STK Silo ACS V1.1 Release Notice

Exemplar Servers

B5655-90016

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Hewlett-Packard Company
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STK Silo ACS V1.1
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How to use this manual

Purpose and audience

This guide describes the installation of the StorageTek automated cartridge system (ACS), commonly referred to as the *silo*, and the tasks required to configure the silo system.

Using this guide

If you are not familiar with the StorageTek ACS, read the STK *Silo ACS V1.1 Installation Guide: Exemplar Servers* before attempting to perform any of the tasks described in this book.

The components and maintenance of the silo system are discussed in Chapter 1.

Notational conventions

This section discusses notational conventions used in this book.

`Bold monospace`

In command examples, text shown in **`bold monospace`** identifies user input that must be typed exactly as shown. Surround this kind of text in a VoiceUser element.

`Monospace`

In paragraph text, `monospace` identifies command names, system calls, and data structures and types.Use the VoiceComputer element for this type of text.

In command examples, `monospace` identifies command output, including error messages. Use theVoiceComputer element for this type of text.

In command syntax diagrams, text shown in `monospace` must be typed exactly as shown. Use VoiceComputer.

Italic

In paragraph text, *italic* identifies new and important terms and titles of documents. Use the Emphasis element for this type of text.

In command syntax diagrams, *italic* identifies variables that must be supplied by the user. Use the Variable element.

Bold

The **bold** character format is used for special emphais. Try not to overuse it. Wrap bold text in the VoiceDisplay element.

{ }

In command syntax diagrams, text surrounded by curly brackets indicate a choice. The choices available are shown inside the curly brackets and separated by the pipe (|) sign.

The following command example indicates that you can enter either a or b:

```
command {a | b}
```

[ ]

In command syntax diagrams, square brackets indicate optional data.

The following command example indicates that the variable *output_file* is optional:

`command` *input_file* [*output_file*]

...

In command syntax, horizontal ellipsis shows repetition of the preceding item(s).

The following command example indicates you can optionally specify more than one *input_file* on the command line.

`command` *input_file* [*input_file ...*]

KEYCAP

In paragraph text, text shown in **KEYCAP** indicates keyboard keys you must press to execute the command. For example, **RETURN** refers to the carriage return key. Use the Keycap element.

Two **KEYCAP** terms separated by a hyphen indicate two keys that you must press simultaneously. For example, **CTRL-d** indicates that you must press the **d** key while holding down the **CTRL** key.

Notes, cautions, and warnings

This document presents notes, cautions, and warnings in the following formats.

Note

A Note highlights supplemental information.

Caution

A Caution highlights information necessary to avoid damage to the system.

Warning

A warning highlights information necessary to avoid injury to personnel.

Associated documents

The following documents are applicable to the *STK silo ACS* 1.1 release:

- *SPP-UX System Administration Guide* (B5655-90002)
- *ConvexTMR Administrator's Guide* (DSW-480)
- *ConvexTMR Operator's Guide* (DSW-482)
- *ConvexTMR User's Guide* (DSW-481)
- STK *Silo ACS V1.1 Installation Guide: Exemplar Servers* (B5655-90017)

Ordering documents

To order the current edition of these or any other Convex documents, send requests to:

Hewlett-Packard Company
Convex Technology Center
Customer Service
P.O. Box 833851
Richardson TX 75083-3851 USA

Please include the order number or the exact title of the document.

Technical assistance

If you have questions that are not answered in this book, contact the Hewlett-Packard Convex Technical Assistance Center (TAC) at the following locations:

Within the continental U.S., call 1 (800) 952-0379.

From Canada, call 1 (800) 345-2384.

All other locations, contact the local Convex Technology Center office.

Description and commands 1

Overview

This release notice describes the 1.1 release of Convex StorageTek automated cartridge system (ACS), also called the *silo*. It includes the following information:

- Hardware and software requirements
- Associated documentation
- STK ACS components
- Status commands
- STK ACS maintenance
- Descriptions of restrictions and known problems, along with fixes and workarounds
- Directory and file information
- Instructions for obtaining technical assistance

Always refer to this document before reporting problems; your questions may be answered here.

Requirements

Hardware requirements

The 1.1 release of *STK silo ACS* runs on Exemplar servers (and requires

- A Sun workstation for a server
- Appropriate connections to the silo drive (via the CNT SCSI Gateway 3200) or other appropriate SCSI type connections
  - 3480/3490: Blkmux CNT SCSI
  - SD-3 (Redwood): SCSI
  - TL-9490 (Timberline): SCSI

Software requirements

The 1.1 version of Convex *STK silo ACS* requires that SPP-UX V5.x or later be installed.

STK ACS components

The automatic cartridge system, or silo, is comprised of many components. These components are explained in this section.

Library storage module

The basic hardware component of the silo is the library storage module (LSM). The library storage module is a structure containing

- Storage cells for tape cartridges
- A robot that retrieves and moves the cartridges

LSMs can be interconnected to form a single silo. Pass-thru ports (PTPs) exist in the walls of adjacent LSMs, through which cartridges can be passed from one LSM to another.

The robot can retrieve any cartridge in the LSM and deliver it to another cell, a tape drive, or a pass-thru port. It identifies the correct cartridge by its external bar-code label.

Library management unit

The library management unit (LMU) is a serial communication line from the server to the LSM. It serves all the LSMs in a single silo, so, there is only one LMU per silo.

Control access port

Each LSM has a door in the outer wall allowing access to the interior. This access door contains a cartridge access port (CAP). Tapes are entered to and removed from the silo tape library through the CAP connected to the silo. The CAP is shown in Figure 1.

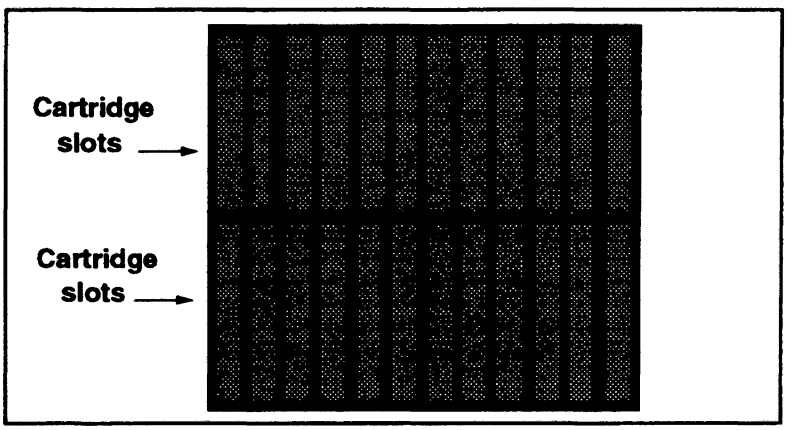

Figure 1 Control access port

Cartridge tape drives

Each silo contains from one to four cartridge drive units. Each unit contains two or four tape drives. These drives are attached to an LSM and are controlled by the server rather than by an operator. All drives connected to the silo can be operated concurrently.

Tape cartridges

The silo supports 3480 and 3490 tape cartridges. Each cartridge entered into the library must contain a valid bar code label containing a unique volume serial number (VSN). The first six characters of the bar code must match the magnetic volume serial number of the tape. Figure 2 shows the bar code label and its placement on the 3480 tape cartridge.

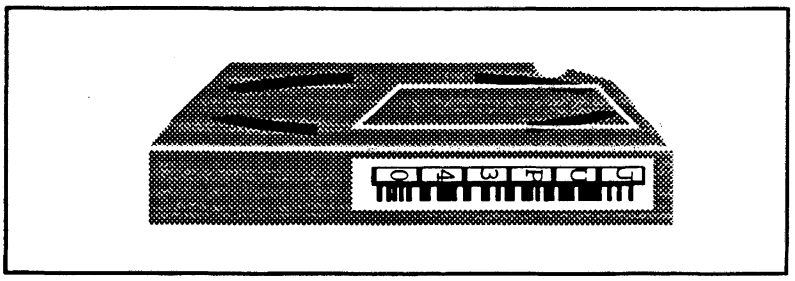

Figure 2 Valid bar code label

Sun server

The silo and all its components are served by a Sun workstation. A single Sun workstation can serve multiple silos. Each silo can contain multiple CAPs, LSMs, tape cartridges, and tape drives.

Because there can be more than one of each of these components, each component is assigned a unique identification number by the system manager. These IDs are used to reference the component when querying its status. The following sections describe how to query the status of these components. If you are not familiar with the IDs of the components you work with, see your system administrator.

Status commands

The status of each of these components can be monitored using the `siloquery` utility on your workstation. The syntax is

`siloquery` *command*

where *command* can be

acs
: Reports the status of a silo

cap
: Reports the status of a cartridge access port

drive
: Reports the status of a tape drive

lsm
: Reports the status of an library storage module

mount
: Reports the status of a mounted tape and the drive on which it is mounted

port
: Reports the status of an library management unit port

request
: Reports the status of a server request

server
: Reports the status of the Sun server where the query is made

volume
: Reports the location of a tape

The following sections describe the syntax for each command.

Reporting silo status

The syntax for reporting silo status is

`siloquery acs` [*acsID* ...]

where *acsID* is an integer or list of integers referencing silos controlled by this server. The first silo that is installed is typically numbered 0, the second 1, the third 2, and so on.

If no ID is specified, the statuses for all silos controlled by this server are reported.

Figure 3 shows output for this command.

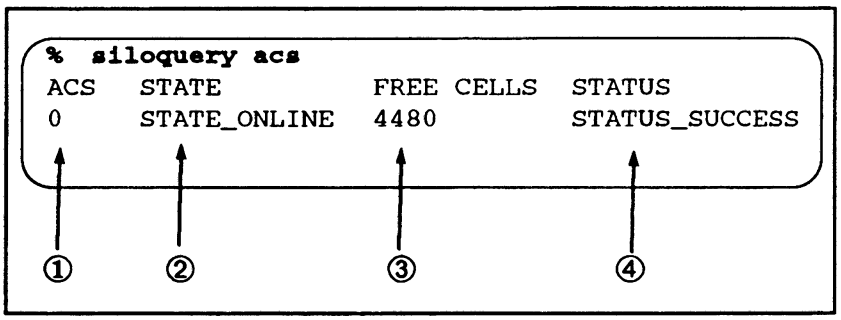

Figure 3 Reporting general ACS silo status

①

Identification number assigned to this silo.

②

State of this silo. This can be either online or offline.

③

Number of cartridges that can still be stored in this silo.

④

Status of this inquiry. This can be either successful or unsuccessful.

Reporting CAP status

The cartridge access port (CAP) is where tapes are entered and removed from the silo tape library. The syntax for reporting CAP status is

`siloquery cap` [*capID* ...]

where *capID* is the ID or list of IDs for CAPs controlled by this server. The first CAP in the first silo is generally numbered 0,0,0; the second CAP in the first silo is numbered 0,0,1; the first CAP in the second silo (if there is one) is numbered 1,0,0; and so on.

If no ID is specified, the status for each CAP controlled by the server is reported.

Figure 4 shows output for this command.

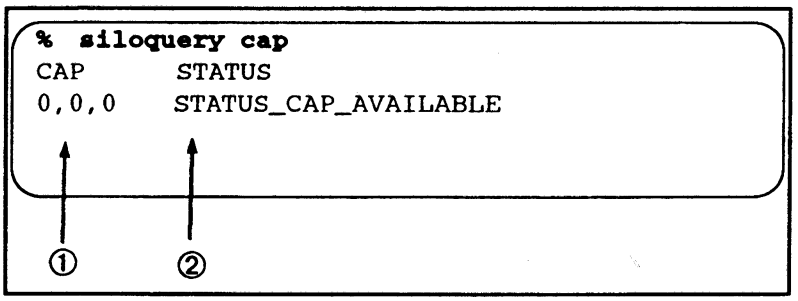

Figure 4 Reporting ACS silo CAP status

①

Identification number assigned to this cartridge access port.

②

State of this cartridge access port. This can be either available or not available. If available, you can use this CAP to enter or remove tapes from the silo.

Reporting tape drive status

The syntax for reporting tape drive status is

`siloquery drive` [*driveID* ...]

where *driveID* is the ID or list of IDs for drives controlled by this server. If no ID is specified, the statuses for all drives controlled by the server are reported.

Figure 5 shows output for this command.

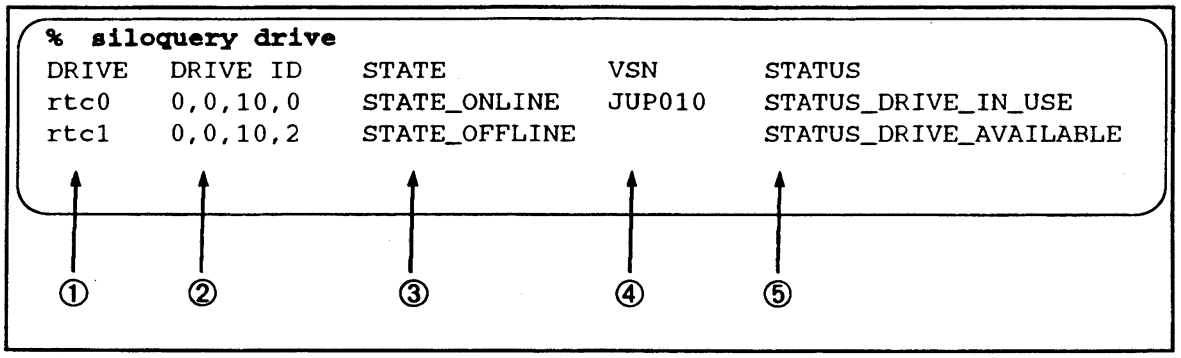

Figure 5 Reporting tape drive status

①

Name assigned to this drive.

②

Identification number assigned to this drive.

③

State of this cartridge access port. This can be either on-line or off-line.

④

Volume serial number currently mounted on drive, if there is one.

⑤

Status of drive. This can either be in use or available.

Reporting library storage module status

Library storage modules (LSM) store 3480 tape cartridges.The syntax for reporting LSM status is

`siloquery lsm` [*lsmID* ...]

where *lsmID* is the ID or list of IDs for LSMs controlled by this server. The first LSM in the first silo is generally numbered 0,0; the second LSM in the first silo is numbered 0,1;, the first LSM in the second silo (if there is one) is numbered 1,0; and so on.

If no ID is specified, the statuses for all LSMs controlled by the server are reported.

Figure 6 shows output for this command.

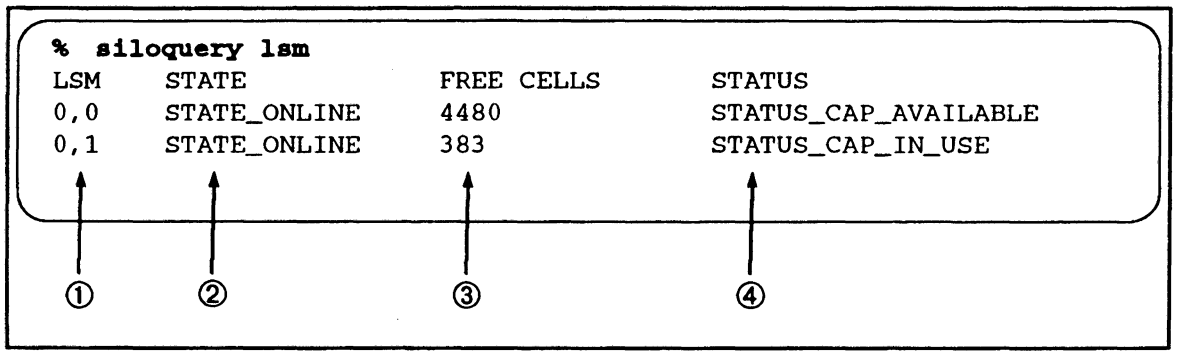

Figure 6 Reporting LSM status

①

Identification number assigned to this library storage module.

②

State of the library storage module. This can be online or offline.

③

Number of cartridges that can still be stored in this library storage module.

④

Status of the cartridge access port. This can be either available or not available. If available, you can use this CAP to enter or remove tapes from this library storage module.

Reporting tape and tape drive status

The syntax for reporting status on tapes that are mounted and the drive on which they are mounted is

`siloquery mount` [*VSN* ...]

where *VSN* is the volume serial number or list of numbers on which to report.

If no *VSN* is specified, the status for all mounts and tape drives controlled by the server are reported. This could take considerable time.

Figure 7 shows output for this command.

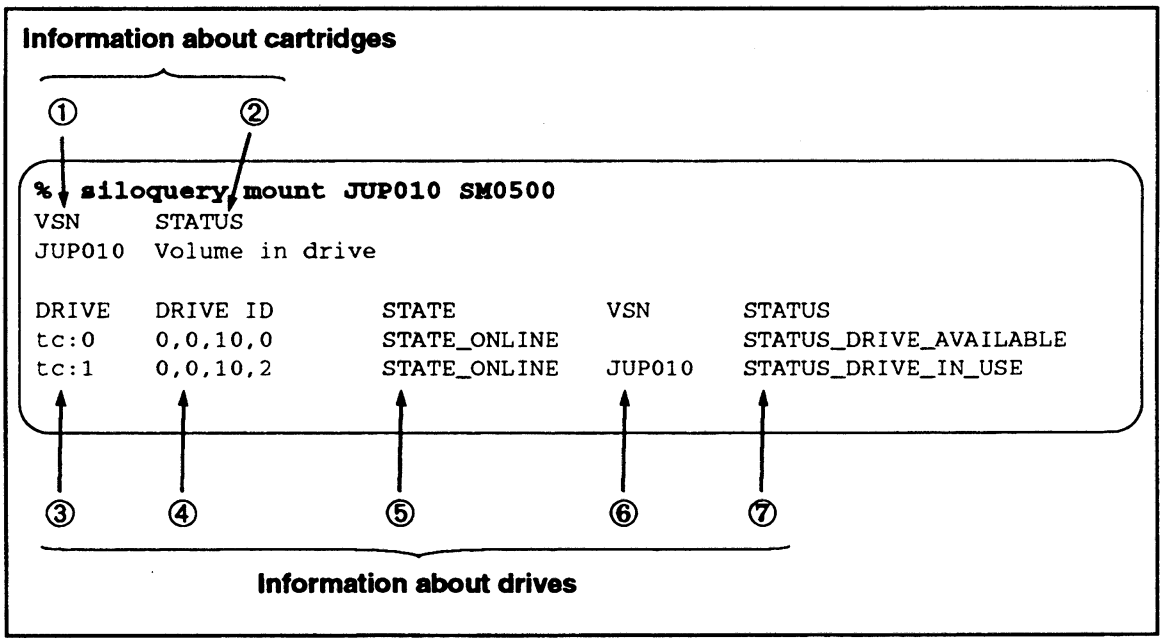

Figure 7 Reporting mount and tape drive status

① Volume serial number specified for inquiry.

② Status of the cartridge containing the requested VSN.

③ Drive or drives associated with the requested VSN.

④

Identification number assigned to drive associated with the requested VSN.

⑤

State of drive. This can be either online or offline.

⑥

Cartridge currently mounted on drive.

⑦

Status of drive. This can be either available or in use.

Reporting port status

A port is a serial connection line from the server to a library management unit (LMU). The syntax for reporting port status is

`siloquery port` [*portID* ...]

where *portID* is the ID or list of IDs for ports controlled by this server. The first port in the first silo is generally numbered 0,0; the second port in the first silo is numbered 0,1; the first port in the second silo (if there is one) is numbered 1,0; and so on.

Note

If no ID is specified, the status for all LMU ports controlled by the server are reported.

Figure 8 shows output for this command.

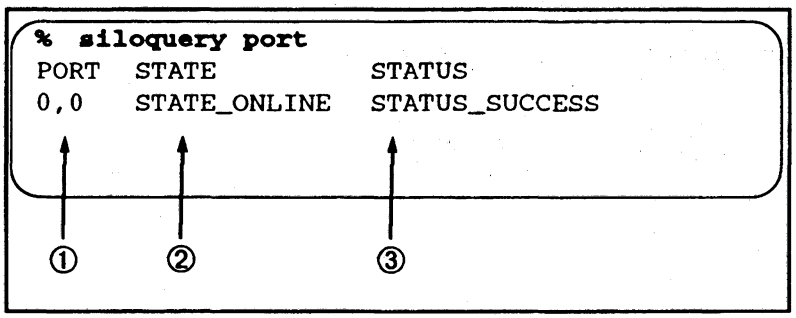

Figure 8 Reporting port status

①

Identification number assigned to this port.

②

State of the port. This can be either online or offline.

③

Status of this request. This can be either success or failure.

Reporting request status

The syntax for reporting the status for server requests is

`siloquery request` [*requestID* ...]

where *requestID* is the ID or list of IDs for requests made to this server. The *requestID* is assigned to a request when it is submitted.

Note

If no ID is specified, the statuses for all requests for the server are reported.

Figure 9 shows output for this command.

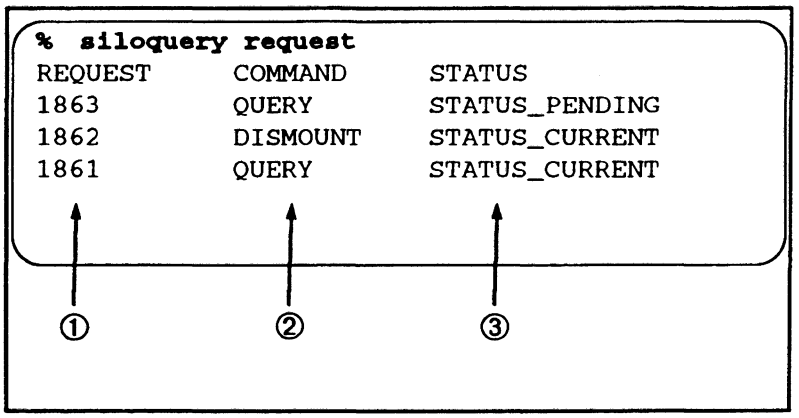

Figure 9 Reporting request status

①

Identification number assigned to this server request.

②

Type of request made.

③

Status of request.

Reporting server status

A Sun workstation acts as a server for the ACS. The syntax for reporting server status is

```
siloquery server
```

which reports the status of the Sun server where the query is made.

Figure 10 shows output for this command.

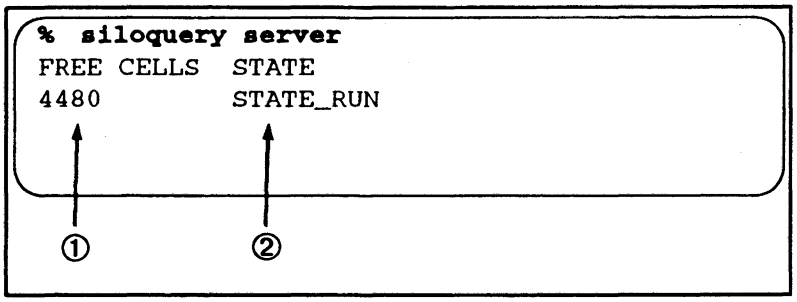

Figure 10 Reporting server status

①

Number of cartridges that can still fit in all the silos controlled by this server.

②

State of the server.

Reporting volume status

The syntax for reporting the location of cartridges in the silo is

`siloquery volume` [*VSN* ...]

where *VSN* is the volume serial number or list of numbers on which to report.

Note

If no VSN is specified, siloquery reports the location of every cartridge contained in the silo controlled by this server. This command can take considerable time, especially if there are many cartridges in the silos controlled by this server.

Figure 11 shows output for this command.

```
% siloquery volume JUP010 053744 STM505
VSN     LOCATION              STATUS
JUP010  0,0,16,0,9            STATUS_VOLUME_HOME
053744  0,0,0,0,0             STATUS_VOLUME_NOT_IN_LIBRARY
STM505  tc:0 0,0,10,0         STATUS_VOLUME_IN_DRIVE
```

① ② ③

Figure 11 Reporting status of a cartridge volume

①

Volume serial number of cartridge stored in the silo.

②

Current location of volume. This is either the coordinates of the cell where the cartridge is stored or the drive it is mounted on.

③

Status of volume.

STK ACS maintenance

This section explains how STK ACS can be used to mount tapes and to move tapes to and from the silo library.

Mounting tapes using ACS

Typically tapes are mounted on tape drives using the `rlaccess` command. However, ACS provides an alternate method to mount tapes on drives for situations when ConvexTMR may not be in use, and it is imperative to mount a tape.

The `silomount` command bypasses ConvexTMR to mount a cartridge. The syntax is

`silomount [-r]` *VSN drive*

where

-r

mount the tape in the drive for read-only access

VSN

is the volume serial number of the cartridge you want mounted.

drive

is the name of the drive with the characteristics you want to use.

Figure 12 shows an example `silomount` command and its output.

```
% silomount JUP340 /dev/tmid/rtc0
Volume JUP340 mounted on drive /dev/tmid/rtc0 (0,0,10,0)
```

Figure 12 Using the silomount command

Unmounting tapes using ACS

Typically tapes are unmounted from tape drives using the `rlrelease` command. However, ACS provides an alternate method for unmounting tapes on drives for situations when ConvexTMR may not be running and it is imperative to unmount a tape.

The `silodismount` command bypasses ConvexTMR to unmount a cartridge with the ACS. The syntax is

`silodismount [-f]` *VSN drive*

where

-f

forces the unmount immediately regardless of the state of the drive. Use this option with extreme caution.

VSN

is the volume serial number of the cartridge you want unmounted.

drive

is the name of the drive with the drive characteristics you want to use.

Figure 13 shows an example `silodismount` command and its output.

```
% silodismount JUP340 /dev/tmid/rtc0
Volume JUP340 dismounted from drive /dev/tmid/rtc0 (0,0,10,0)
```

Figure 13 Using the `silodismount` command

Entering tapes to the silo library

This section describes how to enter tapes to the silo tape library. Once entered to the library, tapes can be accessed by the robotic arm and mounted on tape drives connected to the silo. Perform the following steps to enter cartridge tapes to the silo tape library.

Step 1 Ensure that each cartridge has a bar-code label on the outside. Each label should have a unique volume serial number (VSN) and should be readable by the robot camera that is inside the silo. Any cartridge that does not have a valid label or cannot be read by the robot camera is rejected by the silo during the entry process.

Step 2 Unlock the CAP door with the following syntax:

`siloenter` *CAPid*

where CAPid identifies the control access port (CAP) that you are using. For example, to unlock the CAP door with an ID of 0,0,0 enter

```
siloenter 0,0,0
```

The CAP door associated with the ID is unlocked and the "CAP enter" light above the CAP is illuminated.

Step 3 Open the CAP door and insert the 3480 cartridges into the slots from left to right, starting with the top row. Even though all slots do not have to be filled, do not leave any slots empty between the first and last cartridges. For example, Figure 14 shows entering ten cartridges to the silo tape library. These ten cartridges are placed in the first ten slots of the CAP.

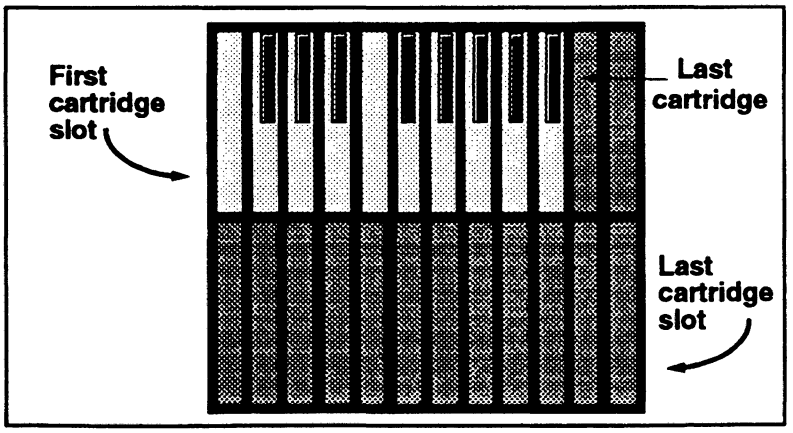

Figure 14 Loading cartridges into silo's CAP

Step 4 Close the CAP door.

The silo robot camera verifies that each tape cartridge has a readable label and a unique VSN, and the robot arm stores the tape cartridges into the library storage modules (LSM).

If all the cartridges are accepted, the "CAP locked" light above the CAP is illuminated and the entry process is finished. A list of the VSNs accepted by the silo is displayed on the terminal screen. Figure 15 shows this output.

```
% siloenter 0,0,0
VOLUME STATUS
JUP010 STATUS_SUCCESS
JUP200 STATUS_SUCCESS
MEL001 STATUS_SUCCESS
```

Figure 15 Completion of cartridge entry into silo

Any tape cartridges whose labels are not readable or have invalid VSNs are returned to the CAP door.

Step 5 If any cartridges are rejected, the "CAP eject" light above the CAP is illuminated. After the "CAP eject" light is illuminated, remove any rejected cartridges. Do not leave any cartridges in the door.

Step 6 Close the CAP door after all the cartridges have been removed.

The robot arm verifies that the top left-hand slot of the CAP door is empty. When the "CAP locked" light above the CAP is once again illuminated, the entry process is finished. A list of the VSNs accepted by the silo is displayed on the terminal screen. Figure 16 shows this output.

```
% siloeject 0,0  JUP010 JUP200 MEL001
VOLUME STATUS
JUP010 STATUS_SUCCESS
JUP200 STATUS_SUCCESS
MEL001 STATUS_SUCCESS
```

Figure 16 Completion of cartridge ejection from silo

Removing tapes from the silo library

This section describes how to remove tapes from the silo tape library.

Step 1 Identify the tape cartridge or cartridges you want to remove from the silo tape library. The syntax is

`siloeject` *CAPid VSN [VSN ...]*

where

CAPid

is the identification number of the CAP you are using.

VSN

is the volume serial number or list of serial numbers of the cartridge you are ejecting.

For example, to remove tapes with VSNs JUP010, JUP200, and MEL001 using the CAP with an ID of 0,0, enter

```
siloeject 0,0 JUP010 JUP200 MEL001
```

The CAP door associated with the ID is unlocked and the "CAP eject" light above the CAP is illuminated.

Step 2 When the "CAP eject" light above the CAP is illuminated, open the CAP door and remove all the ejected cartridges. Do not leave any cartridges in the door.

Step 3 Close the CAP door after all the cartridges have been removed.

The robot arm verifies that the top left-hand slot of the CAP door is empty. When the "CAP locked" light above the CAP door is once again illuminated, the ejection process is finished.

A list of the VSNs ejected by the silo is displayed on the terminal screen. shows this output.

```
% siloeject 0,0  JUP010 JUP200 MEL001
VOLUME STATUS
JUP010 STATUS_SUCCESS
JUP200 STATUS_SUCCESS
MEL001 STATUS_SUCCESS
```

Figure 17 Completion of cartridge ejection from silo

Known problems

This section describes problems in this release of *STK silo ACS* 1.1 that are known at this time. Workarounds for these problems are described.

Problem

Direct use of `silo*` commands can result in flooding the server with an abundance of requests, seriously affecting performance.

Workarounds

Use ConvexTMR. If problems persist, the server may require tuning.

Do a database backup every week; this also reduces fragmentation.

Problem

When mounting a tape for read-only access (i.e., using the `-r` option shown in the command `silomount -r JUP340 /dev/tmid/rtc0`), the current version of CNT SCSI Gateway 3200 does not provide an indication that the tape really was mounted in read-only mode. Use of the `mount` status command does not show `FPT` (File Protect) even though the tape is write-protected.

Workarounds

The Convex tape driver will set the `FPT` flag when a write fails due to file protection so that subsequent queries of the status of the mounted tape will correctly show `FPT`.

Directories and files

These files are in the base directory for *STK silo ACS* 1.1:

- **/opt/silo/bin/**—Contains the `silodaemon`, `silodismount`, `siloeject`, `siloenter`, `silomount`, `siloquery`, and `ssi` files
- **/etc/opt/silo/silodrivelist**—Configuration file
- **/etc/rc.config.d/silo**—rc boot configuration file
- **/sbin/init.d/silo**—Start/stop script