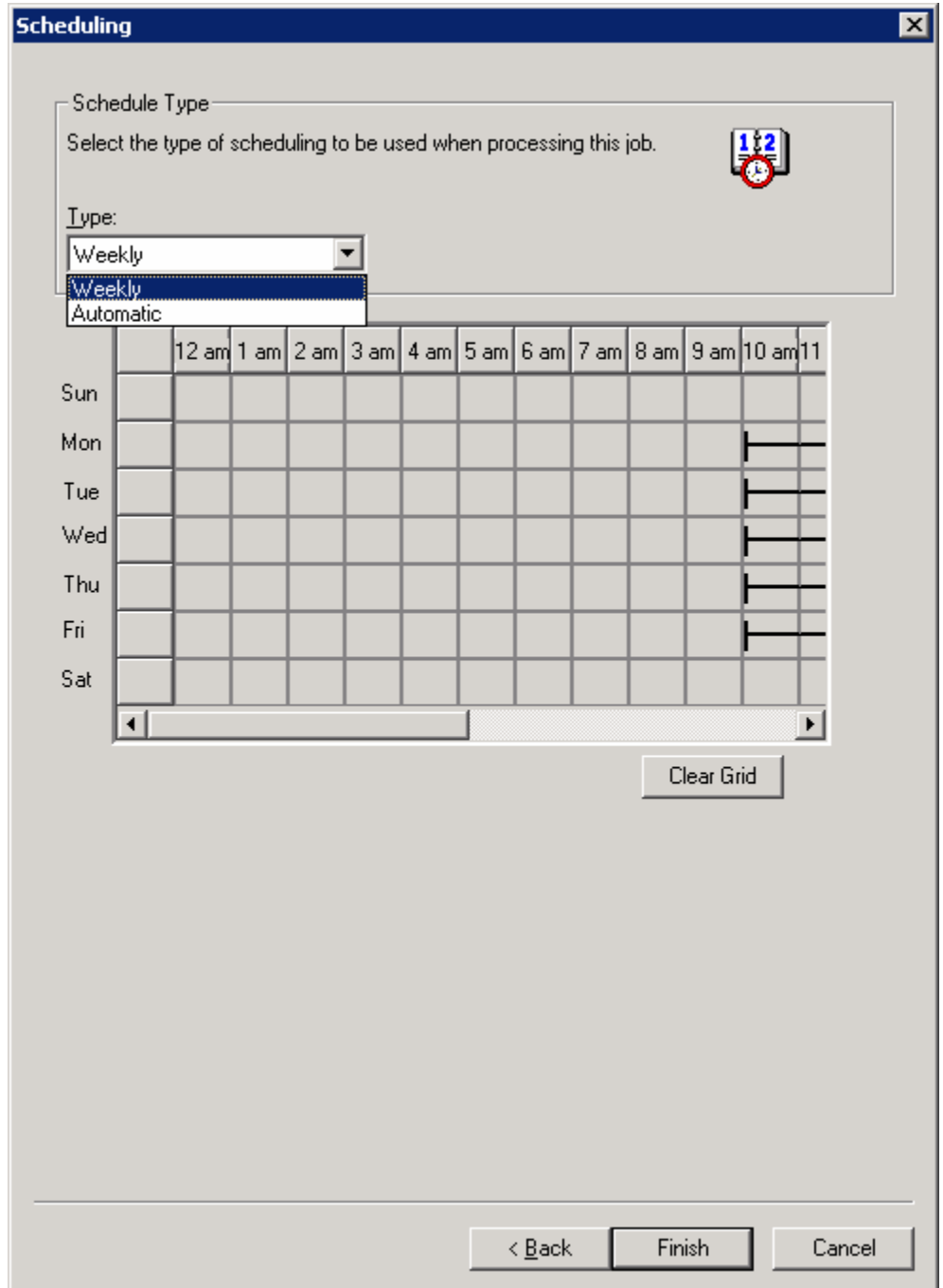
< Back Next > Cancel

## Scheduling Duplication

**Weekly** – Allows the duplicate job to run independent of the replicate job. The job will run according to the scheduled settings.

**Automatic** – This job will only run when triggered at the end of a replicate job.

**Note:** The duplicate will not run if the replicate job is manually stopped by the user.

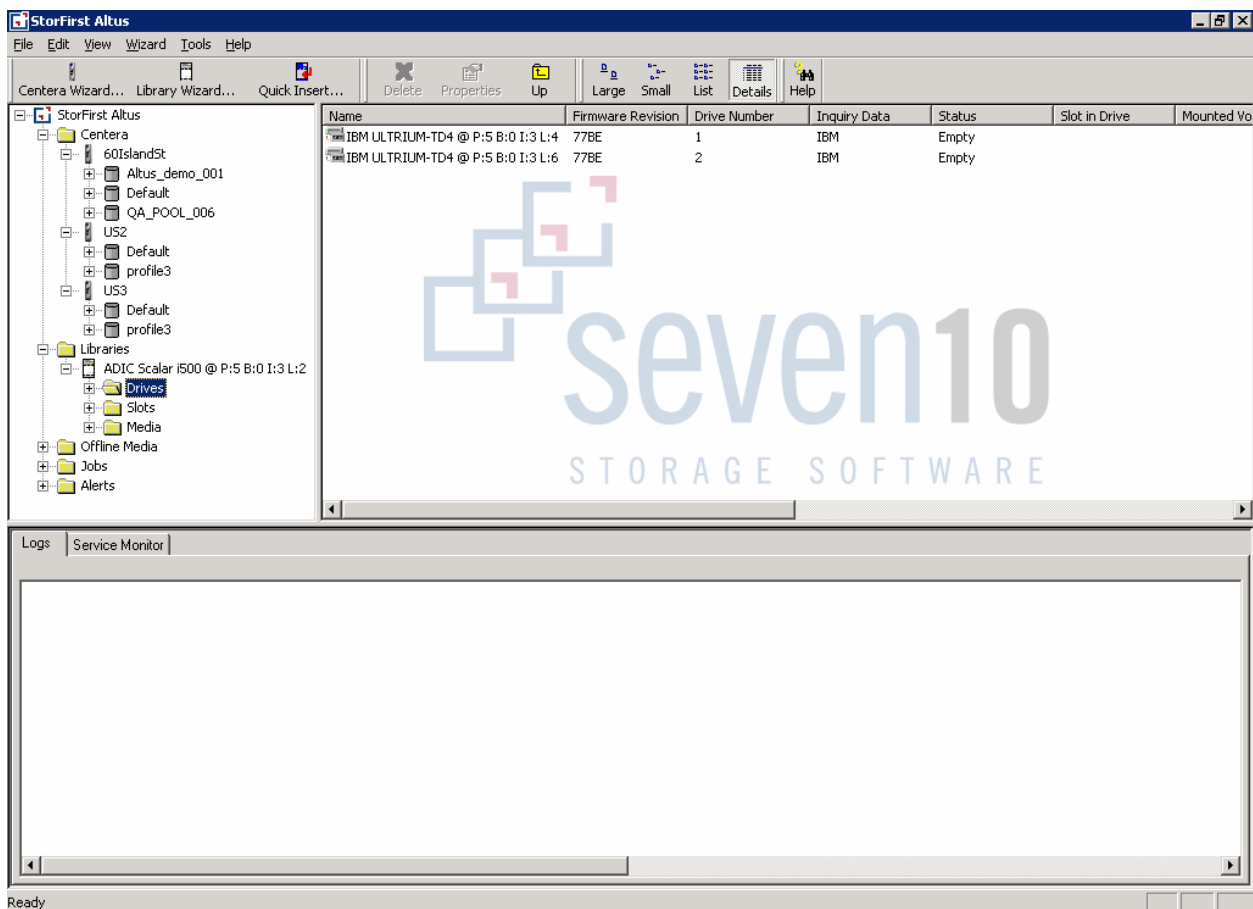


**Note:** For more information about Tape Duplication please see Chapter 7 of this guide.

# CHAPTER 4

## THE ALTUS MANAGEMENT WINDOW

The Altus management window has the familiar look of Windows Explorer and works in similar ways. Expand the entries in the folder window to the left; view content and details in the window to the right; right-click on objects in either window to find properties and operations that may be used on the selected objects:



This screen shot shows an expanded view of the folders and in the detail window a tape library provisioned for use by StorFirst Altus. The bottom window shows the tabs for viewing detailed system information. The job log details progress of the jobs you are running or have run. The service log contains messages from the background service. In the Logs tab above the window you will find a status line reporting job progress. If more than one job is active at any time then the status line will alternate between them automatically.

## The Toolbar

The top part is the standard Windows menu bar; combining standard windows with the StorFirst custom menus.

## The Tree Window

The tree window is on the upper- left side of the screen and displays various expandable trees. These trees operate like the directory tree in Windows Explorer; providing a hierarchical representation of Centera's, libraries, media, jobs, and alerts in the StorFirst system.

Expand the **Centera** and you will see virtual pools. Listed under each virtual pool is the media associated with each virtual pool. Listed under media is any duplicate media associated with each piece of primary media. Right-click on any of the items listed in directory to execute commands pertaining to that item or to view the properties of the selected item.

Expand the **Libraries** and you will see their drives, media slots, and media (All, Primary, Duplicate and Scratch) within each. Right-click on any of the items listed in directory to execute commands pertaining to that item or to view the properties of the selected item.

Expand **Offline Media** to see all the media that is being managed offline.

Expand the **Jobs** and to see "Pending" and "Completed." The Pending subfolder lists all jobs that are either in progress or that are scheduled to run at a later date or time. All time consuming operations that you initiate in the system are accomplished by creating and running jobs. The Completed subfolder displays all jobs that have been completed and are not scheduled to run again. Right-click on any job in either of these folders to run, delete, reschedule or view status logs of the selected job. To view the log for an individual job, simply right-click on a job in the Tree window and select View Log. Note that job logs are kept until you delete the completed job. This also applies to jobs that are run automatically on a schedule.

Expand the **Alerts** and you will see "Unacknowledged" and "Acknowledged." The items listed in the "Unacknowledged" subfolder are alerts that have been issued by the system and that have not yet been addressed or viewed by the administrator. Those listed in the Acknowledged subfolder are those that have received attention, and have been "signed off" by the administrator. Right-click on items to view properties on selected alerts.

## The Detail Window

The Details window is the major window in the upper-right side and lists the contents of the item selected in the tree window; expanded with details. Operationally, it works just like Windows Explorer. Tasks on single items are initiated by right-click on the item in the detail window. If you need to perform a task on several items at once, highlight them together by holding down the Shift or Ctrl key; then right-click to select the operation.

## The Status Window

The Status Window, located at the bottom of the StorFirst Administrator Window contains tabs each detailing different activities about the StorFirst system.

The **Logs** tab displays interspersed events from all jobs in order of occurrence. This tab provides an easy way for the administrator to monitor the system and can be a fast indicator of any potential issue. Individual job logs are discussed above. The status line provides detail progress information for any inventory, uninventories, replicate or restore job in progress.

The **Service Monitor** tab displays the log from all services and service errors in the system. The details listed in this tab are also stored in a log file.

## System Options

Get familiar with the system options. They are reached from the tools menu on the menu bar.

### The Log Files Tab

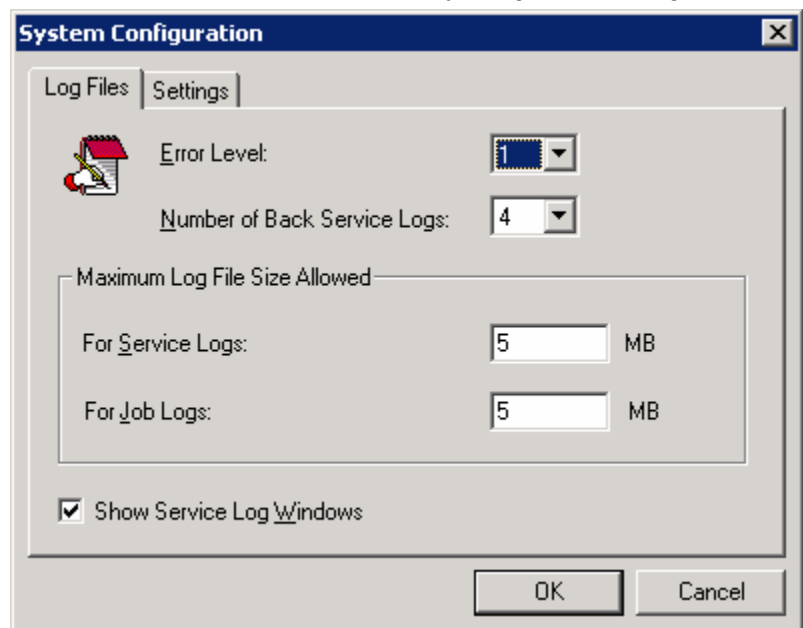
This tab controls the volume of service logs kept by the system. It can also remove the service log from view.

The system has three kinds of log files in addition to the Administrator windows; job logs, service logs, and UI logs. Logs are saved to assist with device errors as well as customer service call situations. They can be found in the StorFirst installation folder.

Use the defaults unless otherwise instructed.

The error level controls logging volume and the default is low, producing minimal logging. A log-file will end when the specified size has been reached and a new log-file will be started. The name of the job log file is the job name.

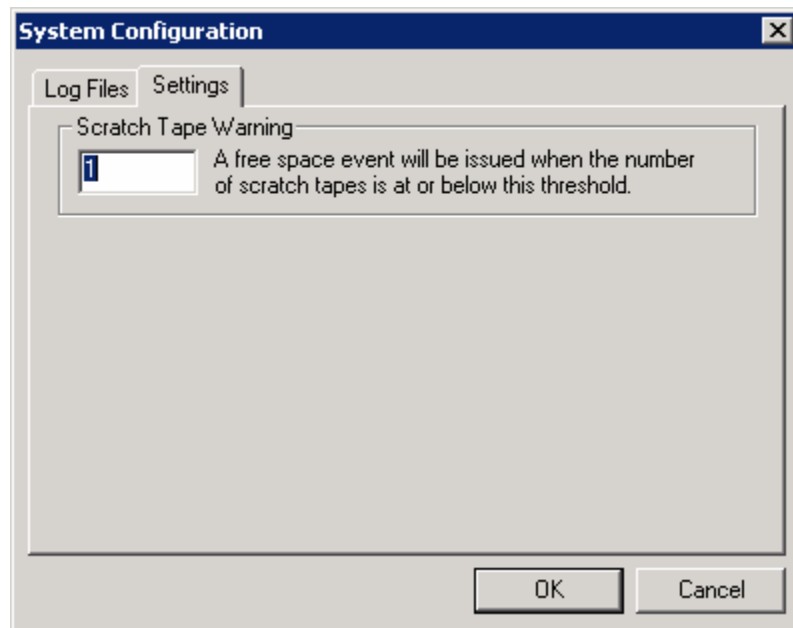
Disk consumption for system service logging is limited by log size multiplied by the number of such logs.



Jobs that complete and terminate when they are done will typically create a single log file. Recurring jobs on a never ending schedule will create logs that use disk capacity limited by size multiplied by number. Jobs are started manually so their logs are kept until the job is manually deleted.

## The Settings Tab

This tab controls the warning when you are running low on scratch tapes. A free space alert will be issued when the number of scratch tapes is at or below the number set.



## Help About

Displays the version and build date of StorFirst Altus, as well as, the Centera SDK that is distributed with StorFirst Altus.

## Alerts and Notification

Alerts represent important system events. All alerts are posted in the “Unacknowledged” folder and can be reviewed at the bottom of the tree window.

Duplicates are usually not delivered. Two observations of the same condition, for whatever reason are considered duplicates. The reason duplicates are unwanted is that it is possible that the same condition is discovered a large number of times inside a short span of time.

It is important to monitor and respond to alerts as proper system operation may depend on timely operator assistance. Most alerts represent conditions that require physical access to the system and intervention of some sort. At that time, always acknowledge the alert. A pending and un-acknowledged alert will, the next time that type of alert occurs, suppress the new alert; even if the events actually have differences.

*Note: Two different conditions of identical type are considered duplicates.*

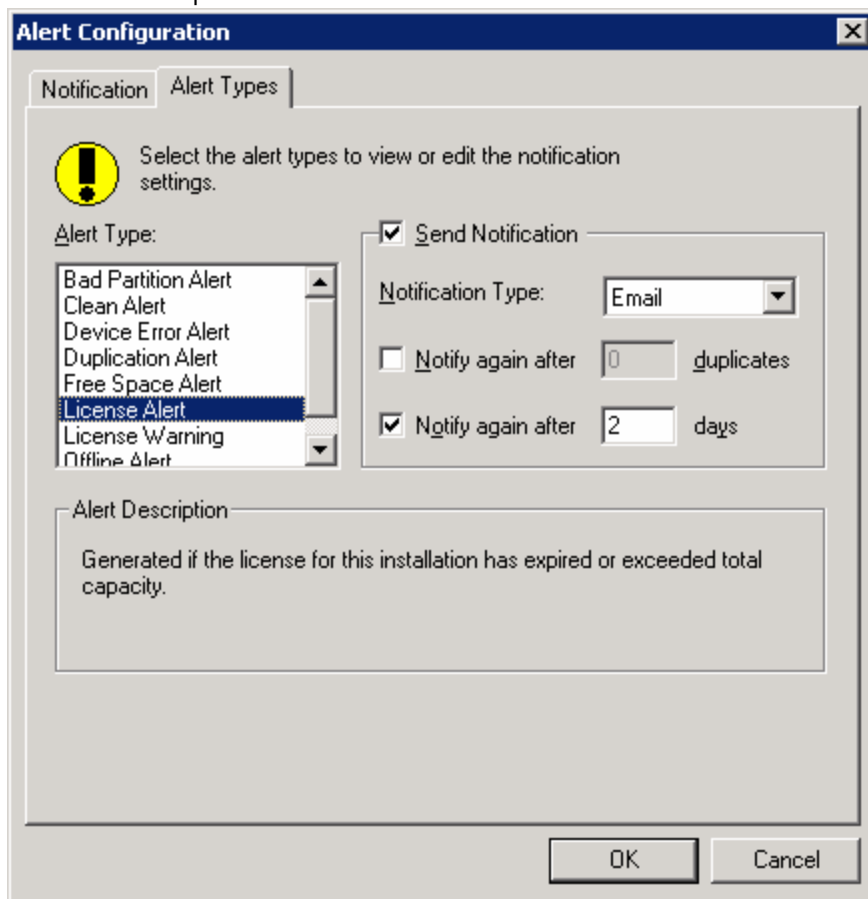
## Alert Types

Configure each alert type individually; making selections for each type, one at a time and repeat the process for all alert types:

Two observations of the same condition are considered duplicates. However the “Notify again after” option prevents message flooding while ensuring that conditions are not forgotten. We recommend re-notification after one day.

There are 8 alert types which are as follows:

- **Bad Partition Alert** – Reserved for future implementation. Please contact StorFirst support for more details if needed.
- **Clean Alert** – Generated when a drive is reporting that it needs to be cleaned.
- **Device Error Alert** – Generated in the case of a general SCSI or SCSI timeout error for libraries, drives or disks.



- **Duplication Alert** – Generated after a duplicate job is run. Includes any instructions an administrator might need to take.
- **Free Space Alert** – Generated if the system is running out of scratch tapes.
- **License Alert** – Generated if the license for this installation has expired or exceeded total capacity.
- **License Warning** – Generated when the license for this installation is approaching the expiration date or total capacity.
- **Offline Alert** – Generated when a piece of media has been offlined and is required for a restore job. The recovery for this alert is to reinsert the media back into the library.

## Alert Delivery

Alert Configuration is found under Tools in the menu bar. The StorFirst Altus Administrator software is accessible directly on the StorFirst server that may be located far from the workplaces of the administrator that supports the StorFirst application. It may be convenient to configure StorFirst to deliver alert notifications to other systems over the network, closer to the administrator.

Alerts can be delivered in one of two ways:

1. Broadcast
2. Email

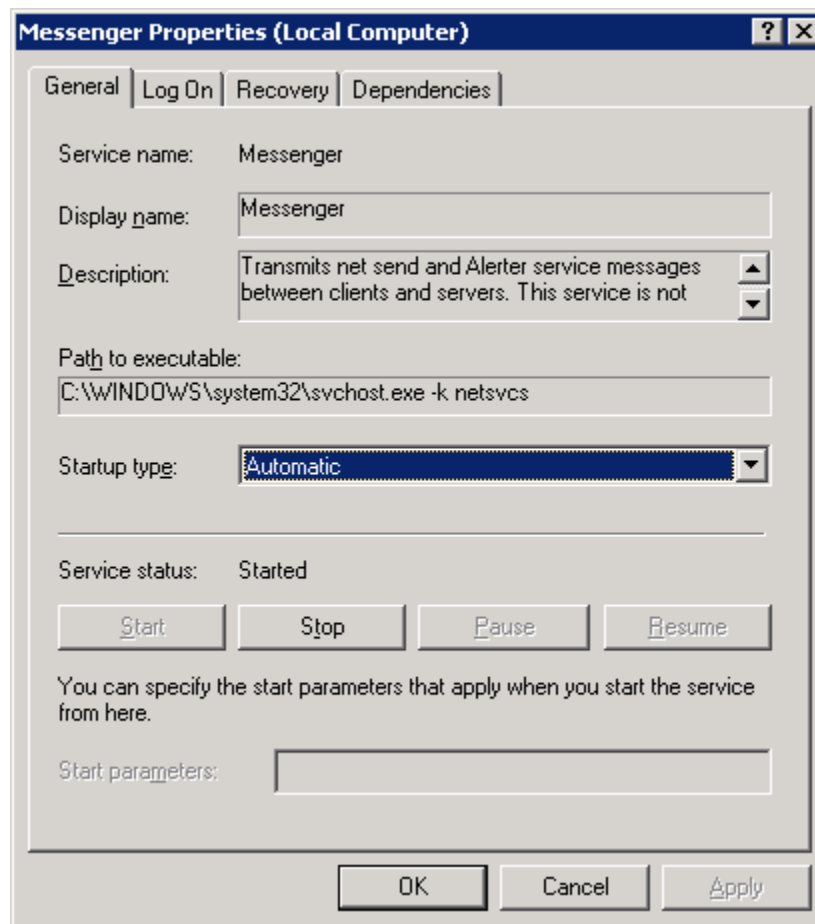
For broadcast, the default is delivery on the Altus server. This can be changed by entering the Domain and Machine name of the appropriate server.

For email, the default email server is Seven10's public SMTP Server. In some cases your StorFirst Altus server will be behind a firewall and will require a local SMTP Server. This can be changed by entering your company email address and your company's SMTP Server. Note: The username and password are optional.

## Broadcast Requirements

For Broadcast of pop-ups, the messenger service must be running on both the StorFirst server and the target system; even local delivery depends on this. The Microsoft default in Windows 2003 is disabled. To activate:

- Open **Control Panel** under **Settings** in the **Start** menu
- Open **Administration Tools**, then **Services**, then **Messenger**:
- In the **Startup type** list, select **Automatic**
- Click **Start** and then **OK**.



## Email Requirements

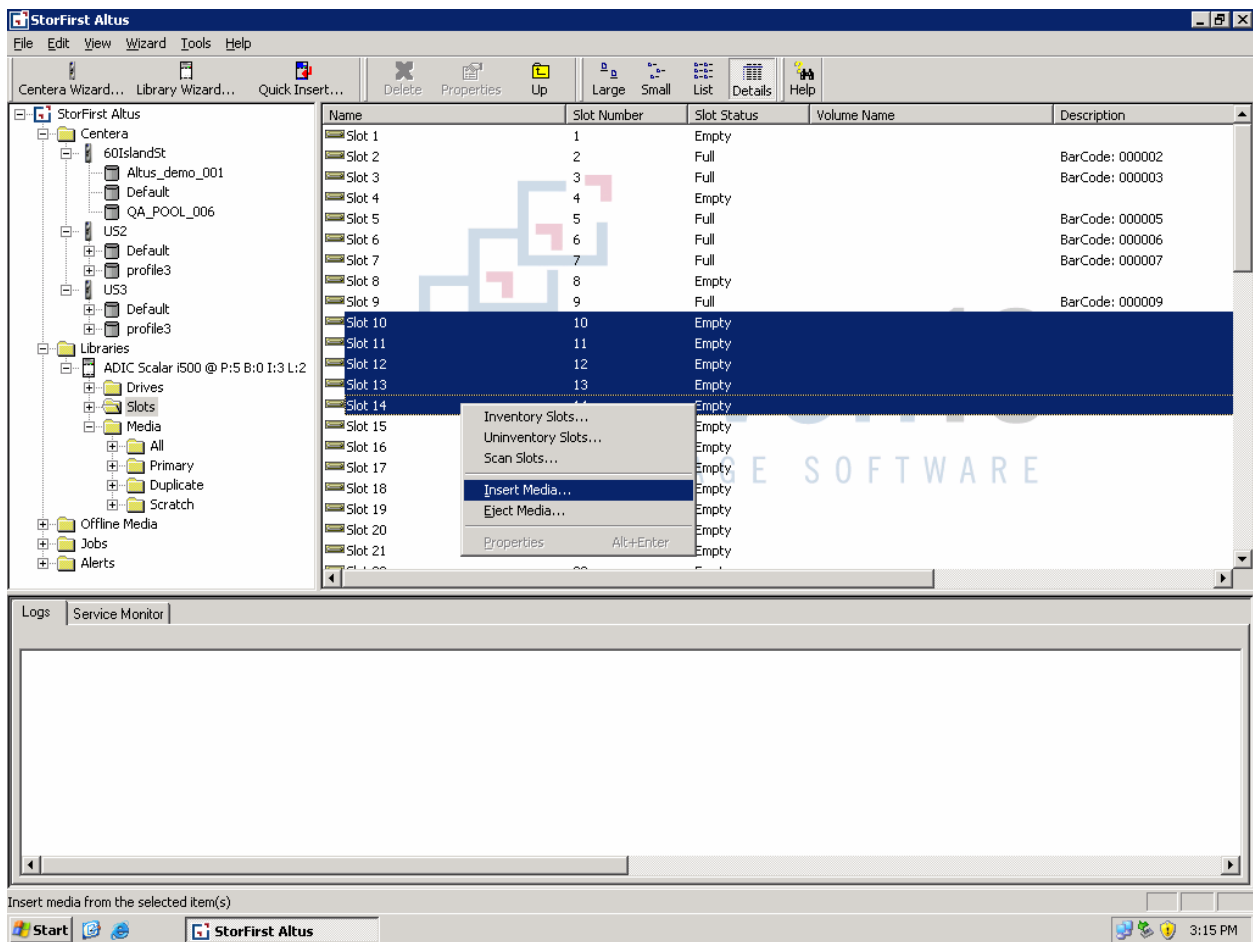
If your StorFirst Altus server is behind a firewall, you can use a local SMTP Server. This can be done by entering your company email address and your company's SMTP Server. Note: The username and password are optional.

# CHAPTER 5

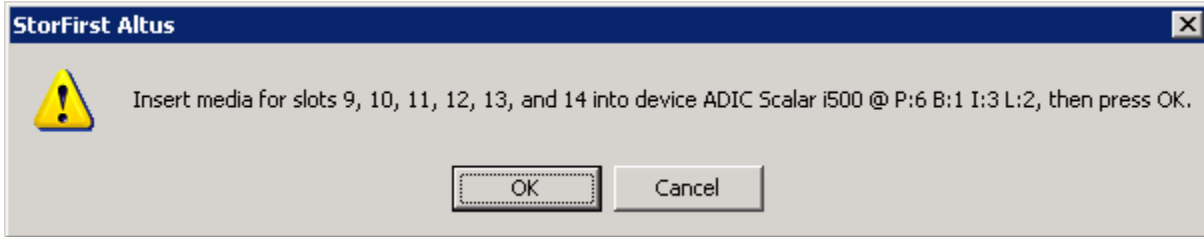
## TAPES & INVENTORY

Altus keeps unused tapes in a pool called the “Scratch”. Tapes that are partially or fully written are below the Centera Pool that is using the tape. The “Scratch” pool is stocked by formatting media using an inventory job. From there, media is provisioned automatically by replicate jobs as needed and placed in the appropriate Centera Pool media folder. Scratch media can also be assigned to virtual pools.

If the library is empty then start by inserting media. Select slots; right click, and select “Insert Media...”.



Altus will control the library and instruct you through the process.



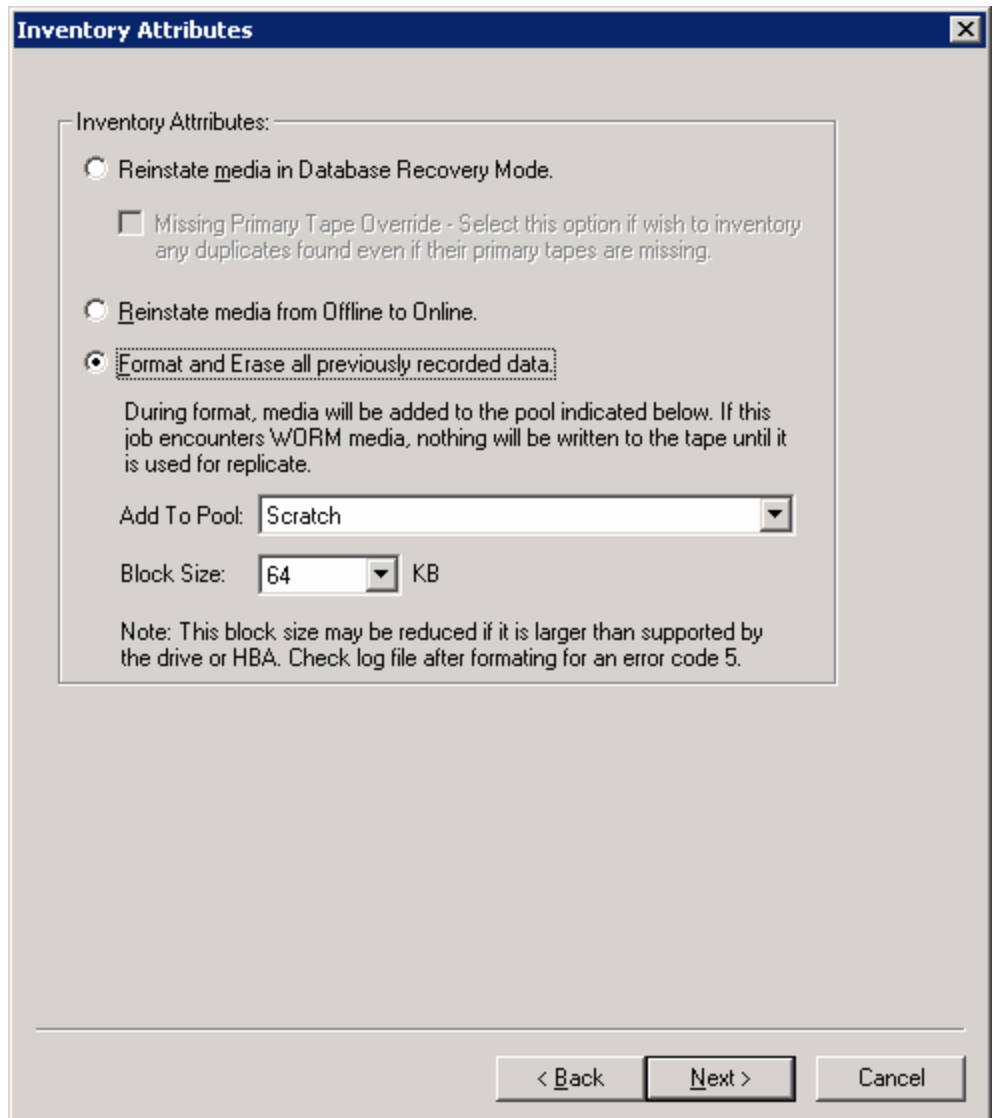
Load the tapes into the library as instructed by its operational guide. Many libraries require you to use its operator panel to open the door for media insertion.

After completion of the media insert operation, the slots will be full and the system will auto-launch an inventory job to deal with the just inserted tapes; this may be delayed using Cancel. Full slots may be inventoried anytime; select a slot or set of slots, right click, and select "Inventory Slots...".

## Inventory Job

Altus protects its own data tapes from accidental formatting by not allowing existing data tapes from an Altus instance to be inventoried. Any tape with valid data from this Altus instance will be recognized and formatting refused. Any other tape will be overwritten, including tapes from other Altus instances and tapes that were purged from this instance (see Uninventory section for more details).

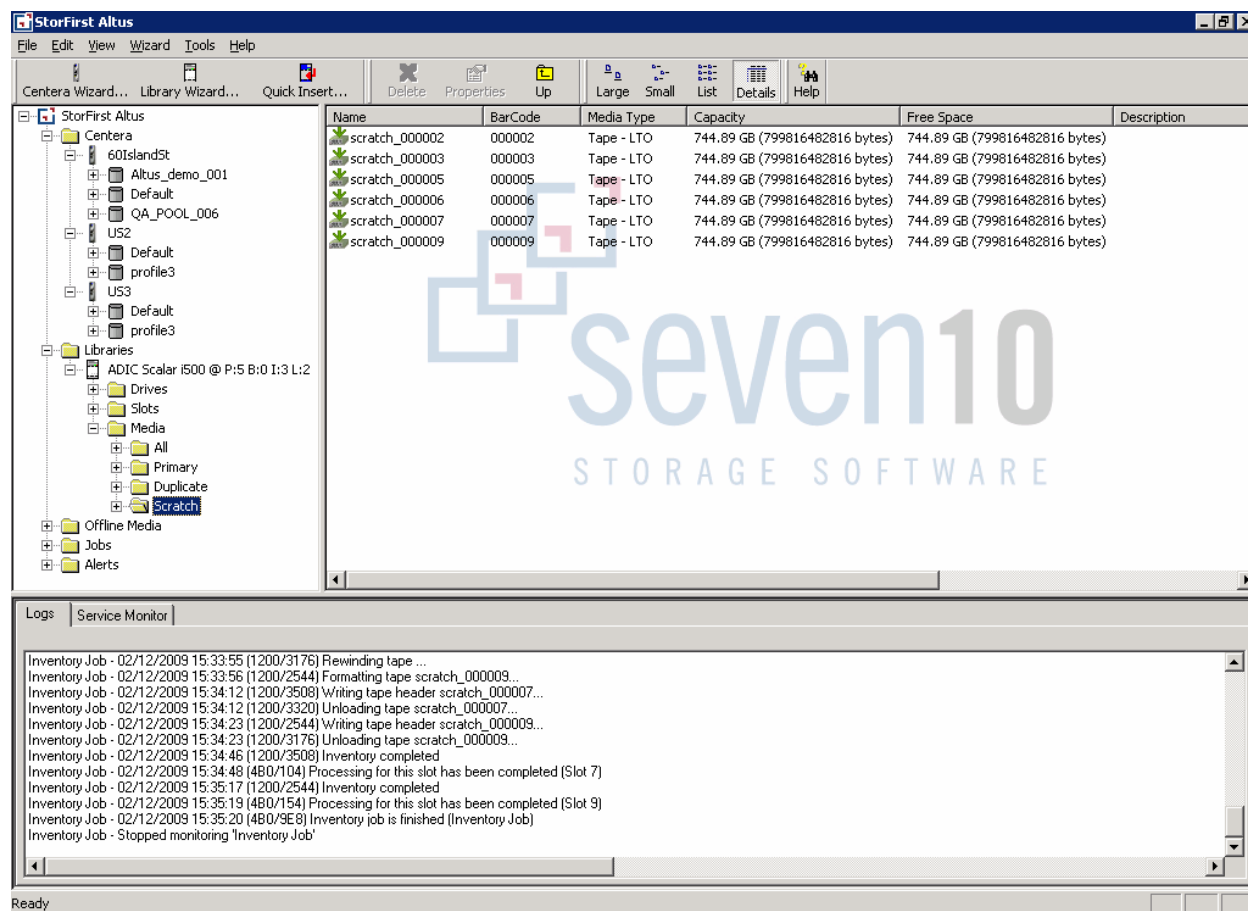
Tapes can be formatted with sizes ranging from 1KB to 2MB for better granularity, space saving and performance, depending on the Centera Virtual Pools dataset. The general recommendation is to set the block size at half of the average C-Clip size of the Centera Virtual Pool.



**Note:** Formatting will erase all prior data that may have existed on the tape.

Select the "Job" tab in the bottom window and watch the progress of the inventory job. This job can also be found in the pending job folder during execution. This job is likely to take some time as every tape is loaded into a drive and a header is written.

The inventory job delivers the new media to the Scratch Pool (or configured Centera Virtual Pool) where they will remain until they are provisioned by some job. The same tapes can also be found in the All folder under the Media folder under the device.



After completion, the inventory job moves to the completed folder and remains there until manually deleted.

## Tape Identification

All tapes must have readable bar codes. The initial tape name is "scratch" and the bar code. The final tape name is assigned when the tape is provisioned for use. Tapes are then identified by a time stamp and the bar code with the following format:

**yyyymmddhhmm barcode**

As tapes are loaded from slot to drive, the barcode is checked using the picker robot and the volume label is read from the tape and verified. In addition to name, the volume label identifies the tape as a proper Altus formatted tape and the Centera that provided the C-Clips. All operator references regarding offline tapes include the full name and thereby both identifiers.

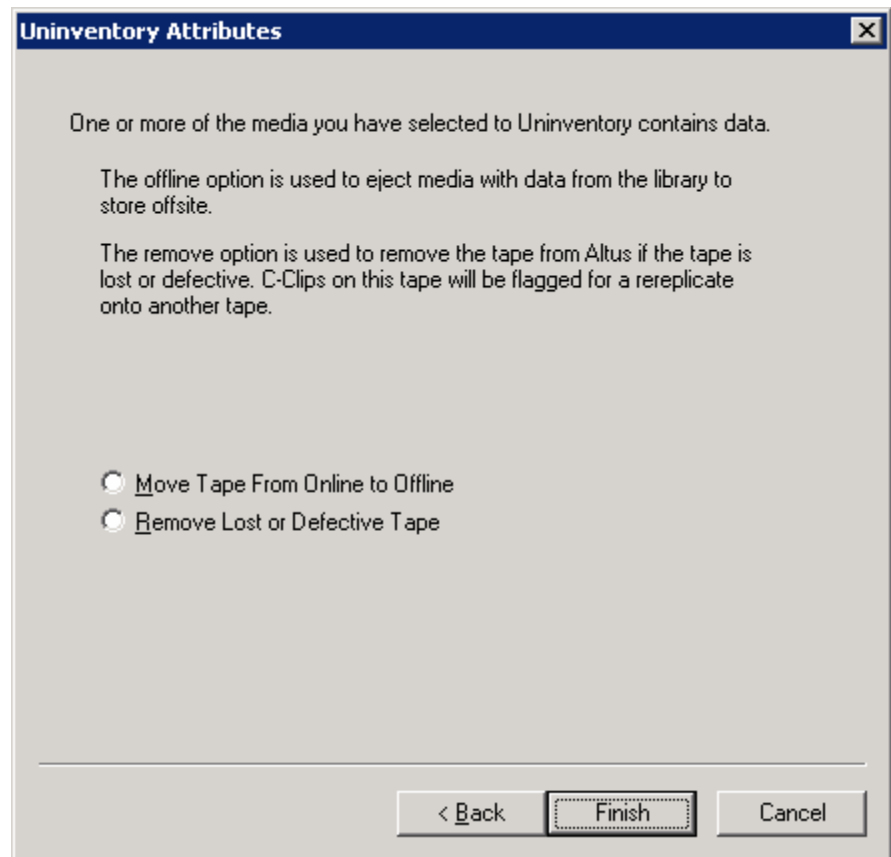
## Uninventory Job

### Offline

Data tapes are sometimes removed after completion for offline storage to make room for new blanks, increasing the system's effective capacity and/or providing the added protection of offsite vault storage. The uninventories job prepares tapes for ejection. Select tapes, right click and select eject. The eject command automatically initiates an uninventories job. Follow the instruction on the screen and in your library manual.

For tapes that are removed for offline storage, select "Move Tape From Online to Offline". Altus retains all internal information about the offline tape

content in its database. A replicate job would know not to replicate the data again, and a restore job will prompt the operator to re-load the tape. Offline tapes are kept visible in the offline media folder so they may be recognized when re-introduced via inventory.



### Remove Lost or Defective Tapes

Tapes may go bad or become lost or physically destroyed outside the library. In such cases these tapes should be removed from the library. This type of uninventories job removes all association of C-Clips to tape(s). Removal of a tape will cause replicate jobs to re-replicate the C-Clips that were lost by removed tapes. Remove applies to both online and offline tapes.

### Purge from the Database

Purge from the database is done by first uninventories all the tapes associated with the virtual pool and then right clicking on the virtual pool and selecting "Uninventories Virtual Pool...". This type of uninventories job removes all references to the C-Clips from the database. The tapes associated with the virtual pool may now be formatted for re-use or inventoried as a database restoration option.

**Note:** The Uninventories of a Virtual Pool option should only be used if you are removing the Centera Virtual Pool.

## Reinstating Tapes for Database Recovery

In normal operation; this form of inventory may be used to reverse an accidental purge operation. Replication may already have picked up some clips but no harm is done since duplicates are simply ignored; except for wasting space on tape. Its wider use is described later in the service chapter.

If this option is incorrectly used during normal operation then it will often fail. The error message will indicate one of the following reasons:

1. This is not an Altus tape
2. This is a known offline tape

**Note:** Please see Chapter 7 for information on Missing Primary Tape Override.

**Inventory Attributes**

Inventory Attributes:

Reinstate media in Database Recovery Mode.

Missing Primary Tape Override - Select this option if wish to inventory any duplicates found even if their primary tapes are missing.

Reinstate media from Offline to Online.

Format and Erase all previously recorded data.

During format, media will be added to the pool indicated below. If this job encounters WORM media, nothing will be written to the tape until it is used for replicate.

Add To Pool:

Block Size:  KB

Note: This block size may be reduced if it is larger than supported by the drive or HBA. Check log file after formatting for an error code 5.

< Back    Next >    Cancel

## Re-inserting Offline Tapes

Reloading a tape using the media insert option will change the slot status to full. These tapes may be subsequently recognized as online by an inventory job working on the filled slots:

Altus prevents accidental formatting of offline tapes. Altus rejects random tapes presented as offline.

In the event of a library replacement this inventory job performs the very useful procedure of recognizing all the tapes after their relocation. The full procedure is described in the service chapter at the end.

## CHAPTER 6

# THE REPLICATE JOB

Everything is now in place: Centera, the tape\VTL library, and a set of blank tapes. Altus replicates in lights-out environments with all functions automated. Altus replication is fundamentally different from traditional backup. Altus replication builds a single, complete and always synthesized copy of all the information in Centera by incrementally capturing new C-Clips. C-Clips cannot change so there is no need to replace old with new; simple accumulation is all that is necessary.

We are ready to create the ongoing replicate job that will be the normal state of operation unless interrupted by some exception event. A predictable exception event could be Altus running low on media. Equipment, site, or network failures represent other and less predictable exceptions.

Centera archiving may have begun before installation of Altus and it may contain data already or Centera may be blank. Regardless, we will

create a replicate job that will replicate all the C-Clips from Centera to tape. Initially, the job may be in catch-up mode. Eventually the job will settle into a mode of incremental replication and monitoring deletion of C-Clips on Centera. Start by right-clicking on the Centera Pool and select "Replicate...".

This job will usually be a permanent part of the system so you should name it for easy recognition. You may have several jobs on different schedules or serving different Centera units depending on configuration or windows of opportunity. Click Next to get to job attributes.

The screenshot shows a 'New Replicate Job' dialog box. The title bar reads 'New Replicate Job' with a close button (X). The main area contains a text input field with the text 'Replicate Job of Application Pool'. Below this, there are two rows of text: 'Created: Oct 6, 2008 - 17:14:41.00' and 'Modified: Oct 6, 2008 - 17:14:41.00'. Further down is a 'Description:' label followed by a text input field containing '12AM - 6AM Daily'. At the bottom of the dialog, there are three buttons: '< Back', 'Next >', and 'Cancel'.

## Replicate Job Attributes

It is easy to measure the actual performance of a replicate job using the information displayed in its status line. The measured rate of replication may be used to calibrate the replication schedule if for example, the average daily archiving volume is known. Increasing the number of drives will increase performance if Centera and the network can keep up. Vary the number of drives and compare the results. Environments with large C-Clip sizes (> 5MB) will also make good use of multiple drives.

Centera uses a cluster of processors for high availability and scalable performance. Performance is only gained to the extent that the clients are multithreaded. To that goal, the Replicate job offers multiple connections, each with its own thread. Roughly speaking, while the aggregate performance is increased by adding threads, each thread will consume a portion of the totally available Centera performance. Therefore, decrease the connections to limit the share of performance taken up by Altus versus other simultaneous Centera clients. If Altus will be scheduled to run replication during off hours then use the maximum setting, otherwise reduce it accordingly (for scheduling, see replicate job scheduling later).

Incremental replication implies that as Altus scans a Centera it will not waste time reviewing the same C-Clips every time

because once captured, there is no need. The reset option will force a rescan from the beginning and all C-Clips are verified against the Altus database. This option is time consuming and should be avoided.

Duplicate tape will trigger a tape duplication job on the virtual pool following the completion of this job.

**Note:** For more information about Tape Duplication please see Chapter 7 of this guide.

**Replicate Attributes**

Maximum Number of Connections: \_\_\_\_\_  
 Maximum number of connections relates to Centera performance sharing. Consult the documentation or StorFirst support professional for recommendations.

Maximum Number of Concurrent Drives: \_\_\_\_\_  
 This option will limit the number of drives used by this job allowing sharing of available drives for other jobs.  
 Note: You may not have more drives than connections.

Reset Incremental Replication  
 Select this option if you want searching on Centera to begin from the earliest clip recorded. This option will force a rescan that will be very time consuming.  
 Refer to chapter 6 of the Administrator's Guide or consult your StorFirst support professional.

Duplicate Tape  
 This option will trigger a tape duplication job on the virtual pool following the completion of this job.  
 There must be a virtual pool tape duplicate job created for this virtual pool using the automatic schedule for this option to have an effect.

< Back    Next >    Cancel

## Job Scheduling

Select the job scheduling option that is most suitable to your needs. The “now” option runs the job once until completion. Jobs that are run once are in the pending job folder during execution and then move to the completed job folder. The simplest option for scheduled a recurring job is daily, starting at a set (see image on right).

Jobs on a recurring schedule never complete and remain in the pending job folder; their next scheduled start time may be viewed in the details window.

**Scheduling**

Schedule Type  
Select the type of scheduling to be used when processing this job.

Type:  
Daily

Schedule Options  
Please set the starting and ending time for your job.

Start At: 12 AM

Stop At: 6 AM

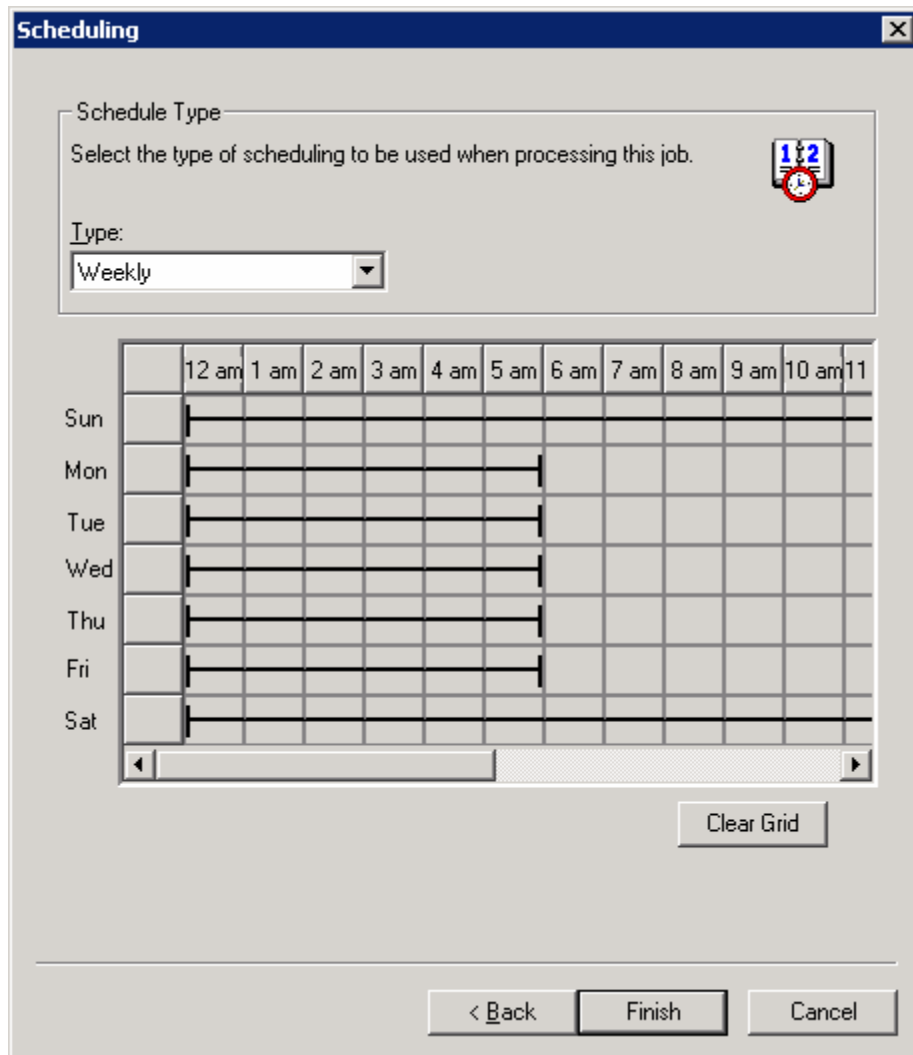
< Back Finish Cancel

## Advanced Scheduling

Think about your archiving and retrieve load patterns on Centera. If, for example:

- Daytime has light retrieval and low tolerance for long latency
- Early evenings have high archival rates
- Night and weekend activity is unusual and low priority

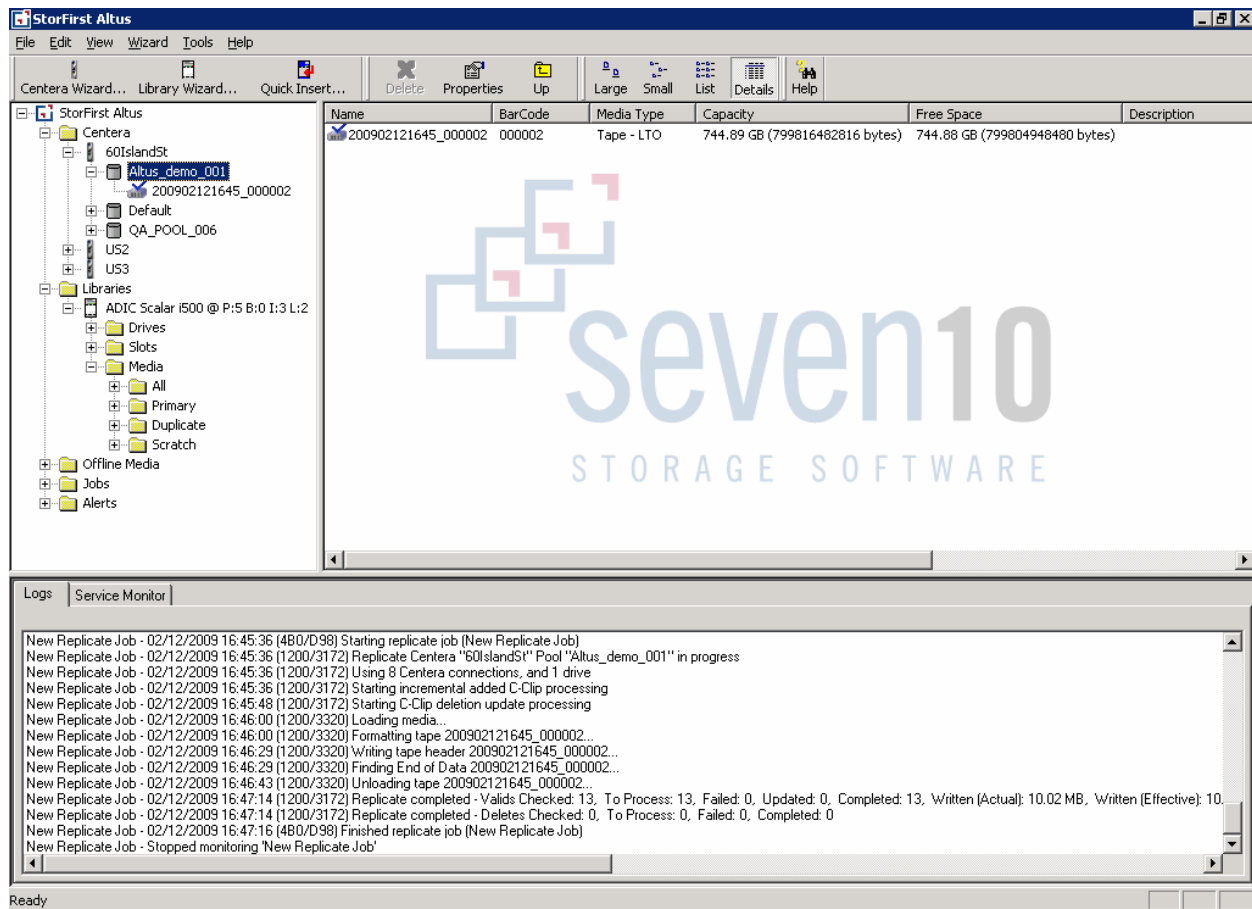
To match these patterns, we are going to create a weekly job that is running late nights during the work week and all weekend long to catch up, just in case.



## Replicate Job Execution

The replicate job will first replicate C-Clips that were lost by purging tapes (if any exist), then replicate newer C-Clips, and finally scan the entire Centera Virtual Pool for deleted C-Clips and mark the database accordingly. Note that there is a lag time between deletion in Centera and discovery by Altus that cannot be helped because Altus and Centera clients are not synchronized.

The replicate job provides up to date status information in the status line just below the Log tab.



"Valids Checked" shows the progress of scanning for C-Clips in the Virtual Pool in chronological order, starting where the last job ended. "To Process" represents the number of C-Clips that were placed in the job queue for replication, replication being a separate set of threads from scanning. "Failed" counts the C-Clips that had a replication failure during read and should normally remain at zero, implying some unexpected error transferring the C-Clip. Failed C-Clips will be logged by the service log. "Updated" represents duplicate Centera query results when replicating. "Completed" counts the C-Clips successfully transferred to tape. "Written (Actual)" is the amount of data that the completed C-Clips represent. "Written (Effective)" is the amount of data that the completed C-Clips represent on tape, but differs from Actual due to block size settings on tape. "Deletes Checked" represent C-Clip reflections deleted in the Virtual Pool before or after replication by Altus.

After final or session completion, the job will log the final numbers from the status line.

The job also updates the Virtual Pool attribute with the starting time stamp of the next replicate job and will resume replicating from that point. As described above, this function may be over-ridden and reset to the beginning of time by an attribute of a new replicate job. This Centera attribute may have importance in external audits of the Altus replication as described later.

A job will stop replicating from Centera on one of several occasions:

1. The job is done

2. The scheduled time window has ended
3. The job is stopped manually

Be patient; the actual job completion may take a substantial amount of time because buffered outbound data transfer is completed and the tape is rewind. The job will start again at its next start-time or if it is manually re-started.

## Multiple Replicate / Restore Jobs

Altus may have as many replicate / restore jobs as you please. Replicate and Restore jobs can run simultaneously on Virtual Pools on different Centeras, as well as, on Virtual Pools of the same Centera. If you want to replicate and or restore multiple Pools on the same Centera, please see the following requirements for each:

### Replication Job

One requirement for the Replication Job is that there has to be at least one drive freely available for the job to use when it is started. If the job specifies to use more than the amount available, the number of drives will be scaled back to the number not in use. If there are no drives available, the job will quit.

Another requirement is that there has to be enough threads from the free thread pool for the specified number of transfer threads. The Replication Job will not scale back the number of threads automatically, therefore, the administrator must be careful to configure overlapping scheduled Replication and Restore jobs appropriately. Please consult your StorFirst Altus support representative for recommendations in setting up multiple overlapping jobs.

### Restore Job

The requirements for the Restore Job are that there has to be at least 1 drive available and 32 threads available out of the job thread pool. This means that at most two restore jobs can be run simultaneously.

The restore job will automatically mount any and all available (i.e. not in-use) drives for use, therefore, the administrator must be careful to configure overlapping scheduled Replication and Restore jobs appropriately.

## Tape and Drive Use

When a scratch tape is provisioned from the scratch pool it is named using the Altus timestamp, the name of the Centera Virtual Pool using it is written to the tape, and from then on the tape is reserved for use by that Virtual Pool. C-Clips on tape are broken up in blocks and interspersed with blocks of other C-Clips. All blocks making up one single complete Centera C-Clip will be on a single tape. C-Clips do not span multiple tapes.

Tapes are first selected from the Media Pool belonging to the specific Virtual Pool, and then from the Scratch Media Pool. Tapes with the least remaining available capacity are selected first. If there are no available tapes the job session will terminate with an alert.

Each job uses all available tape drives up to the limit set by the job attributes. If there are no available tape drives the job waits until a drive becomes available or until its time slot expires. The total number of partially written tapes in a Virtual Pool media folder will not exceed the maximum number of drives used by its replicate jobs.

C-Clips are acquired in parts by a set of parallel threads and queued in memory. The data is streamed to tape using a cyclic buffer in memory for the highest possible performance.

When the replicate job reaches the end of a tape, the tape is closed. All together the tapes used by a single Centera Virtual Pool constitute a useful set.

## Replicate Verification

The replicate job is constantly scanning Centera for new C-Clips. The process reviews all C-Clips on the Virtual Pool and will replicate C-Clips that are not found in the Altus database. The Altus database is used to ensure that each C-Clip is captured exactly once. C-Clips that were deleted on Centera are identified and marked in the Altus database.

## Auditing Replication

In addition, Altus offers the option of external audits of its replication process. Right click on a Centera, a Virtual Pool or individual tapes and select "Report all C-Clips". This will start a reporting job that will produce a text file log of all C-Clips in Altus. The text file can be found in the Jobs Log folder of the Altus installation directory. Its name will be the same as the job name except the extension will be TXT. The format is C-Clip ID, Centera Name, Virtual Pool Name, Status, Create Time (GMT), Write Time (GMT), C-Clip Size, and Physical Media Name. The screenshot below shows a C-Clip report of a Centera Pool in Microsoft Excel format. Altus C-Clip reports can be easily imported in to Excel by doing the following:

Open Excel

Open File, browse to the place where the C-Clip report .txt file is stored

Choose the "delimited" option in the first screen of import. Do not choose the fixed width option. Click Next  
Make sure only the "comma" option is checked.

Click Finish.

Expand header columns (double click on the right edge) for readability.

C-Clip ID	Centera Name	Virtual Pool Name	Status	Create Time (GMT)	Write Time (GMT)	C-Clip Size	Physical Media Name
41U86POBHGU1eF2OS0HJ3V1P4N	60IslandSt	Altus_demo_001	Valid	4/14/2008 14:21	6/3/2008 6:08	1050228	200810081436_000003
DU05TPU9EPQITTeELPR917TM8EK9	60IslandSt	Altus_demo_001	Valid	4/14/2008 14:21	6/3/2008 6:08	1050228	200810081436_000003
4JJDJC3KLS5Ne9BL75SOUU8NJV	60IslandSt	Altus_demo_001	Valid	4/14/2008 14:21	6/3/2008 6:08	1050228	200810081436_000003
6S5PF18NFGUCDe17ABIDUBT3NOT	60IslandSt	Altus_demo_001	Valid	4/14/2008 14:21	6/3/2008 6:08	1050228	200810081436_000003
84ICOUOUV4BGLe4A58LSS4V7SE9	60IslandSt	Altus_demo_001	Valid	4/14/2008 14:21	6/3/2008 6:08	1050228	200810081436_000003
85EMDASKM9T93e7LV3AIHEAFNND	60IslandSt	Altus_demo_001	Valid	4/14/2008 14:21	6/3/2008 6:08	1050228	200810081436_000003
8JUUEUISL1AGCe67OUADTVRHCM	60IslandSt	Altus_demo_001	Valid	4/14/2008 14:21	6/3/2008 6:08	1050228	200810081436_000003
9GLHKDC96MF19eADE8EAUMBVPVU	60IslandSt	Altus_demo_001	Valid	4/14/2008 14:21	6/3/2008 6:08	1050228	200810081436_000003
AEDP1KLEJK2JAeE0KE7SPD5MTJ6	60IslandSt	Altus_demo_001	Valid	4/14/2008 14:21	6/3/2008 6:08	1050228	200810081436_000003
FGF5A74VJV2MLeBDM9I22J08AR1	60IslandSt	Altus_demo_001	Valid	4/14/2008 14:21	6/3/2008 6:08	1050228	200810081436_000003
UJ05R04OEGC57e9BP0LIGTHOB5A	60IslandSt	Altus_demo_001	Valid	4/14/2008 17:20	6/3/2008 6:08	1149	200810081436_000003
88LD1DCEBIBVTeFET9NBCBPPVQV	60IslandSt	Altus_demo_001	Valid	4/14/2008 17:20	6/3/2008 6:08	2643	200810081436_000003
AQF7S9OUeQ10e9G59MB012R01R	60IslandSt	Altus_demo_001	Valid	4/14/2008 17:20	6/3/2008 6:08	1095	200810081436_000003

Please Note: The C-Clip report text files can be used during restore when you select to "Restore by C-Clip ID" and choose to "Import C-Clip ID From File".

# CHAPTER 7

## TAPE DUPLICATION

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### Tape Duplication

The focus of tape duplication is to create full or incremental daily offlined backups of data. The driving force behind this feature is to give the user peace of mind that a C-Clip is located in more than one physical tape location.

In a CAS system, both the data and metadata for a file never changes. For this reason, the Replication Job in Altus is essentially always incremental. Once a C-Clip is successfully put onto a physical tape, there is no need to check the Centera to see if that C-Clip has changed.

Two important terms used to describe this feature are *primary tape* and *duplicate tape*. A primary tape is the tape a Replication Job uses to transfer C-Clips from a Centera onto a tape. A duplicate tape is used by a Duplication Job to transfer C-Clips from a primary tape to another tape.

CAS backup differs from traditional file system backup. The total set of data on a tape in Altus is by its very nature totally unique. Therefore, the goal of the duplication feature in Altus is to have one full tape and one full duplicate.

The most practical idea is to keep one tape in the library at all times which simply fills up constantly. Each day, the data on that tape is replicated to another tape. This other tape could either be kept in library to be used again for more duplicate data, or could be offlined and placed in a secure location.

In an incremental and offline scenario, this may require three tapes for the data on any given day, until a full second copy can be offlined permanently. These tapes include:

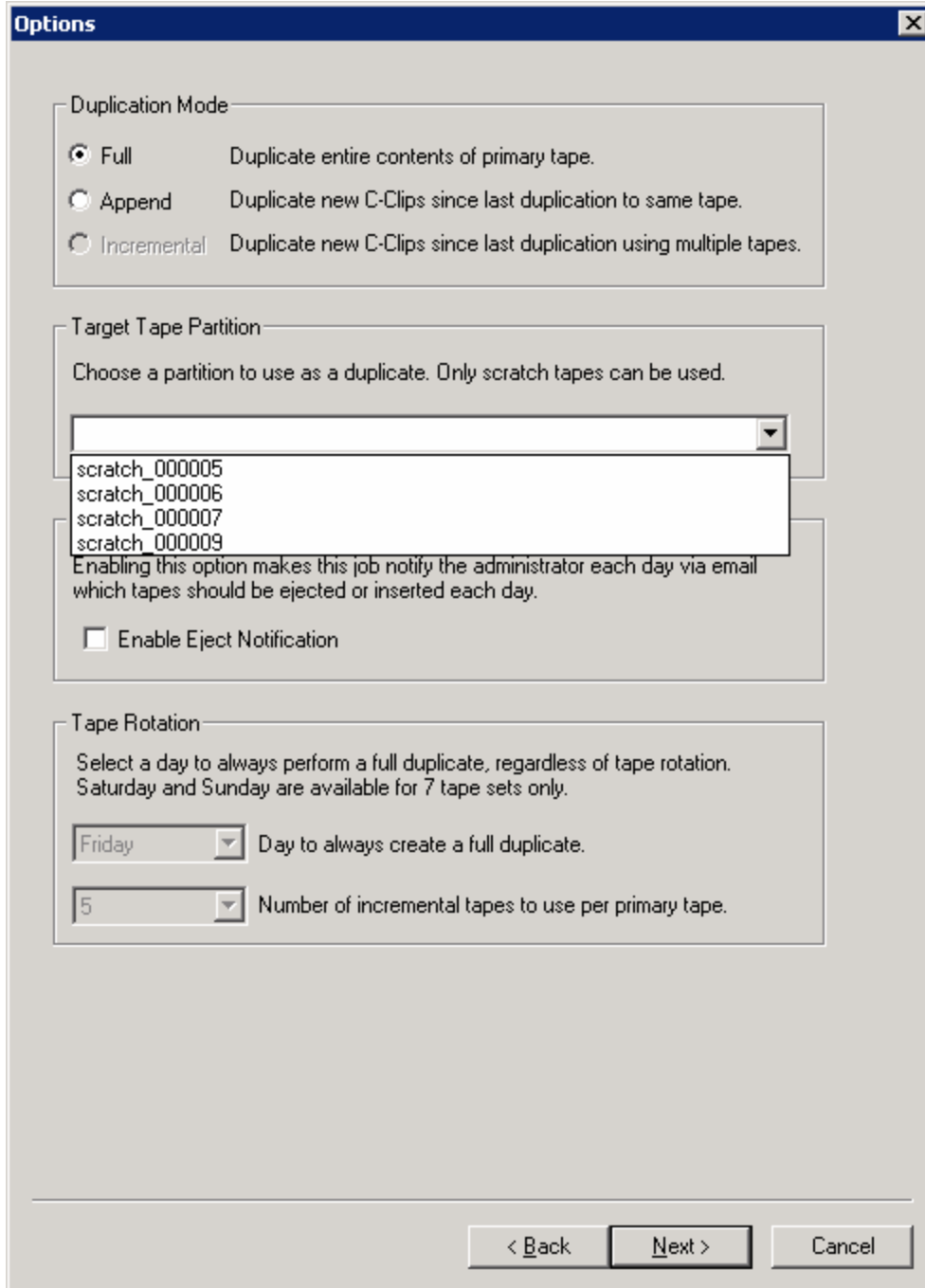
1. The primary tape used every day for the first copy of replicated data.
2. A full duplicate tape that keeps a second copy of all the replicated data.
3. One (or more) incremental tapes for duplicate data that has yet to make it out to the full duplicate tape, most likely because that full duplicate was offlined for a time.

### Tape Duplication Details

The two ways to create a duplicate of data are manual and automatic.

#### *Manual Type*

A manual duplicate can be created by right clicking on any primary tape and selecting "Duplicate Tape..."



With a manual duplication, the tape to use as a duplicate must be specified by the user. Only empty scratch tapes are available in the drop down box.

## Modes

1. The first option is "Full." If this option is selected, the job will format or reformat the selected tape and copy the entire contents of the primary tape to the duplicate tape.

Note: Because this job reformats the duplicate tape every time, there is the possibility of exposure to lost data should the primary tape become corrupt before the duplicate is created. Therefore, it is not recommended to rerun a manual duplication job using the same tape as a target.

2. The second option is "Append." If this option is selected, the job will format the selected tape once and copy the entire data content of the primary tape to the duplicate tape. If this job is run a second time, it will copy, by appending to the duplicate tape, only the data content which was new to the primary tape since the last duplication.

## Automatic Type

One or more duplicates can be created automatically by right clicking on a virtual pool and selecting "Duplicate Tape(s) in Virtual Pool..."

**Options**

**Duplication Mode**

Full Duplicate entire contents of primary tape.  
 Append Duplicate new C-Clips since last duplication to same tape.  
 Incremental Duplicate new C-Clips since last duplication using multiple tapes.

**Target Tape Partition**

Not applicable for this type of job.

**Eject Notification**

Enabling this option makes this job notify the administrator each day via email which tapes should be ejected or inserted each day.

Enable Eject Notification

**Tape Rotation**

Select a day to always perform a full duplicate, regardless of tape rotation. Saturday and Sunday are available for 7 tape sets only.

Friday Day to always create a full duplicate.

5 Number of incremental tapes to use per primary tape.

< Back   Next >   Cancel

With an automatic duplication, the job will automatically decide which tapes to use as duplicates. The job will search for eligible tapes from the virtual pool first, then search the scratch pool if required.

*Requirements of eligible tapes are as follows.*

1. Must have a block size less than or equal to the primary tape.
2. Total size of the tape must be greater than or equal to the current amount of data on the primary tape.
3. Must be enabled.
4. Must be online.
5. Must be blank or already part of the incremental set for this primary tape.

## Modes

1. The first option is "Append." The purpose of the Append type is to incrementally write to one duplicate tape until the primary tape is full, at which point both tapes are finalized and become read-only. At this point, one or both of the tapes can be offlined.
  - a. If this option is selected, the job will format the selected tape once and copy the entire data content of the primary tape to the duplicate tape. Once this job is run a second time, it will copy, by appending to the duplicate tape, only the data content which was new to the primary tape since the last duplication.
2. The second option is "Incremental." The purpose of the Incremental type is to incrementally write to 2 or more duplicate tapes until the primary tape is full. These 2 or more duplicate tapes can be offlined after each duplicate job session, normally each day, in order to ensure a two site data disaster recovery scenario.

## Eject Notification

If this option is checked, a Duplication Alert notification will be issued by the system if action is to be taken by the user. Please see the section in Administration Guide that deals with Alert notifications and types. The default notification method for this Duplication Alert is by email.

For example, if an incremental mode is selected, after a duplication job is run, an instruction will be issued to eject from the library the tape just used to duplicate. If a tape is to be used the next tape for a duplicate and that tape is offlined, the instructions will also indicate which tape to bring back into the library and insert.

Whether or not this option is checked, these instructions can be manually viewed by the administrator by looking at the job's instruction log. To view this, right click on the job and select "View Instruction Logs..."

## Tape Rotation: Number of Tapes in Set

This option specifies how many tapes to use in an incremental set *per primary tape*. The minimum number of tapes is 2 and if set will create a full duplicate per primary tape each day using 2 tapes.

If no new data is written to the primary tape in any given day, the duplication job will detect this when run and will not advance the rotation by duplication unless the rotation or day specifies a full duplicate is scheduled.

**Note:** The rotation is advanced each time the duplication job is run if and only if the duplication job actually transferred C-Clips to a duplicate tape.

## Tape Rotation: Day to Always Create a Full Duplicate

This option can either be set to "Rotation Only" or can be set to a certain day of the week. With rotation only, the rotation strictly decides which days of the week to create a full duplicate. This can best be described through an example. If a 3 tape set is selected:

1. The first day the job runs, a full duplicate is created.
2. On the second day the job runs, an incremental duplicate is created.
3. The third day the job runs a full duplicate is created using a third tape.
  - *Note: At this point, the data on the first and second tapes is considered unnecessarily redundant and the duplication job will overwrite these as necessary.*
  - *Note: If necessary, these tapes can be uninventoried and provisioned for use elsewhere by the user.*
4. On the fourth day, the job will create an incremental copy of the primary tape since the last duplication and it will use the first tape in the set, as seen in step 1 above, to do so.
5. On the fifth day, the job will create a full copy of the primary tape using the second tape as seen in step 2 above.

When selecting a day to create a full duplicate, if the duplication job is run on that day, a full duplicate will be created, regardless of whether the rotation specifies so or not.

This rotation mechanism ensures that no duplicate data is ever overwritten unless it is redundant, i.e. there is *more* than 2 copies of that data.

**Note:** Saturday and Sunday are only available if using a 7 tape set to avoid duplicate creation on weekends where user intervention may be required.

**Note:** If the duplication job is run multiple times in the same day on the full day override, it will create a full duplicate each time.

## Duplication Job

At the completion of a duplication job, the duplicate tape will be fully part of the set of duplicates for the primary tape.

Once the primary tape becomes full, it gets finalized. This can be observed by noting that the free space of the primary tape is zero. If an incremental job encounters a primary tape which is finalized, it detects whether a finalized duplicate exists and if not creates one. After completion of the job, from this point forward the Duplication Job will ignore the primary tape. If the administrator wishes to create another duplicate of the primary tape, this duplicate will need to be created manually.

For any manual duplication jobs, if the primary tape is finalized the duplicate tape will also be finalized.

## Uninventory

1. If a primary tape is uninventoried because it became missing or was damaged, Altus attempts to assign all C-Clip's primary locations to duplicate tapes. Any C-Clips that did not make it out to the duplicate tapes will be flagged for a Re-replicate from the Centera if and only if the C-Clips were not deleted.

Altus' first preference is to assign C-Clips to tapes which are completely full, up to date duplicates of primary tapes. In this instance, the full duplicate essentially becomes a primary tape and all incremental tapes become uninventoried and can return to the scratch pool to be used for other purposes. If no full up to date duplicate exists for the primary tape, then all tapes, full or incremental become themselves primary tapes to be used for Replication Jobs and to be eligible to have a duplicate created of them.

2. If a duplicate tape is uninventoried, all locations of C-Clips on that tape are removed from the database and those C-Clips become eligible to be duplicated to another tape.

*Note: An uninventory should not be performed unless a.) the administrator wants to offline tapes or b.) primary or duplicate tapes are actually lost or defective.*

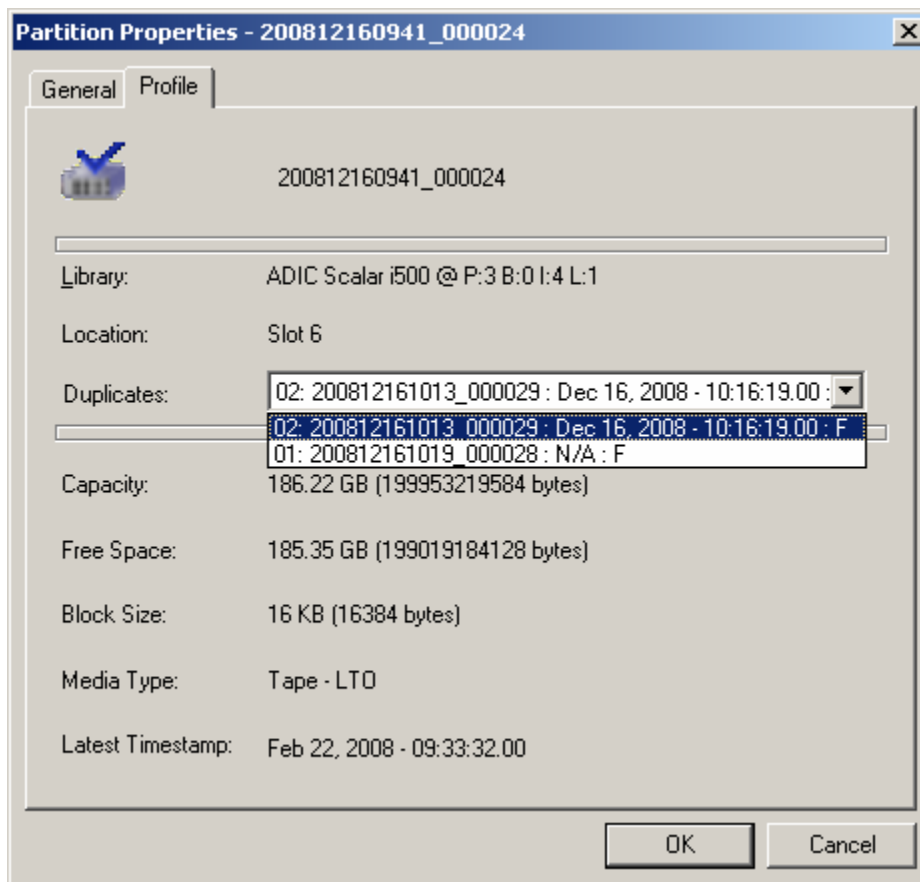
## Inventory

1. Inventory of primary tapes is not affected by the duplication feature.
2. Inventory of duplicate tapes requires than the primary tape be inventoried first. If it is not, the job will not allow a duplicate tape to be inventoried. If however the primary tape was lost or defective, the duplicate tape may be inventoried as a primary tape by selecting the *Missing Primary Tape Override* check box as part of the inventory job.

## User Interface

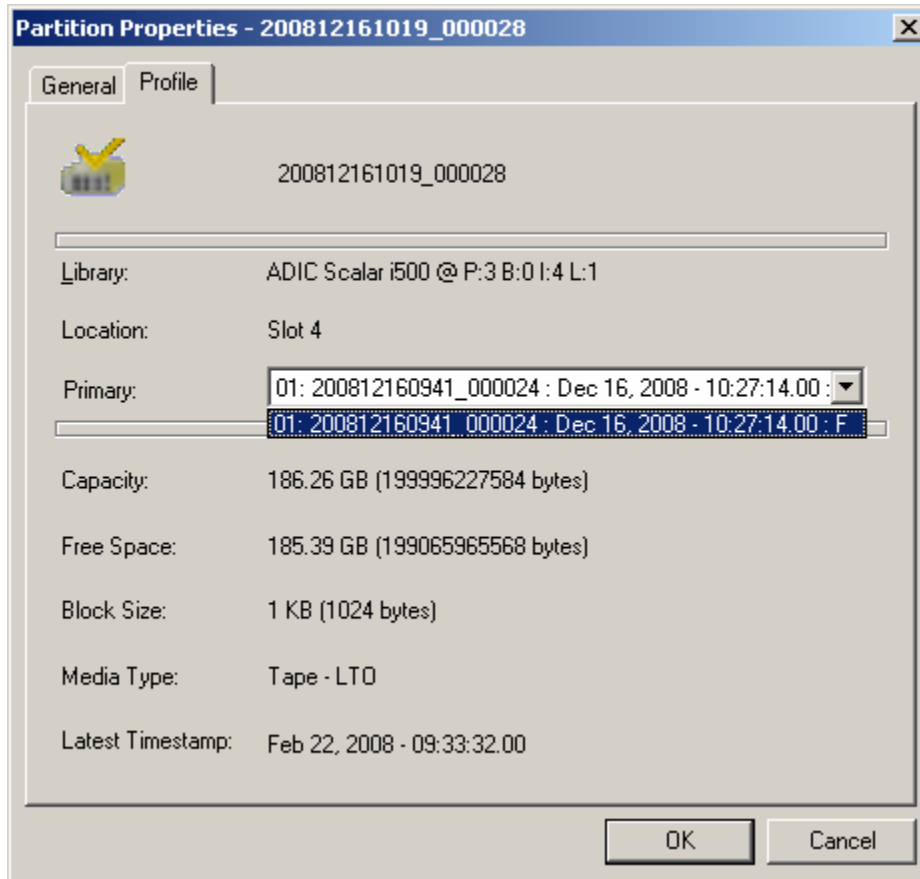
The StorFirst Altus Administrator has a few ways to determine whether a tape is a primary tape or a duplicate tape. The first is through a tape's properties, which can be accessed by right-clicking on the primary tape. If the tape is a primary, it will list its duplicates, if they exist, in a drop down box. The format of entries in the box is as follows:

Number in Incremental Set: Duplicate Tape Label : Date Duplicate Written To : Full or Incremental.

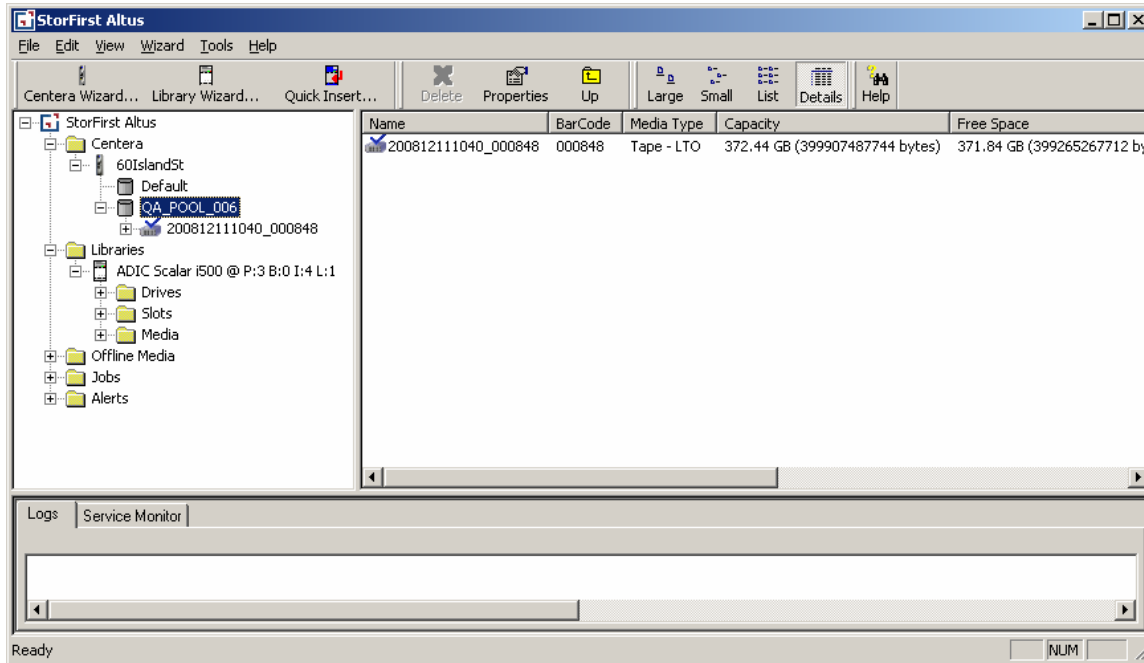


If the tape is a duplicate, it will indicate its primary tape in the drop down box. The format of entries in the box is as follows:

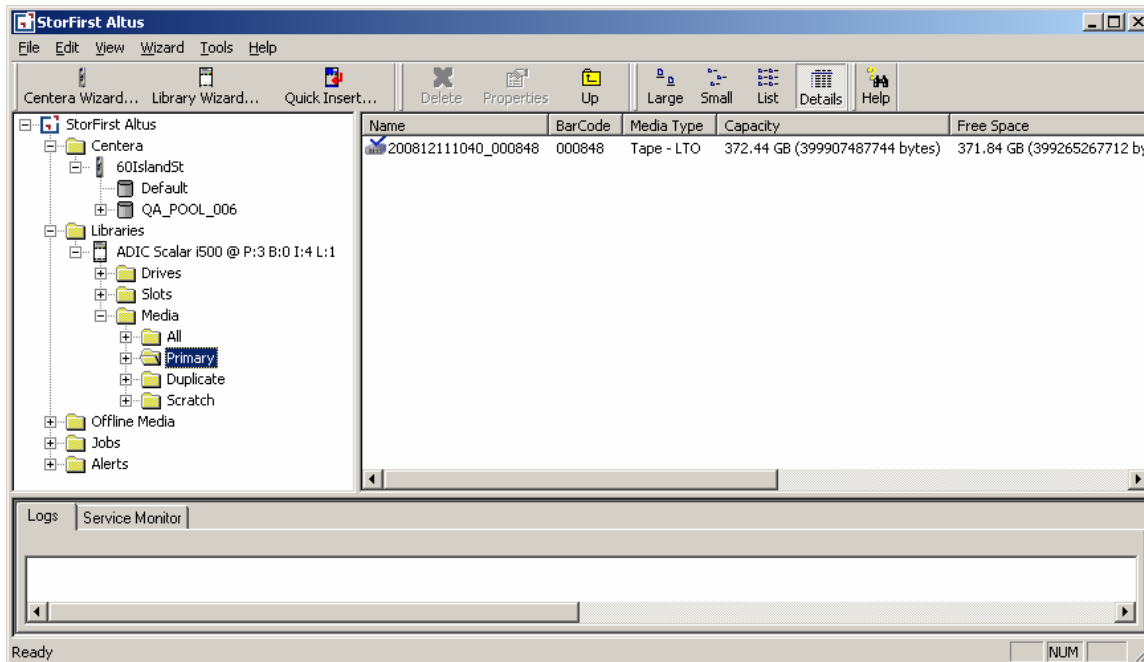
Number in Incremental Set: Primary Tape Label : Date Duplicate Written To : Full or Incremental.



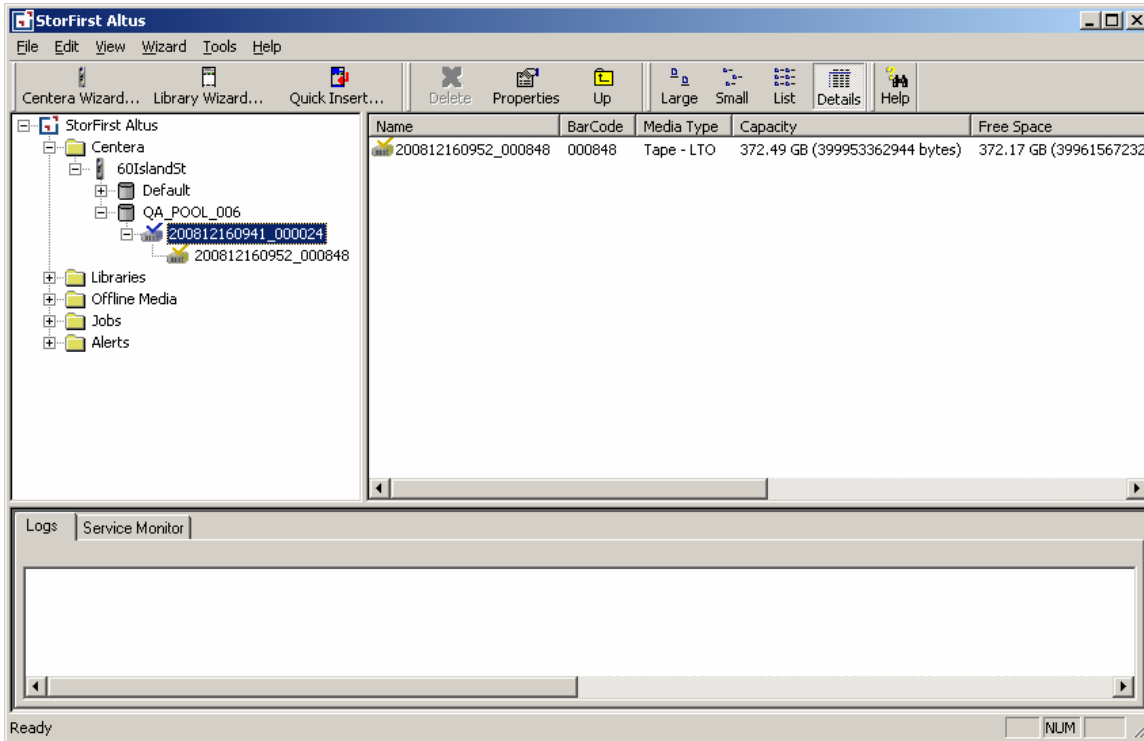
Primary tapes are listed under the Virtual Pool Folder:



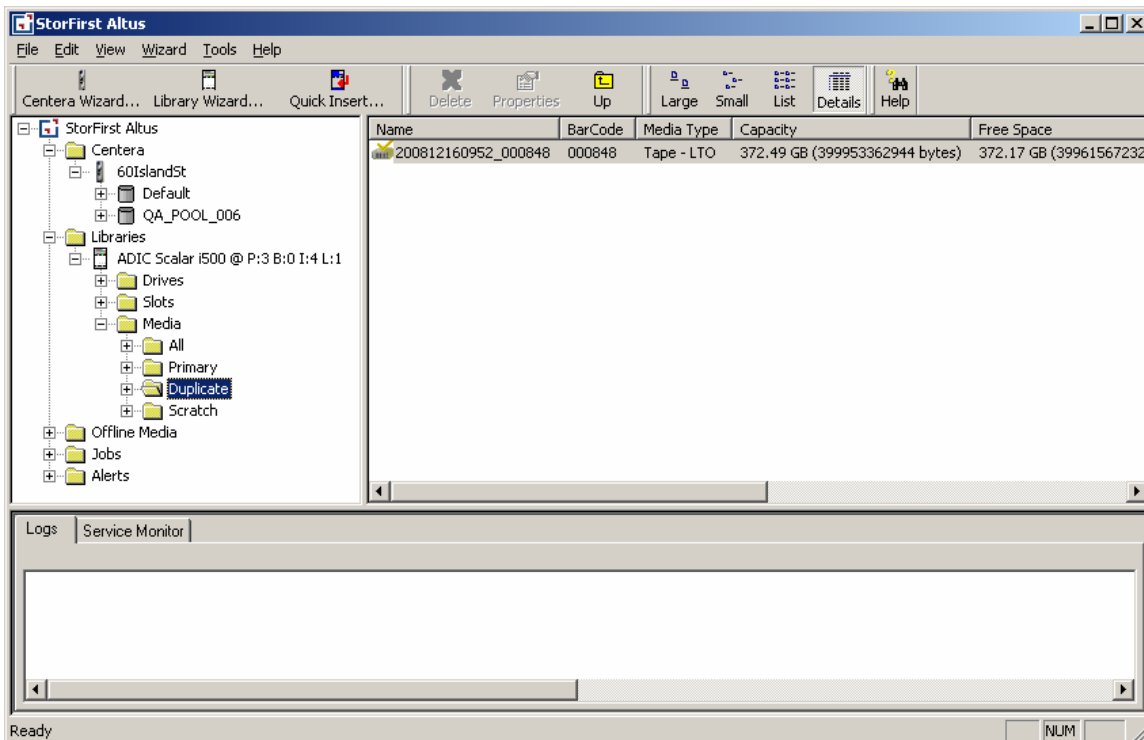
Primary tapes are also listed under the Library's Media folder:



Duplicate tapes are listed under the Primary Tape:



Duplicate tapes are also listed under the Library's Media folder:



## CHAPTER 8

# MANAGING RETENTION

---

Each Centera C-Clip includes the creation timestamp and the intended time period of retention. Deletion is always up to the applications that are archiving to Centera. In compliance mode, Centera does not allow deletion before expiration, otherwise deletion is allowed anytime. Altus saves the entire Centera C-Clip including the metadata used by Centera for retention management. If a C-Clip is deleted in Centera and restored from Altus then its metadata is restored as well.

Altus Retention Management is based on these principles:

1. Altus will never delete C-Clips on Centera
2. Altus has features for extended management of retention after deletion on Centera

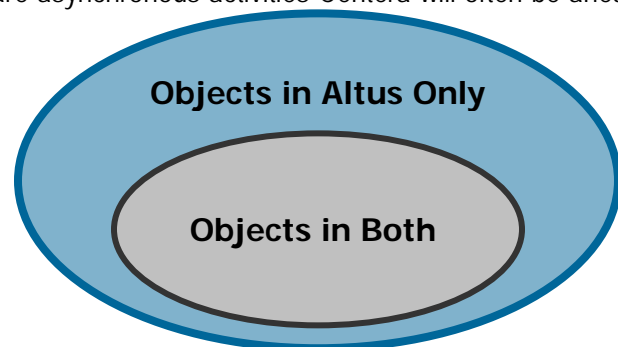
Therefore, this chapter is entirely about keeping C-Clips in Altus after their deletion on Centera and how this affects options for restoration to Centera from the set of C-Clips kept by Altus.

Retention management always has two conflicting requirements, both valuable depending on business and compliance needs. Availability objectives direct toward proliferation of copies. Liability and privacy requirements direct toward few and controlled copies. Altus is initially directed toward the data availability enhancement.

### Data Availability

Since archiving to Centera and replication to Altus are asynchronous activities Centera will often be ahead of Altus, therefore, look at the picture to the right as the goal of Altus. Centera deletion is discovered in Altus with a random delay by a replicate job that marks the Altus database accordingly.

The C-Clips, including the retention parameters obtained from Centera, are retained in Altus without time limits. The objective is to logically enlarge Centera capacity without incurring the costs of physical upgrades while retaining the complete data set. Operated this way, Altus keeps all C-Clips without time limits regardless of any Centera deletion. Deleted Centera C-Clips are retained in the Altus database and physically retained in Altus on tape without time limits. The deleted C-Clips may be excluded from restoration in the Restore Job. Deletion on Centera is marked in the database while the tapes remain unchanged. This presents a separate disaster recovery concern that will be discussed later.



## CHAPTER 9

# THE RESTORE JOB

This chapter describes restoration of C-Clips from tapes to a Centera. Restoring data from Altus to Centera would be considered a disaster recovery scenario if it resulted from a Centera failure, however restoration may also simply be the need to restore C-Clips that were deleted by mistake or it may be the result of a change in configuration or equipment deployment.

**Note:** Altus only allows one active replicate or restore job per Centera Virtual Pool; therefore make sure to stop replication from the target before starting restoration.

## Target Selection

The target Centera Pool is selected by right clicking on a Centera Pool & selecting "Restore...".

## Restore Type

Restoration is logically defined as the equivalent of a copy process from one lost Centera to another Centera. The target Centera was selected with the right click that began the creation of this Replicate Job. The logical source Centera, now possibly only existing in Altus and not physically available will be selected after selecting a restore type in the menu. Source and target Centera Pools may be the same.

The "Restore All" type makes this job restore all C-Clips from source to target. However, you may override this to restore on one tape on the following page.

Restore Type

Choose the "Restore All" option if you would like to restore all C-Clips from all tapes.

Choose the "Restore by C-Clip ID" option if you would like to restore specific C-Clips from tape.

Choose the "Restore by Date Range" option if you would like to restore all C-Clips with a Centera create time (GMT) within the specified date and time range from tape.

Restore All

Restore by C-Clip ID

Restore by Date Range

between: 10/ 9/2008 14:30:23

and: 10/ 9/2008 14:30:23

< Back Next > Cancel

The “Restore by C-Clip ID” option will give the user the ability to specify specific C-Clip IDs to the job through a file or manually entering them into a field.

The “Restore by Date Range” is similar to the “Restore All” type, except the date range refers to the time of C-Clip creation that remains an unchangeable attribute of all C-Clips.

## Centera Source Selection

The source logically defines the Centera Pool from where the C-Clips were originally replicated and may be different from the target; in fact the source may have been entirely lost in some site disaster. All Centera Pools ever configured may be selected as the C-Clip source since the real source will be the Altus tapes. C-Clips that were found to have been deleted on a Centera Pool may be restored or excluded from restoration. By default, source and target are the same. Use the drop down menu to select a different source pool.

At this point we are set to restore from a given source, all C-Clips, or all C-Clips from any time window to a given target. C-Clips that were found to have been deleted on the source may optionally be excluded.

Additionally, the user may click the Override Source Tape option and choose only one specific tape, belonging to the Source Pool, to restore C-Clips from.

**Restore Centera Options**

Target Pool: 60IslandSt\Altus\_demo\_001

Source Pool: 60IslandSt\Altus\_demo\_001

Override Source Pool - If checked, you will have the option to restore C-Clips which belong to a different Centera Virtual Pool than the target.

Source Tape: [Dropdown]

Override Source Tape - If checked, you will have the option to restore C-Clips which reside on one particular tape partition.

< Back    Next >    Cancel

## Restore Attributes

### Restore Deleted C-Clips

Check this box if you want to restore C-Clips that were previously deleted from the Centera Pool.

To be sure all deletes get restored to the Centera Pool, make sure the replication is fully up to date on this Pool.

Leave this box unchecked if you do not want to restore previously deleted C-Clips to the Centera Pool.

To be sure all deletes do not get restored to the Centera Pool, make sure the replication is fully up to date on this pool.

### Open Verification Check

Check this box if you don't want to restore C-Clips that already exist on the Centera. Altus will issue an Open C-Clip command to Centera to determine whether the C-Clip exists.

**Restore Deleted C-Clips**

Restore C-Clips even if they were previously deleted from the Centera. Choosing this option will include in this restore job any C-Clips which were removed from the Centera through an application specified deletion.

**Open Verification Check**

Do not restore C-Clips if they can be opened on Centera. Choosing this option will make Altus open each C-Clip and ignore those C-Clips which are opened successfully. If left unchecked, Altus will restore the C-Clips regardless of whether it can be opened.

NOTE: C-Clips which were opened successfully will be indicated in the job's logs as "skipped."

< Back    Next >    Cancel

## Restore by C-Clip ID

The C-Clip ID is not often available to an administrator. It is used by the application or gateway with the Centera API. C-Clip IDs are often stored in metadata kept by these applications and may in some cases be discovered by special inquiries using those applications.

When restoring by C-Clip ID you have a choice to enter it manually or import from a file. When entering manually, there is a limit of 200 C-Clips per restore job. When importing from a file there is no limit on the number C-Clips.

**Please Note:** The C-Clip report text files can be used during restore when you select to “Restore by C-Clip ID” and choose to “Import C-Clip ID From File”.

## Restore

C-Clips are in all cases restored completely with their original Centera authentication and meta-data intact using a restore function in the Centera SDK for exactly this purpose.

Altus delivers the complete C-Clip to Centera, Centera computes the authentication code and checks the computed code against its original code. The creation time stamps and the retention parameters are also restored by this method.

**Restore Centera Options**

Target Pool: 60\islandSt\Altus\_demo\_001

Source Pool: 60\islandSt\Altus\_demo\_001

Override Source Pool - If checked, you will have the option to restore C-Clips which belong to a different Centera Virtual Pool than the target.

Manually enter C-Clip IDs or import from a new line delimited text file:

Manually Enter C-Clip IDs (200 Count Limit)

Import C-Clip IDs From File (No Limit)

From File

Browse

Manually Enter C-Clip ID(s) To Restore

Clip Id	Created

Add

Remove

Modify

Import

< Back    Next >    Cancel

## Offline Tapes

All required tapes should be online for the restore job. Should any of the tapes required by the job be offline when the job starts then it will immediately list the missing tapes in its log, one line per tape as follows:

```
Clips from OFFLINE tape 200810101533_000311 skipped - bring tape online and restart the job to complete restore.
```

At completion, bring the tapes online and restore using the restore by individual source tape feature.

## Duplicate Tapes

Altus only restores data from Primary Tape(s). In order to restore from Duplicate Tape(s) you must uninventory the Primary Tape(s). This will promote the Duplicate Tape(s) to Primary Tape(s) and you can now restore from what were previously Duplicate Tape(s).

## C-Clip Duplication

Identical C-Clips stored on different Centera units will be considered different by Altus and each different C-Clip is captured exactly once by Altus. It is worth noting that identical copies of C-Clips restored to different Centera units are also considered different by Altus so multiple copies may be captured in such cases.

For example, if C-Clip "FOO" is stored on Centera A and replicated by Altus, then restored to Centera B, replication by the same Altus instance from Centera B to tape will create a second copy. This ensures that selectively restoring from Centera B's C-Clip set to Centera C later will be simple and complete.

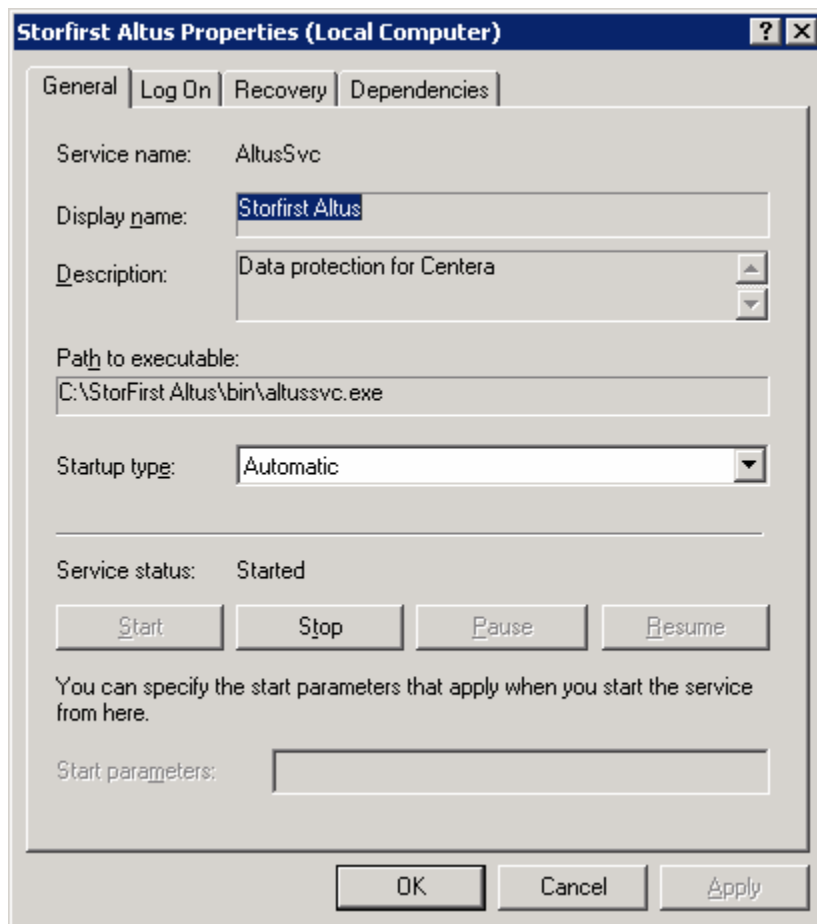
# CHAPTER 10 SUPPORT SERVICES

## StorFirst in Windows

The StorFirst software is delivered and copied to a distribution folder of your choice; usually via a zip file downloaded from our FTP site. The installation process creates the StorFirst Altus Destination folder with the software, database & log file folders.

The running StorFirst Altus system is in two parts on your server. The StorFirst Altus Service is in the background and can be manipulated by Microsoft's administrative tools in the control panel under Services; it is configured for auto-start after booting. The StorFirst Altus Administrator is run from the icon on your desktop; you may leave it running permanently or start it up as needed.

StorFirst Altus service Properties viewed from Services in Windows Admin Tools:



## Support Call

Seven Ten Storage Software Support can be contacted via:

1. Phone – (978)725-5525
2. Email – support@seventenstorage.com

Before initiating a service call or email please be prepared to send the Altus log files. Go to Tools → Zip Logs... in the StorFirst GUI and click on “Zip Logs...”. This will zip the JobLogs Folder, Service Logs Folder, the Seven Ten Storage portion of the Registry, Application Event Log, Security Event Log and System Event Log.

Please Note: You must have Microsoft .NET Framework v2.0 (x86) installed on the StorFirst Altus server to use this feature. For your convenience this is included in your StorFirst Altus install package. The file name is NetFx20SP1\_x86.exe.

## Server Replacement

In the case of upgrading or replacing your existing server, please contact Seven10 Support for assistance.

## Software Uninstall

StorFirst Altus may be removed by first stopping the StorFirst Altus service and then using Windows Add or Remove Programs. This will remove all software binaries, shortcuts, and Registry entries. The database files and logs will not be removed from the server. A complete removal of StorFirst is accomplished by deleting the StorFirst Altus install directory.

## Changing SCSI Address

Server reconfiguration or server replacement may change the SCSI address used to communicate with a library and its drives. If StorFirst can no longer communicate as the result of such a change it will mark the device as disconnected but retain all information about tapes and slot locations that may have been accumulated over time.

### Tape Libraries

Simply using the library wizard again will create a new, but blank representation of the library without that valuable knowledge. This transition may be implemented easily and without loss of operational information in two very different ways. The first method makes all the tapes offline and then uses the library wizard for automated recognition of the library and its new SCSI addresses. This way is highly recommended. The second method is to change the SCSI addresses directly and manually; this method is only there for expert support people and presumes that the new SCSI addresses are known.

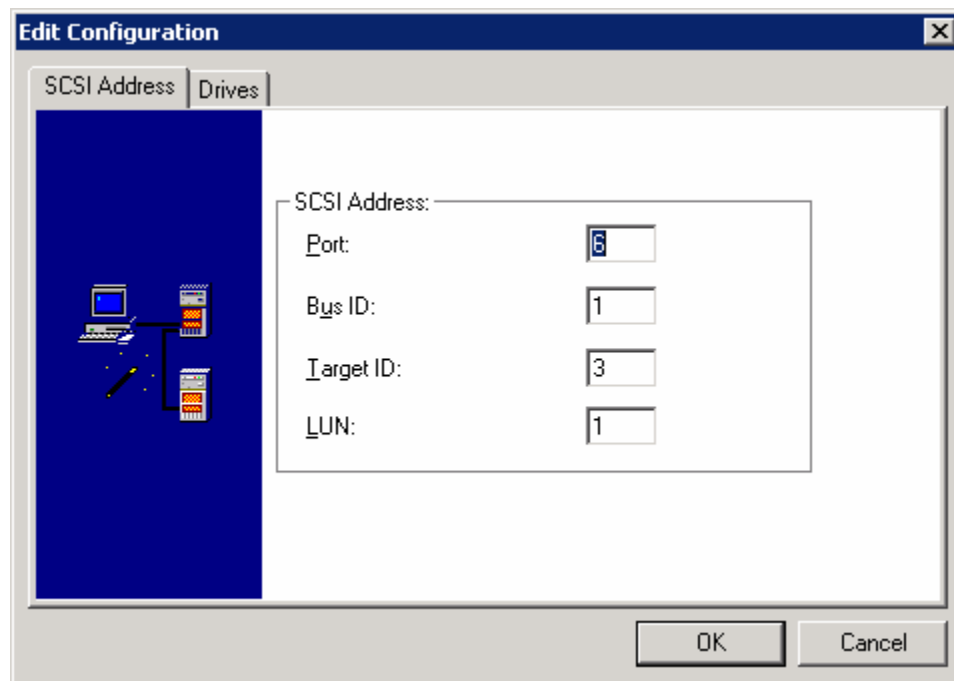
**The Automated Offline way** follows these steps:

1. Disable and delete the library object in StorFirst; all its media are now offline
2. Activate the library wizard and configure the library
3. Select all the full slots; right click and select Inventory
4. Select the Offline to Online option and run the job

Step 1 may be done while the library is still operational or after the system changes while the library appears disconnected; it makes no difference. Steps 2 - 4 must be done after the system changes.

The manual SCSI editor way follows these steps:

1. Implement the system changes and start StorFirst
2. StorFirst will recognize the issue and Red X the Library
3. Right click and select Edit Configuration
4. In the Device Editor first update the SCSI address of the library:
5. Select "OK". StorFirst will verify the new addresses and confirm the identity of the library. The SCSI addresses of the drives are then updated automatically.



## Replacing a Library

Libraries can be replaced for capacity, maintenance, and many other reasons. Media may be logically moved from one library to another if a new Library is installed and the media were transferred without StorFirst participation or StorFirst may be used to assist in the transition. In any case follow these steps:

1. Extract tapes:
  - a. If the library is operational then eject all media with StorFirst commands
  - b. If the library is not operational then extract the media manually
  - c. Disable and delete the library object in StorFirst

Deleting a library object preserves all its Media objects in the Offline folder. The net logical result is that all the useful media are in the Offline folder. The system has severed the connection between the tape object and the library & slot. Physically, the tapes are stacked on a table.

2. Reconfigure:
  - a. Shut the system down. Disconnect the old library and connect the new.
  - b. Insert all the tapes in the library now or do it later using StorFirst commands. Turn the library on, wait for it to become ready, and then start the server. Note that hot pluggable functionality is supported but, when in doubt, restart the server.
3. In StorFirst, use the wizard to configure the new library.
4. Use the "insert media" command to load all media if not loaded already.

At this point, all the old media are in the new library in slots marked full and known to StorFirst as Offline. It is time to connect the two.

5. Inventory all the slots using the "Return Online" option. This will scan all media, match them to the objects in the offline folder, and reconnects the tape and the slots. Now all media is back online.
6. Done. The library is replaced, the system restored, and back in operation.

## Notification of Alerts via Email

If your StorFirst Altus server is behind a firewall, you can use a local SMTP Server. This can be done by entering your company email address and your company's SMTP Server. Note: The username and password are optional.

**Alert Configuration**

Notification | Alert Types

Broadcast machine information

Specify the domain and the computer name the support person is logged in to broadcast a message when an alert occurs.

Domain name:  (Optional)

Machine name:

Email Address

Specify the support person to contact when an alert occurs.

Email address:

Override default SMTP server settings here. Some SMTP servers do not require authentication, therefore you may leave username and password blank.

SMTP Server:  Port:

Username:  (Optional)

Password:  (Optional)

## System Restart

Sometimes power spikes or outages will adversely affect computers, I/O buses, or Libraries. Should the system stop or hang under such circumstances, then follow these steps to restore system operation:

1. shut down the server and all managed storage units
2. power up the storage units and wait for ready
3. re-boot the server with StorFirst Altus

## Tape Block Size

The available block size may be limited by the tape drive, tape type, and/or attached SCSI or FC card's available BUS transfer sizes. If the user selects a block size that exceeds any of these values, Altus will scale the value used back to the smallest maximum allowed by any of these items in the data path. If Altus does this, a note will be indicated in the log

**5:TapeMgr SetBlockSize - resetting blksize to [Block Size in KB] (Host: [Block Size in KB], Tgt:[Block Size in KB], Min:[Block Size in KB], Max:[Block Size in KB])**

where Host and Tgt indicate the SCSI or FC card limits and Min and Max indicate the device, drive and tape's limits.

# APPENDIX A

## CENTERA VIRTUAL POOLS

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### Virtual Pools

Your archiving application which writes/archives *to* Centera may write to a *Virtual Pool* on Centera. If not, it writes to the *Default* pool.

To see which pools are available on your Centera, using the Centera CLI (or Centera Viewer) run the "Show Pool List" command.

To see specifics of a given pool, run the "Show Pool Detail [Pool Name]" command.

To see capacity and number of C-Clips and objects of all pools, run the "Show Pool Capacity" command.

### Default Pool

In this case, the archiving application uses a *Profile* called the *Anonymous Profile*. This profile needs no Profile Entry Authorization (PEA) file installed on the archive server or the Altus server to access the Default pool. However, this profile is normally disabled by EMC when the Centera ships. If there is a need to replicate the Default pool, make sure that the Anonymous Profile is enabled by "Show Profile Detail Anonymous" command.

### Virtual Pool

In this case, the archiving application uses a specific Profile with a Profile Entry Authorization (PEA) file to connect to this virtual pool. This profile can be named anything the administrator wishes, but the key is that its *Home Pool* attribute is the specific Virtual Pool the administrator wishes the application to use for writing.

### Creation of Profiles and PEA Files

Although not a requirement, Seven Ten recommends creating a *different* Profile and accompanied PEA file than the one the archiving application uses for each virtual pool customers wish StorFirst Altus to replicate. The reason for this is two fold.

1. EMC recommends each application get its own profile.
2. Profiles can be logically separated per application and their access rights can be different. For example, you may not wish the archiving application to have the capability of querying the Centera Virtual Pool. However, the query capability is a requirement for Altus.

To create a profile using the Centera CLI, use the following steps:

Note: These instructions are applicable to Centera Viewer 4.0.

1. Find the virtual pool you wish to replicate by using the "Show Pool List" command.
2. Create the profile by using the following command: Create profile [Profile Name].

- a. Seven Ten recommends adding "ALTUS" to the profile name. E.g. if your pool is named "MyPool", use the Profile Name "MyPool\_ALTUS"
3. At prompt: "Enable Profile? (yes, no) [yes]" Choose *yes*.
4. At prompt: "Set Data Access Capabilities (yes, no) [no]:" Choose *yes*.
5. At prompt: "Profile Type (access, cluster) [access]:" Choose *access*.
6. At prompt: "Home Pool [default]:" Choose the name of the Virtual Pool.
7. At prompt: "Granted Rights for the Profile in the Home Pool [rdqeDcw]" Choose *rdqecw*  
*r = read*    *d = delete*    *q = query*    *e = execute*    *D = privileged delete (not needed for StorFirst Altus)*    *c = clip-copy*    *w = write*
  - a. Note: Even though Altus is given the capability of deleting C-Clips, Altus will *never* issue a delete command to Centera for any C-Clip for any reason whatsoever. The reason Altus needs the delete capability is that a requirement of the Centera is that any application that needs to *query* for deletes, must be able to delete.
8. At prompt: "Profile-Metadata Capability? (yes, no) [no]:" Choose *no*.
9. At prompt: "Set Cluster Management Roles (yes, no) [no]:" Choose *no*.
10. At prompt: "Profile Secret (prompt, generate, file) [generate]:" Choose *generate*.
11. At prompt: "Issue the command? (yes, no) [no]:" Choose *yes*.
12. At prompt: "Establish a Pool Entry Authorization for application use? (yes, no) [no]:" Choose *yes*.
13. At prompt: "Please enter PEA file location:" Choose a path and file name for the PEA file.
  - a. E.g. "C:\TEMP\MyPool\_ALTUS.pea"
14. The pea file that is generated can be put on the StorFirst Altus server and configured as indicated below.

Note: Profiles can also have access rights to other Virtual Pools other than their Home Pools, however, they can still only write to their home pool.

StorFirst Altus does **not** support using a Profile which has access writes to other pools other than the home pool.

## APPENDIX B

# INSTALLING LIBATTACH

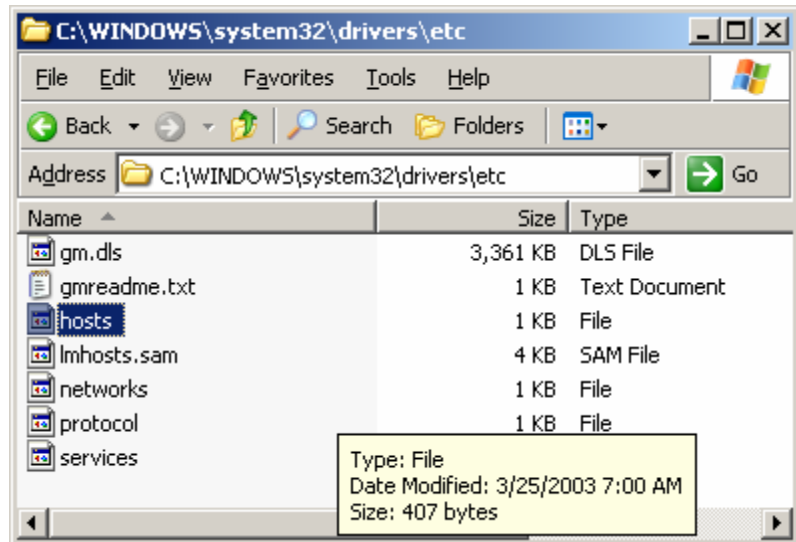
ACSLs is a software solution from Sun Data Management Group providing library aggregation and sharing of libraries among library management enabled applications like backup and StorFirst. Windows based applications use LibAttach, installed on their server, for access to ACSLS over LAN. To use ACSLS with StorFirst you must first install LibAttach on the StorFirst server before using the library wizard.

LibAttach is not delivered with StorFirst and must be acquired independently from Sun Data Management Group. Installation will typically be available from Sun Data Management Group and the following are only observations from the installation of LibAttach 1.4 at Seven10 labs and are offered here as advice. The official Sun Data Management Group documentation and their support organization is the only authority on the subject.

### Step One: Modify the Host File

Add the ACSLS server host-name and static IP address to the host file. The file can be found in the location shown on the right.

Open the Host File with a text editor like Notepad and add the ACSLS server at the end of the file.



**Step Two:  
Install LibAttach**  
Install LibAttach on the StorFirst server using the CD supplied by Sun Data Management Group.

```

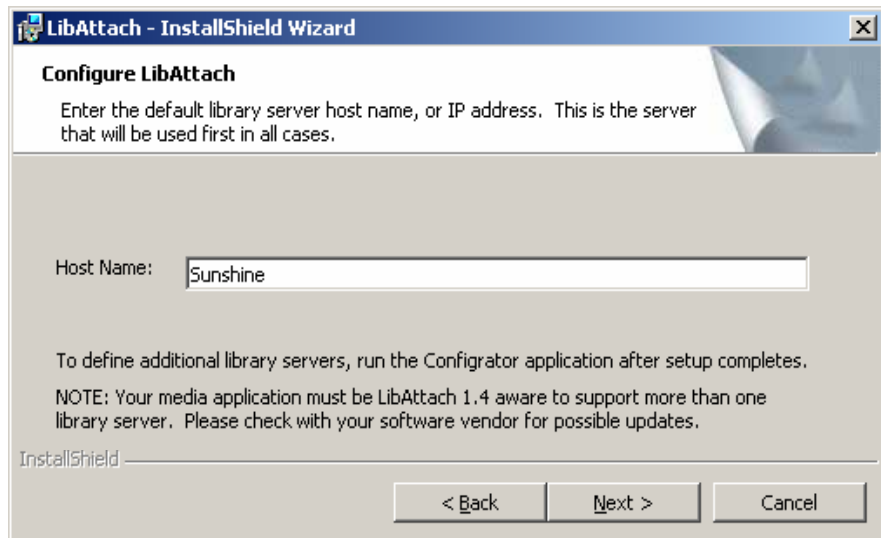
hosts - Notepad
File Edit Format View Help
# Copyright (c) 1993-1999 Microsoft Corp.
#
# This is a sample HOSTS file used by Microsoft TCP/IP for Windows.
#
# This file contains the mappings of IP addresses to host names. Each
# entry should be kept on an individual line. The IP address should
# be placed in the first column followed by the corresponding host name.
# The IP address and the host name should be separated by at least one
# space.
#
# Additionally, comments (such as these) may be inserted on individual
# lines or following the machine name denoted by a '#' symbol.
#
# For example:
#
#       102.54.94.97       rhino.acme.com       # source server
#       38.25.63.10      x.acme.com           # x client host

127.0.0.1       localhost
192.168.1.200   sunshine

```

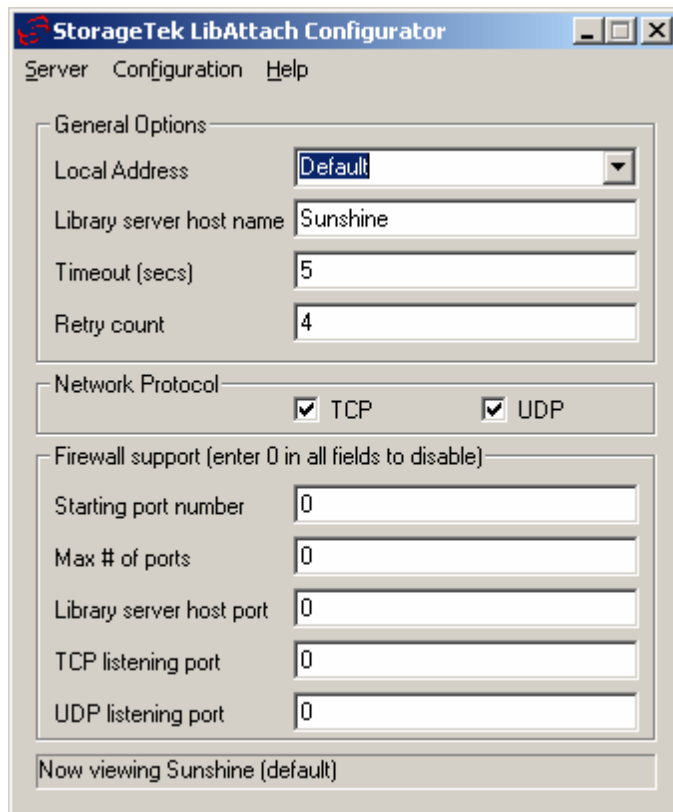
### Step Three: ACSLS Server Name

LibAttach may automatically enter configuration after installation, otherwise start it from the Start Menu. Enter the name of the particular ACSLS server to be used; only one such server is supported in StorFirst and the LibAttach default is automatically selected. The ACSLS server IP address is retrieved from the Host file automatically and transparently using the name as key.



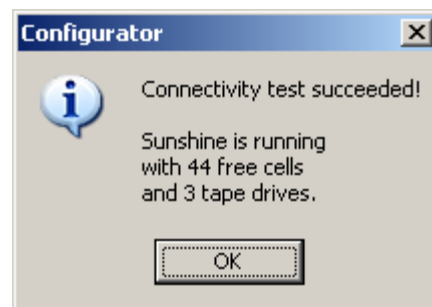
### Step Four: Properties

The defaults seem to work well if there is no firewall in the way.



### Step Five: Test the ACSLS Connection

Make sure that LibAttach successfully can communicate with the ACSLS server. Select Configuration and Test in the menus above.



### Step Six: Troubleshooting

If the test fails then try to ping the ACSLS server from the LibAttach server. Check that the IP address was entered correctly into the Host File. Make sure that a firewall is not the problem. If the network works and LibAttach connectivity still fails then contact Sun Data Management Group.

## APPENDIX C

# ACSLS

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### Configuring ACSLS

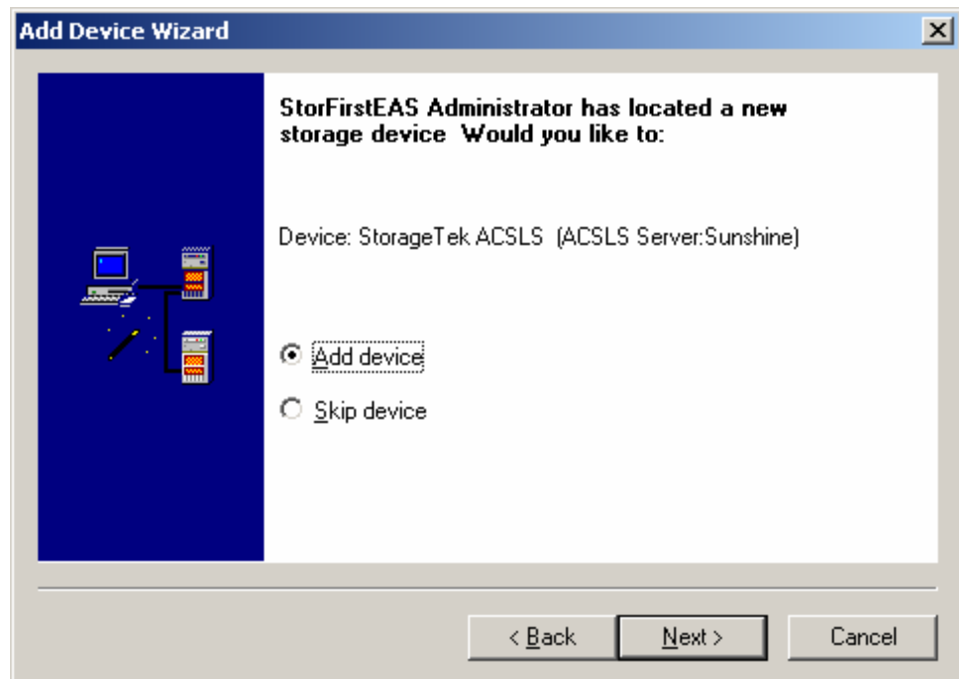
To use ACSLS you must install LibAttach on the StorFirst server before using the wizard. Consult Sun Data Management Group and/or the instructions in the Appendix A of this guide. Once present, the ACSLS option may be added or skipped. ACSLS managed libraries should not be visible to StorFirst on a system SCSI bus since dual management is destructive; yet simply skipping the device in the wizard will also work.

The wizard will in turn present all un-configured libraries; managed by ACSLS or directly found on the systems SCSI busses; one after another in turn.

A drive can be excluded from use by StorFirst by selecting "unknown" in the drop-down menu at this time or by disabling it later. This enables sharing of a library between multiple applications.

All drives used by StorFirst must be interchangeable and compatible with all media in the assigned slots. Two separate libraries may use different drives and types of tape.

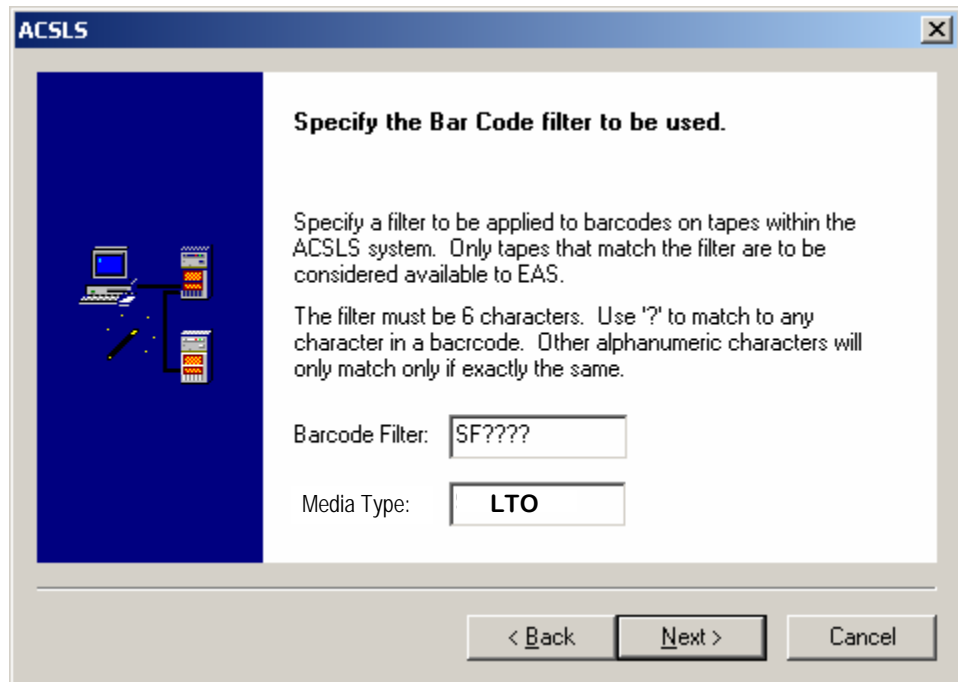
With ACSLS the drives that are offered will be the drives provided by ACSLS and accessible for I/O on the StorFirst systems SCSI buses; matched by serial number comparison. The drives are otherwise no different operationally from the non-ACSLs case.



## Media Selection with ACSLS

ACSLs supply library aggregation and sharing but not partitioning. It may therefore present so large a virtual library that the usual StorFirst UI model is less useful. ACSLS operates on tapes and does not divulge slot locations. To preserve the common StorFirst user interface and its normal operation on slots, StorFirst automatically creates virtual slots for the tapes. To limit the number of tapes shown to those that are likely to be used by StorFirst a bar code filter for selection is offered:

For example, if Altus designated tapes by convention have six character bar codes starting with SF and followed by four digits then set the filter to "SF?????" then the set of media to be used may further be restricted by selection of media type. As StorFirst query ACSLS for media it may be informed



about all media in the aggregate virtual library managed by ACSLS yet only the media passing the filter defined format will be shown in the StorFirst UI.

## Library Partitioning

Altus takes complete control of the drives and slots assigned to it. In a single library, all assigned drives must be interchangeable and compatible with all media in the assigned slots. Two separate libraries may use different types of tape. StorFirst is capable of sharing a library with other Altus instances or even other applications.

The shared resources, the robot and the door, may cause access collisions if a library is shared between applications. Should Altus encounter a busy robot it will simply wait and try again. This works well for sharing between StorFirst instances. Other applications may respond differently and with less tolerance.