IBM Network Tape Access and Control System for AIX and IBM NetTAPE Tape Library Connection User's Guide and Reference

Document Number tape-info-06

Note!

Before using this information and the product it supports, be sure to read the general information under “Special Notices” on page ix.

| **Fifth Edition (November 1997)**

| This edition applies to Version 1 Release 2 of the IBM Network Tape Access and Control System for AIX Licensed Program,
| program number 5765-637, and to all subsequent releases and modifications until otherwise indicated in new editions.

This edition also applies to Version 1 Release 2 of the IBM NetTAPE Tape Library Connection Licensed Program, program number 5765-643, and to all subsequent releases and modifications until otherwise indicated in new editions.

Order publications through your IBM representative or the IBM branch office serving your locality. Publications are not stocked at the address below.

IBM welcomes your comments. A form for readers' comments may be provided at the back of this publication, or you may address your comments to the following address:

International Business Machines Corporation
Department 55JA, Mail Station P384
522 South Road
Poughkeepsie, NY 12601-5400
United States of America

FAX (United States & Canada): 1+914+432-9405
FAX (Other Countries):
Your International Access Code +1+914+432-9405

IBMLink (United States customers only): KGNVMC(MHVRCFS)
IBM Mail Exchange: USIB6TC9 at IBMMAIL
Internet e-mail: mhvrcfs@vnet.ibm.com

If you would like a reply, be sure to include your name, address, telephone number, or FAX number.

Make sure to include the following in your comment or note:

- Title and order number of this book
- Page number or topic related to your comment

When you send information to IBM, you grant IBM a nonexclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

© **Copyright IBM Corporation 1996, 1997. All rights reserved.**
Note to US Government users (documentation related to restricted rights): Use, duplication, or disclosure is subject to restrictions set forth in GSA ADP Schedule Contract with IBM Corporation.

Contents

Special Notices ix
Trademarks and Service Marks ix

About This Book xi
Who Should Use This Book xi
What's in This Book xi
Where to Find Related Publications xii
General Information About This Book xiii
Special Terms xiii
Syntax Notation xiii
Finding and Using NetTAPE Documentation xiv
Manuals xiv
README files xiv
Tips and Other Useful Information xv
Man Pages xv
Downloading Files from the Anonymous FTP Server xv
What's New In This Book xvii
Summary of Changes, August 1997 xvii
Summary of Changes, November 1996 xviii
Summary of Changes, August 1996 xviii
Summary of Changes, May 1996 xviii
Summary of Changes, April 1996 xviii

Part 1. About NetTAPE 1

Chapter 1. Introduction to NetTAPE and NetTAPE Tape Library Connection 3
How NetTAPE Helps System Administrators 3
How NetTAPE Helps Tape Device Users 4

Chapter 2. About the NetTAPE Graphical User Interface 7
About the Main Screen 7
Other Functions 7

Chapter 3. Supported Hardware and Software 11
Workstation Hardware 11
Workstation Software 11
NetTAPE Tape Device Support 11
NetTAPE Tape Library Connection Tape Device Support 13

Chapter 4. Operation of NetTAPE with Other Products 15
Operation with ADSM 15
Coexistence with CLIO/S 15
Integration with Non-AIX Workstations 15

Chapter 5. Notes for Users with Both NetTAPE and CLIO/S Installed . . . 17
Compatibility of NetTAPE and CLIO/S Interfaces 17
Using NetTAPE and CLIO/S Together 17
Differences between NetTAPE and CLIO/S 17

© Copyright IBM Corp. 1996, 1997

Part 2. Installing, Configuring and Administering NetTAPE 19

Chapter 6. Installing NetTAPE and NetTAPE TLC 21
If You Have CLIO/S Installed 21
Installing NetTAPE 21
On an RS/6000 SP 22
On an RS/6000 Workstation 22
Installing NetTAPE TLC 23
On an RS/6000 SP 23
On an RS/6000 Workstation 23
Installing ADSM Device Drivers 24
On an RS/6000 SP 24
On an RS/6000 Workstation 25
What To Do Next 25

Chapter 7. Migrating from NetTAPE 1.1 to NetTAPE 1.2 27

Chapter 8. Once You've Installed NetTAPE 29
Getting NetTAPE Up and Running 29
Starting NetTAPE 29
Trying out NetTAPE Commands 30
Trying out the NetTAPE API 31
What To Do Next 31

Chapter 9. Configuring and Customizing NetTAPE 33
Step 1: Ensuring Network Connectivity 36
Step 2: Defining NetTAPE's Security Method 37
NetTAPE's Options for User Authentication 37
Establishing Your NetTAPE Security System 39
Step 3: Customizing the nettape.adm.config File 42
Planning Your Device Pools 42
Specifying the NetTAPE Utility Daemon Port Number 44
Defining the User Authority Control List 44
Controlling User Access to Specific Device Pools 45
Specifying the Tape Libraries 47
Specifying the Retry Interval for the Tape Library Daemon 48
Handling Tape Library Tape Label Errors 48
Defining the Devices and the Device Pools 48
Specifying Shared Devices 53
Defining the Esoteric Device Pools 54
Defining the Default Device Pool 54
Specifying Default Scratch and Default Private Tape Categories 55
Controlling Mount Queue Processing 56
Specifying the AVR Daemon Scanning Interval 56
Specifying a Volume Check Installation Exit 56
Specifying a Scratch Tape Mount Installation Exit 57
Sample nettape.adm.config File 58
Making Changes to nettape.adm.config Using the NetTAPE GUI 62
Step 4: Customizing the nettape.config File 63
Customizing NetTAPE's Volume Check Process 66
Customizing NetTAPE's Scratch Tape Mount Process 68
Step 5: Defining SCSI Tape Library Configuration Files 70
Naming the file 70

File Format . . . 70
Sample SCSI Library Configuration File . . . 78
Cleaning Support . . . 80
Automatic NetTAPE SCSI Catalog Definition . . . 82
NetTAPE SCSI Label Generation . . . 82
Step 6: Defining Alternative Connections to Tape Device Hosts . . . 84

Chapter 10. Using ADSM with NetTAPE . . . 85
Defining a New Storage Pool . . . 85
Authorize the ADSM Server to Access NetTAPE . . . 85
Define ADSM External Managers . . . 86
Labeling Scratch Cartridges . . . 87
Other Considerations . . . 87
Migrating an Existing Storage Pool . . . 87
Identify the Media in the ADSM Library . . . 87
Define the Library and Drives to NetTAPE . . . 88
Define the New Library to ADSM . . . 89

Chapter 11. Administering NetTAPE . . . 91
Understanding NetTAPE Daemons . . . 92
Starting or Restarting NetTAPE . . . 94
Stopping the NetTAPE Status Daemon . . . 94
Starting the NetTAPE GUI . . . 94
Adding or Deleting Devices from NetTAPE . . . 95
Understanding NetTAPE Tape Device States . . . 95
Resetting a Tape Device . . . 97
If There's a Hardware Problem . . . 98
Accessing the NetTAPE Reset Function . . . 98
Reserving a Tape Device . . . 98
Sharing a NetTAPE Tape Device with an MVS System . . . 98
Managing Device Pool Mount Queues . . . 99
Creating a Bootable System Image on a Remote Tape with mksysb . . . 99

Chapter 12. Administrative Commands . . . 101
clnetrc—Encrypting user password information . . . 102
cltopr—Issuing a NetTAPE operator command . . . 105
cltoprg—Starting the NetTAPE Operator Graphical User Interface . . . 117
cltterm—Stopping the NetTAPE Tape Client Daemon . . . 120
xcltopr—Starting the NetTAPE Operator Graphical User Interface . . . 121

Chapter 13. Troubleshooting Tips for the Administrator . . . 123
Finding NetTAPE Error Logs . . . 123
The Status Daemon and Tape Library Daemons . . . 123
Tape Client Daemon . . . 123
GUI Message Log . . . 123
System Error Log . . . 124
Device Down Due to Tape Job from Previous Session . . . 124
Tape Device Reset Slow to Complete . . . 124
Failure to Deallocate Tape Devices . . . 124
Failure Restarting NetTAPE . . . 125
Setting NetTAPE Environment Variables for Debugging . . . 125
To Debug Status Daemon Problems . . . 125
To Debug Client Daemon Problems . . . 126

Part 3. Using NetTAPE 127

Chapter 14. Introduction to Using NetTAPE 129
Allocating and Using Tapes 129
Using NetTAPE Commands 129
Using the NetTAPE API 130
Stopping a NetTAPE command or Subroutine 130
Determining the Available Device Pools for Your Allocation Request 130
Obtaining Volume Information Using the VFILE Option 131
Understanding MVS Tape Formats 132
Record formats 132
Volumes, Files and Data sets 133
Markers 133
Label Types 133
File and Volume Mark Sequences 134
BOV Mark Sequence 135
BOF Mark Sequence 135
EOF mark sequence 135
EOV mark sequence 135
Restrictions for AMPEX DST 310 or 410 Tape Devices 136
Understanding NetTAPE Tape Positioning 136
Unlabeled Tapes 137
ANSI or Standard Labeled Tapes 137
Bypass Label Processing 137
Suppressing End of Volume Processing 137
Suppressing End of File Processing 137
Tape Positioning After NetTAPE Operations 137
Understanding NetTAPE End of Tape Handling 139
Understanding and Controlling Write-Behind Buffers 140

Chapter 15. Commands 141
cltalloc—Allocating a tape device 143
cltclose—Closing the volume information file 153
cltopen—Accessing a tape file using different parameters 155
cltunall—Unallocating a tape device 162
cltvols—Obtaining information about tape volumes used 163

Chapter 16. Application Programming Interfaces 165
Compiling, Linking, and Running with the NetTAPE API 165
Finding the NetTAPE API Examples File 165
ctpalloc or tpalloc—Allocating a tape device 166
ctpclose or tpclose—Closing the tape file 173
ctperr or tperr—Translating an error code to a message 174
ctpflush or tpflush—Flushing remaining write-behind buffer data 175
ctpioctl—Issuing an IOCTL Command 177
ctpopen or tpopen—Opening the tape file 178
ctpqwbh or tpqwbh—Querying the number of data blocks in write-behind buffers 185
ctpread or tpread—Reading the tape 186
ctpreads or tpreads—Reading the tape 187
ctprew or tprew—Rewinding the tape 188
ctpskpf or tpskpf—Skipping tape files 189
ctpskpr or tpskpr—Skipping tape records 190

ctpunall or tpunall—Unallocating a tape device 191
ctpvols or tpvols—Obtaining information about tape volumes used 192
ctpweof or tpweof—Writing tape marks 193
ctpwrite or tpwrite—Writing to tape 194
ctpwrites or tpwrites—Writing to tape 195
NetTAPE Messages and API Return Values 196

Chapter 17. Troubleshooting Tips for Users 201

Appendix A. Customizing the IOCTL Table 203
Adding IOCTL Commands to the IOCTL Table 203
Step 1: Identify header files and ioctls 203
Step 2: Add the New Header File to the IOCTL Table 204
Step 3: Add New IOCTL Commands to the IOCTL Table 204
Step 4: Recompile with the Updated IOCTL Table 206
Step 5: Update the NetTAPE Configuration 207
Step 6: Copy Executables to Other Client Systems 207

Appendix B. How to Use NetTAPE Commands 209
Using tar with Labeled Tapes 209
Using tar, cpio, dd, and backup/restore with Multi-volume Data Sets 209
Using the backup/restore Commands 210
Using the cpio Command 211
Using DB2 PE Database's backup/restore Commands 212

Appendix C. NetTAPE API Usage Examples 213
Example 1 213
Example 2 215

Appendix D. SCSI Tape Library Messages 219

Appendix E. Frequently Asked Questions 237
General Questions about NetTAPE 237
Questions about Administering NetTAPE 237
Questions about Using NetTAPE 243

Index 247

Special Notices

References in this publication to IBM* products, programs, or services do not imply that IBM intends to make these available in all countries in which IBM operates. Any reference to an IBM product, program, or service is not intended to state or imply that only IBM's product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any of IBM's intellectual property rights or other legally protectible rights may be used instead of the IBM product, program, or service. Evaluation and verification of operation in conjunction with other products, programs, or services, except those expressly designated by IBM, are the user's responsibility.

IBM is exclusively responsible for sales, service, and support for the IBM Network Tape Access and Control System for AIX and IBM NetTAPE Tape Library Connection products.

IBM may have patents or pending patent applications covering subject matter in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing
IBM Corporation
500 Columbus Avenue
Thornwood, NY 10594
USA

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

IBM Corporation
Mail Station P300
522 South Road
Poughkeepsie, NY 12601-5400
USA
Attention: Information Request

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

Trademarks and Service Marks

The following terms are trademarks of the IBM Corporation in the United States or other countries or both:

ADSTAR	AIX
RS/6000	RS/6000 Scalable POWERparallel Systems
Scalable POWERparallel Systems	IBM
Magstar	MVS/ESA

UNIX is a registered trademark in the United States and other countries, licensed exclusively through X/Open Company Limited.

© Copyright IBM Corp. 1996, 1997

Other company, product, and service names, which may be denoted by a double asterisk (* *), may be trademarks or service marks of others.

About This Book

This book is a guide and reference manual for using IBM Network Tape Access and Control System for AIX and IBM NetTAPE Tape Library Connection, referred to as NetTAPE and NetTAPE TLC, respectively. The book includes:

- A high-level overview of NetTAPE
- How NetTAPE and IBM's Client Input/Output Sockets (CLIO/S) can coexist on the same network
- How to configure and administer NetTAPE
- How to allocate and access tape devices using NetTAPE commands
- How to allocate and access tape devices using NetTAPE application programming interfaces

Who Should Use This Book

This book is written for users who administer, manage, or use tape devices:

- System programmers
- System administrators
- Tape device operators
- Application developers
- End users

This book assumes the user is familiar with the AIX operating system (environment variables, shells). The chapter describing the programming interfaces assumes that the user is familiar with C or FORTRAN language programming.

The type of knowledge you need to have depends on which NetTAPE functions you plan to use.

- System programmers and system administrators are assumed to know how to configure and support the tape devices they plan to use with NetTAPE
- Application programmers and end users are assumed to be familiar with tape allocation and access functions, as well as general concepts related to the use of tape devices such as tape formats and tape labels.
- Operators are assumed to be familiar with the tape allocation and management procedures normally performed without the use of NetTAPE.

What's in This Book

This book includes the following sections:

- **Front Matter**

  Contains the Table of Contents, Special Notices, and Preface. Use these to find or interpret information in the book.

- **Part 1, About NetTAPE**

  This section gives an introduction to NetTAPE. Read this chapter first to get an overview of the product and identify the sections of the book devoted to the information you need.

© Copyright IBM Corp. 1996, 1997

- **Part 2, Installing, Configuring and Administering NetTAPE**

  This section tells you how to install, configure, administer, and run the NetTAPE product.

- **Part 3, Using NetTAPE**

  This section describes the NetTAPE command line and application programming interfaces. It also explains some basic tape device concepts you'll need to know.

Where to Find Related Publications

Here's a list of related programming and hardware publications you may find useful:

- *AIX Version 3.2 Technical Reference: Base Operating System and Extensions, Volumes 1, 2, and 3*, SC23-2382, SC23-2383, and SC23-2384

  These three publications describe the AIX socket calls.

- *AIX Version 3.2 Communication Programming Concepts*, SC23-2206

  This publication is an overview of AIX socket programming.

- *AIX Version 3.2 Problem Solving Guide and Reference*, SC23-2204, *AIX Version 4.1 Problem Solving Guide and Reference*, SC23-2606, and *AIX Version 4.1 Software Debugging and Reporting for the RISC System/6000*, GG24-2513

  This publication explains how to debug AIX system hardware and software problems.

- *Internetworking with TCP/IP, Volumes 1 and 2*, SC31-6144 and SC31-6145

  These publications describe TCP/IP programming concepts.

- *MVS/ESA Data Administration Guide*, SC26-4505

  This publication describes MVS tape record formats.

- *MVS/DFP Using Magnetic Tape Labels and File Structure*, SC26-4565

  This publication helps you understand MVS/DFP processing of magnetic tape labels.

- *IBM SCSI Device Drivers: Installation and User's Guide*, GC35-0154

  This publication explains how to install and use the IBM SCSI Tape Drive and Library Device Drivers.

- *IBM AIX Parallel and ESCON Channel Tape Attachment/6000*, GA32-0311

  This publication explains how to install and use the IBM Parallel Channel Tape Attachment/6000 product and the ESCON Channel Tape Attachment/6000 product.

- *ADSTAR Distributed Storage Manager: General Information*, GH35-0131

  This publication contains general information about ADSTAR Distributed Storage Manager (ADSM) Version 2 for all supported platforms.

- *ADSTAR Distributed Storage Manager for AIX: Administrator's Guide*, SH35-0134

  This publication explains how to administer the ADSTAR Distributed Storage Manager for AIX Version 2 Release 1.

- *ADSTAR Distributed Storage Manager for AIX: Administrator's Reference*, SH35-0135

  This publication includes reference information for administering the ADSTAR Distributed Storage Manager for AIX Version 2 Release 1.

- *ADSTAR Distributed Storage Manager: Device Configuration*, SH35-0137

  This publication explains how to configure devices for use with ADSTAR Distributed Storage Manager (ADSM) Version 2 on all supported platforms.

- *AIX Tape Management*, SG24-4705

  This publication describes approaches and techniques for managing tape drives in an AIX environment.

General Information About This Book

The following sections explain terminology, syntax, and other information you need to use this book.

Special Terms

Standard data processing terms are used in this book.

The term workstation includes both RS/6000 workstations and RS/6000 SPs (SPs).

This book covers two products, NetTAPE and NetTAPE Tape Library Connection. Within this book, both products are simply referred to as NetTAPE. References to the following, however, apply only to the NetTAPE Tape Library Connection:

- IBM 3494, 3495, and 3575 Tape Library Dataservers
- StorageTek (STK) Tape Library devices
- SCSI-attached libraries and autochangers.

References to STK Tape Library devices include all supported STK devices. See Chapter 3, “Supported Hardware and Software” on page 11 for a complete list.

Syntax Notation

Here's how to interpret the syntax used in this book:

- AIX is case sensitive, so AIX commands and file names should be entered exactly as shown. These are shown in bold face type, for example, **/etc/parconf**.
- Subroutine names and programming language elements should be entered exactly as shown.
- Parameters for which you substitute an appropriate value, such as *volser*, are in italic type face.
- Machine names, such as ***AIXnode***, are in bold italics.
- Square brackets (**[ ]**) enclose optional items in syntax diagrams.
- The notation <**ctrl-***x*> indicates a control character sequence. For example, <**ctrl-c**> means that you hold down the control key while pressing the character **c**.

Finding and Using NetTAPE Documentation

This section describes how to access the different types of information provided with NetTAPE.

Manuals

NetTAPE includes the following manuals:

- *IBM Network Tape Access and Control System for AIX General Information*, GC23-3990.

  This publication provides a high level overview of NetTAPE and NetTAPE Tape Library Connection, and discusses their major features and benefits.

  This document is available in these ways:

  – You can order printed copies from the IBM Distribution Center.

  – You can download a PostScript listing from the anonymous FTP server. "Downloading Files from the Anonymous FTP Server" on page xv describes how to connect to the server and download the file.

    You can also view or download this book from the IBM RS/6000 web site at **http://www.rs6000.ibm.com**. At the time this manual was published, the full path was **http://www.rs6000.ibm.com/resource/aix_resource/sp_books**. However, the structure of the RS/6000 web site can change over time.

- *IBM Network Tape Access and Control System for AIX and IBM NetTAPE Tape Library Connection User's Guide and Reference*, no order number.

  This document, which you are reading now, is available as a listing you can browse or print for yourself. You can get it one of these ways:

  – A listing formatted for a PostScript printer is included in the NetTAPE product in **/usr/lpp/nettape/doc/nettape_users_guide.ps**.

  – An HTML file, which you can view using any HTML document browser (such as Netscape, WebExplorer, or Mosaic), is included in the NetTAPE product as **/usr/lpp/nettape/html/nettape_users_guide.html**.

  – You can also download a PostScript-formatted listing of the latest version of this book from the anonymous FTP server. This listing is refreshed as needed to give you access to the latest NetTAPE information."Downloading Files from the Anonymous FTP Server" on page xv describes how to connect to the server and download the files.

    You can also view or download this book from the IBM RS/6000 web site at **http://www.rs6000.ibm.com**. At the time this manual was published, the full path was **http://www.rs6000.ibm.com/resource/aix_resource/sp_books**. However, the structure of the RS/6000 web site can change over time.

README files

The README files for NetTAPE and NetTAPE Tape Library Connection contain important information about the products including installation instructions and release notes. The README files are:

- **/usr/lpp/nettape/README**
- **/usr/lpp/nettape_tlc/README**

- **/usr/lpp/nettape/doc/nettape_gui.README**
- **/usr/lpp/nettape_tlc/doc/library_config.README**

Tips and Other Useful Information

In addition to the latest version of this book, you can download other NetTAPE-related information, such as performance tips, from the anonymous FTP server. See“Downloading Files from the Anonymous FTP Server” for downloading instructions.

Man Pages

The man pages are in the **/usr/lpp/nettape/man** structure. Because this is not one of the directories automatically read by the AIX **man** command, use one of these ways to indicate which man page directories should be searched:

- Specify the –**M** *manpath* flag when you invoke the **man** command. For example, you can display the NetTAPE man pages using

  ```
  man -M/usr/lpp/nettape/man  topic
  ```

- Set the MANPATH environment variable to the top of the man page structure. Consult the reference information for the AIX operating system for information about setting MANPATH.

Man pages are in the following directories:

- User commands are installed in **/usr/lpp/nettape/man/cat1**.
- Subroutines are installed in **/usr/lpp/nettape/man/cat3**
- Administrative commands are installed in **/usr/lpp/nettape/man/cat8**.

Tips on Using Man Pages

To view a NetTAPE man page, specify by name any of the NetTAPE commands or subroutines when you invoke the **man** command. For example, `man cltalloc.` displays the man page for the **cltalloc** command. Man page names are case sensitive. Specify the name in the case shown in this manual.

For more efficient information retrieval, include the number of the man page section when you issue the **man** command. For instance, to view the man pages for the NetTAPE subroutines, which are in section three of the manual, issue:

```
man 3 ctpalloc
```

Downloading Files from the Anonymous FTP Server

To copy files from the anonymous FTP server, use **ftp** to connect to **lscftp.pok.ibm.com** and login with user ID anonymous, using your Internet address as the password.

The NetTAPE manuals are:

- **/pub/pps/nettape/nettape_gi.ps.Z**
- **/pub/pps/nettape/nettape_users_guide.ps.Z**

The files are compressed. Uncompress them using the AIX **uncompress** command and print them as you print other PostScript files.

You'll also find other information such as hints, tips, and late-breaking information in /**pub**/**pps**/**nettape**. Download these PostScript files and print them on a PostScript printer.

What's New In This Book

Summary of Changes, August 1997

This edition contains changes for NetTAPE Version 1 Release 2. Changed lines are marked by a vertical bar '|' in the left margin. Changes include the following:

- Chapter 7, “Migrating from NetTAPE 1.1 to NetTAPE 1.2” on page 27 provides migration information for NetTAPE 1.1 users.
- Devices accessible through the SCSI tape interface, including those supported by ADSTAR Distributed Storage Manager (ADSM) device drivers, are now supported.
- Remote devices and esoteric device pools for ADSM devices are now supported.
- "Defining NetTAPE's Security Method" on page 37 describes three new security available for controlling user access to NetTAPE.
- “Controlling User Access to Specific Device Pools” on page 45 describes a new feature that allows you to control user access to specific device pools.
- “Specifying a Volume Check Installation Exit” on page 56 provides information about a new volume check installation exit.
- “Specifying a Scratch Tape Mount Installation Exit” on page 57 provides information about a new scratch tape mount installation exit.
- NetTAPE now supports variable (V), variable blocked (VB), variable blocked spanned (VBS), and fixed blocked standard (FBS) records.
- NetTAPE now supports non-standard ANSI labels (NSAL).
- The new **ctpflush** subroutine on page 175 lets you manually flush write-behind buffer data.
- The new **ctpioctl** subroutine on page 177 lets you issue **ioctl** commands for functions that are not supported by other NetTAPE tape API subroutines.
- The new **ctpqwbh** subroutine on page 185 lets you query the number of blocks of data in the write-behind buffers of a particular device.
- The new **ctperr** subroutine on page 174 translates an error code into its corresponding message.
- The new **ctpreads** subroutine on page 187 reads data from tape and also returns the number of bytes read.
- The new **ctpwrites** subroutine on page 195 writes data to tape and also returns the number of bytes written.
- “Step 4: Customizing the nettape.config File” on page 63 includes new **nettape.config** keywords that allow you to customize additional aspects of tape processing.

Summary of Changes, November 1996

This edition contains minor technical and editorial corrections. Changed lines are marked by a vertical bar '|' in the left margin. Changes include the following:

- "Allocating and Using Tapes" on page 129 describes how to use NetTAPE to perform a sequence of tape operations.
- Appendix B, "How to Use NetTAPE Commands" on page 209 shows examples of using NetTAPE commands to perform different tasks.
- Appendix C, "NetTAPE API Usage Examples" on page 213 shows examples of using th NetTAPE API to perform different tasks.
- Information has been clarified regarding the location and contents of the **.netrc** file entries for NetTAPE.

Summary of Changes, August 1996

This edition contains minor technical and editorial corrections. Changed lines are marked by a vertical bar '|' in the left margin. Changes include the following:

- The description of the **bf** parameter of the **ctpvols** subroutine has been corrected.
- NetTAPE supports labeled tapes on 8mm devices but only for single volume data sets.

Summary of Changes, May 1996

This edition contains corrections and enhancements provided by APARs PN84690 and PN84692, as well as technical and editorial improvements. Changed lines are marked by a vertical bar '|' in the left margin. Changed information includes the following:

- The volume information file now contains the type of tape label for the volume (al, sl, or nl).
- You can now override the device pool specified in the volume information file using the **-P** option on the **cltalloc** command or the **POOL=** option on the **ctpalloc** subroutine.
- The **MAX_DATA** option, which was erroneously listed as a parameter for the **ctpopen** subroutine, has been deleted.

Summary of Changes, April 1996

This edition contains corrections and enhancements provided by APARs PN82965 and PN82968. Changed lines are marked by a vertical bar '|' in the left margin.

Part 1. About NetTAPE

Chapter 1. Introduction to NetTAPE and NetTAPE Tape Library Connection 3

Chapter 2. About the NetTAPE Graphical User Interface 7

Chapter 3. Supported Hardware and Software 11

Chapter 4. Operation of NetTAPE with Other Products 15

Chapter 5. Notes for Users with Both NetTAPE and CLIO/S Installed . . . 17

© Copyright IBM Corp. 1996, 1997

Chapter 1. Introduction to NetTAPE and NetTAPE Tape Library Connection

NetTAPE improves and simplifies tape operations management and tape device access in networks of RS/6000 workstations, RS/6000 SP (SP) systems, or both. NetTAPE offers:

- Consolidated tape operations for all network tape devices from a single graphical user interface
- Transparent user access to remote tape devices using either a command line interface or a programming interface.

NetTAPE Tape Library Connection builds on NetTAPE, adding support for robotic tape library devices. These devices include the IBM 3494, 3495, and 3575 Tape Library Dataservers; StorageTek** Tape Library devices; SCSI-attached 4mm, 8mm, DLT, DST autochangers and libraries, and IBM 3590 and IBM Magstar MP devices in random mode. NetTAPE is a prerequisite product for NetTAPE Tape Library Connection.

NetTAPE Tape Library Connection also includes the ADSTAR Distributed Storage Manager (ADSM) device drivers for SCSI-attached drives and libraries.

For a complete list of supported tape devices, see Chapter 3, “Supported Hardware and Software” on page 11.

How NetTAPE Helps System Administrators

NetTAPE lets you set up your tape operation in the way that is most beneficial to your organization. One or more operators can manage a group of tape devices from a single workstation or multiple workstations, using either a Motif/X-Window System-based graphical user interface or a set of commands. Figure 1 on page 9 shows a sample operator screen.

With NetTAPE you can:

- **Consolidate Control of Distributed Tape Operations**

  NetTAPE provides a single system image of all of the network's tape devices. Tape device allocation, mount queue management, and tape device monitoring functions are performed using a graphical user interface.

- **Customize Operator Views of Tape Operations**

  NetTAPE allows you to assign each tape device to an operator domain. Using the NetTAPE GUI, operators limit the display of tape devices to those in their own domain. They see only the devices for which they are responsible.

- **Use Tape Device Pools to Process Mount Requests More Efficiently**

  NetTAPE lets you create pools of tape devices, organized by device type. With device pools, mount requests for a certain type of device can be satisfied by any device in the pool. As a result, mount requests can be processed more quickly and efficiently.

- **Support for Advanced Tape Devices and Features**

© Copyright IBM Corp. 1996, 1997

NetTAPE Tape Library Connection (NetTAPE TLC) supports advanced tape devices such as the IBM 3494, 3495, and 3575 Tape Library Dataservers, and StorageTek Tape Libraries. It also supports the automatic cartridge loading functions of several types of tape devices. NetTAPE lets installations take advantage of the large capacity and automatic features of these tape devices in an AIX environment.

With the use of ADSTAR Distributed Storage Manager (ADSM) device drivers, a myriad of SCSI-attached autochangers and libraries, from small 16 GB Autochangers to 14.4 TB libraries, are also supported.

- **Coexistence with ADSM and CLIO/S**

  NetTAPE works with ADSM for AIX Version 2.1 and can coexist on the same network with IBM's CLIO/S. The IBM 3494, 3495, and 3575 Tape Library Dataservers, StorageTek Tape Libraries, and SCSI-attached libraries and autochangers can be managed by NetTAPE and shared with ADSM, allowing you to make better use of tape resources.

  Starting in Version 1 Release 2, NetTAPE TLC supports remote devices and esoteric device pools for ADSM. This eliminates the requirement that devices accessed by ADSM be physically located on the same node as the ADSM server.

How NetTAPE Helps Tape Device Users

- **Easy Tape Device Allocation**

  Users can allocate and access tape devices anywhere in the network without needing to specify a particular device. NetTAPE uses dynamic tape device allocation and installation-defined device pools to deliver this capability.

  Devices of each type are grouped into device pools. Rather than requesting a certain tape device on a certain node, users can simply request a device of a certain type by specifying its device pool. And with device pools, a mount request can be satisfied by any device in the pool, so it has a better chance of being fulfilled.

  For users who don't require a particular type of device, installation-specified defaults can simplify the mount request process even further by letting users issue mount requests without specifying even a device pool.

- **Transparent Access to Remote Tape Devices**

  NetTAPE lets users access tape devices on remote nodes as if the devices were locally attached, so standard AIX commands such as **tar** can be used.

- **Access to Tape Data in Multiple Formats, on Multiple Platforms**

  Users can read tapes that were created on either AIX or MVS systems. Users can also create tapes in formats that can be read on either AIX or MVS systems. NetTAPE supports a variety of IBM and ANSI standard tape formats, as well as the unlabeled tape format that is standard on AIX systems. With NetTAPE, users can easily move tape data between systems on different platforms, allowing more flexibility in deciding where to create and process data.

- **Command Line and Programming Interfaces**

NetTAPE provides a command line interface as well as C and FORTRAN application programming interfaces for tape device allocation and data access functions.

Chapter 2. About the NetTAPE Graphical User Interface

The NetTAPE GUI lets operators monitor and manage tape devices in a network of RS/6000 servers, SP nodes, or both.

This topic gives an overview of the NetTAPE GUI and the tasks you can perform with it. Once you bring up the operator GUI, you can access the online help system for assistance in performing specific tasks.

About the Main Screen

NetTAPE's main screen, which is shown in Figure 1 on page 9, is the focal point for monitoring and managing your tape devices. The screen is divided into three parts:

Status display	Lists information about each tape device
Mount message area	Displays application-initiated mount and unmount requests that require operator action.
General message area	Displays NetTAPE informational messages.

From the main screen you can:

- See the status of each tape device
- See the jobs running on each tape device
- Change the status of a particular tape device:
  - Bring up the device
  - Bring down the device
  - Reserve the device
  - Reset the device
- Initiate certain tape drive functions such as scanning the cartridges in a device with an automatic cartridge facility
- Initiate the Automatic Volume Recognition (AVR) daemon for a manual tape device.
- View user or application-initiated mount requests
- Process mount requests
- Transfer a mount request to a different device in the same device pool
- Cancel a mount request.

For complete information about any of these tasks, see the online help for the NetTAPE GUI.

Other Functions

Other NetTAPE GUI functions, accessible from the menu bar, let you:

- Add a new device to your configuration, either temporarily or permanently
- Delete a device from your configuration, either temporarily or permanently

© Copyright IBM Corp. 1996, 1997

- Change the order of a mount request in the queue for a certain device or delete a queued mount request
- Change the tape devices currently being displayed, by specifying a different operator domain
- View the NetTAPE message log
- Scan a SCSI library

  This function causes the in-memory device driver tables to be scanned and the corresponding tables in the SCSI Physical Volume Repository (PVR) to be refreshed. No movement of the robotics occurs.
- Audit a SCSI library

  This function causes the library to audit itself, refreshing both the in-memory device tables and the corresponding tables in the SCSI Physical Volume Repository (PVR).

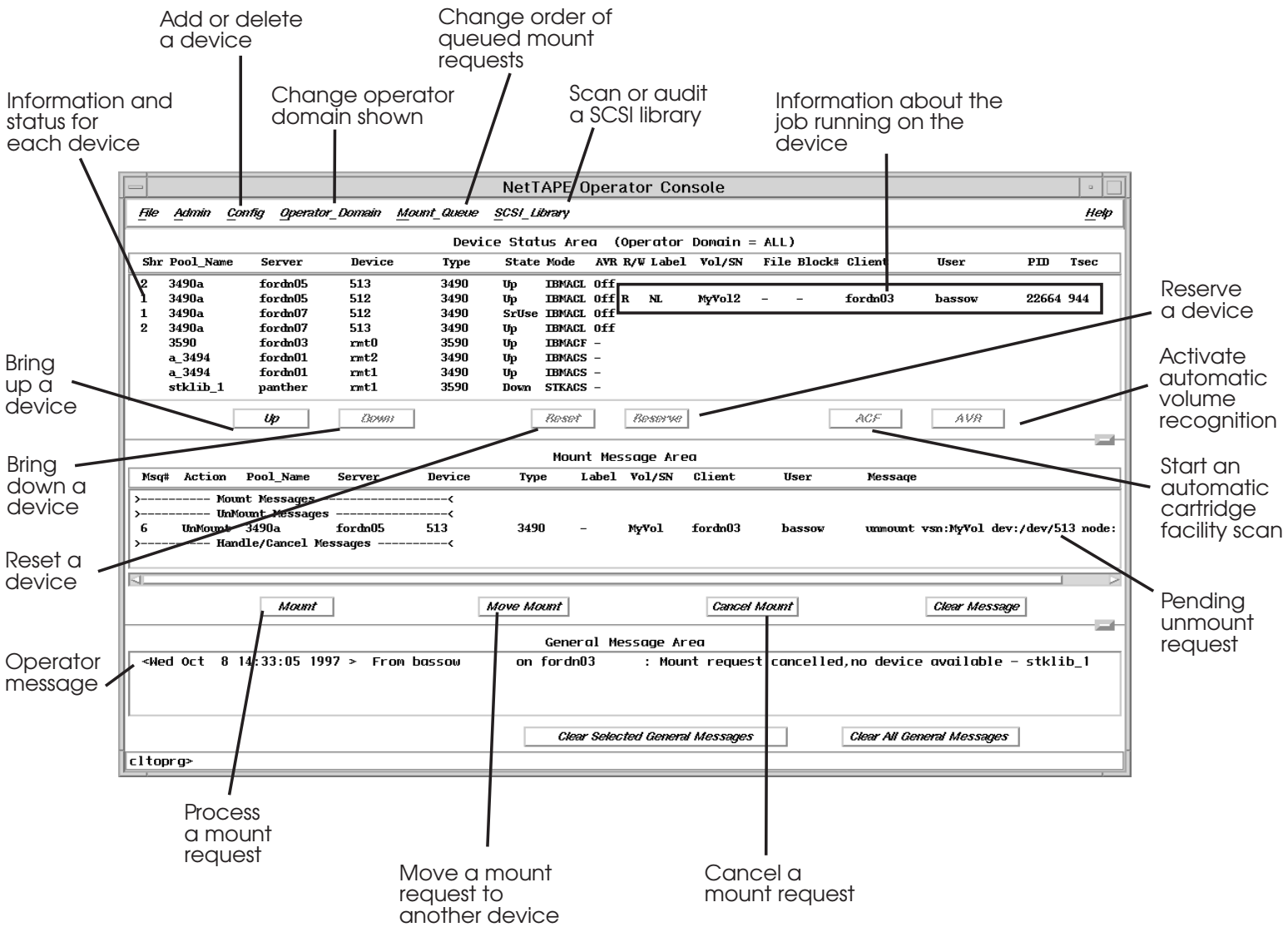

Figure 1. NetTAPE Operator GUI

Chapter 3. Supported Hardware and Software

The following sections list the hardware and software requirements for NetTAPE and NetTAPE Tape Library Connection.

Workstation Hardware

NetTAPE and NetTAPE Tape Library Connection can run on all IBM RS/6000 workstations and RS/6000 SP (SPs).

NetTAPE and NetTAPE Tape Library Connection use TCP/IP for the transfer of data between workstations. The TCP/IP connection can use any hardware supported by TCP/IP, including the High Performance Switch, Fiber Distributed Data Interface (FDDI), ATM, FCS, Ethernet, or token-ring.

Workstation Software

NetTAPE requires:

- IBM AIX Version 4.1 (either program number 5765-393 or 5765-C34) or AIX Version 4.2 (either program number 5765-655 or 5765-C34), or later modification levels.

NetTAPE Tape Library Connection requires:

- IBM Network Tape Access and Control System for AIX Release 1 Version 2 (program number 5765-637).

NetTAPE Tape Device Support

NetTAPE supports the tape devices listed below when they are attached to an AIX workstation. For information about the software and hardware requirements for attaching these devices to the AIX workstation, see the hardware documentation for the devices.

- The Ampex DST** 310 Tape Drive

  This Ampex product is supported but not warranted by IBM.

- The Ampex DST** 410 Tape Drive

  NetTAPE supports the Ampex DST 410 in manual mode and in Automatic mode when used with NetTAPE TLC and the SCSI tape library daemon.

- The IBM 3420 Magnetic Tape Unit
- The IBM 3480 Magnetic Tape Subsystem, including support of the automatic cartridge loader (ACL) in serial mode
- The IBM 3490 Magnetic Tape Subsystem Enhanced Capability Models C10, C11, and C22, including support of the automatic cartridge loader (ACL) in serial mode
- The IBM 3490 Magnetic Tape Subsystem Enhanced Capability Models E01 and E11, including support of the Cartridge Stack Loader in serial mode

© Copyright IBM Corp. 1996, 1997

- The IBM 3490E Magnetic Tape Subsystem, including support of the automatic cartridge loader (ACL) in serial mode
- The IBM 3590 High Performance Tape Subsystem, including support of the Automatic Cartridge Facility (ACF) in random or serial mode.
- The IBM Magstar MP Model B00
- The IBM Magstar MP Model B01, B11

STK devices that emulate an IBM 3480 or 3490E, which have not been explicitly tested, are supported using IBM mtdd and Atape device driver interfaces.

In addition, NetTAPE provides limited tape processing support for devices that are supported by the standard AIX SCSI tape device driver. Due to a device driver limitation on writing trailer labels when NetTAPE encounters an end-of-tape condition, NetTAPE does not support multi-volume tape label processing or record format handling for these devices.

The following types of tape drives are currently supported by the AIX SCSI tape device driver. You can use SMIT to list all of the supported tape drives and to configure them to AIX.

- 4mm tape drives of various capacities, such as the IBM 7206 Model 005 External 4mm Tape Drive
- 8mm tape drives of various capacities, such as the IBM 7208 Model 011 External 8mm Tape Drive
- 1/4-inch tape drives of various capacities, such as the IBM 7207 Model 012 External 1/4-inch Cartridge Tape Drive
- 1/2-inch, 9-track tape drives, such as the IBM 9348 Model 012 Tape Drive
- DLT drives.

NetTAPE TLC Version 1 Release 2 includes the ADSM SCSI device driver, which you can use without purchasing ADSM itself. The following tape drives are currently supported by the ADSM SCSI tape device driver. You can use SMIT to configure the supported tape drives to the ADSM device driver by selecting ADSM Devices from the device menu.

- 4mm drives
  - ADIC DATa 8000, 8008, 8008i, 8008E
  - Hewlett-Packard 35470A, 35480A, C1533A
  - Hewlett-Packard JetStore 2000e, 5000e, 6000e
  - IBM 7206-001, 7206-005
  - Sony SDT-5000, SDT-7000
  - WangDAT 3300DX, 3400DX
- 8mm drives
  - Andataco Encore 8205, 8505
  - Dynatek HSB 2300, 5000, 10.0
  - Exabyte EXB-8200, EXB-8205, EXB-8205XL, EXB-8500, EXB-8500C, EXB-8505, EXB-8505XL, EXB-8700LT, EXB-8900
  - IBM 7208-001, 7208-011
  - Sun 8505XL
  - Transitional Technologies, Inc. CTS-8000H, CTS-8519H

- QIC drives
  - IBM 7207-012
- SONY DTF drives
  - Cybernetics CY-9000
  - SONY GY-10C
  - TTi GY-10C
- DLT drives
  - ADIC DS9200, DS9300, DS9400
  - DEC TZ87/TZ87N, TZ88/TZ88N
  - Quantum DLT 2000, 2000XT, 4000

NetTAPE allows multi-tailed tape devices to be shared by up to eight NetTAPE hosts or by a NetTAPE host and an MVS system.

NetTAPE Tape Library Connection Tape Device Support

When installed with its prerequisite product, NetTAPE, NetTAPE Tape Library Connection adds support for the tape devices listed below when they are attached to an AIX workstation. For information about the software and hardware requirements for attaching these devices to the AIX workstation, see the hardware documentation for the devices.

- The IBM 3494 Tape Library Dataserver
- The IBM 3495 Tape Library Dataserver
- SCSI-attached autochangers and libraries (ADSM device driver required)
  - 4mm autochangers
    - ADIC VLS 4mm
    - AIWA AL-D210, AL-D220
    - Compaq 4/16
    - Diverse Logistics Libra 8, Libra 16
    - Exabyte 018/218
    - Hewlett Packard C1553A, C1561A, SureStore 12000e
    - Qualstar TLS 2218/A, 2236/A, 2436, 2472, 24144
    - IBM 7332-005 4 or 12 slot, 7336-205
    - Spectralogic 4000/20, 4000/40, 4000/60
    - StorageTeK 9704
  - 8mm autochangers
    - Andataco Encore 10e, 210, 440, 120, 480
    - BoxHill Bread Box, Cube Box, Light Box, Freezer Box, Borg Box, Ice Box
    - Exabyte EXB-10i, EXB-10e, EXB-10h, EXB-60, EXB-210, EXB-440, EXB-120, EXB-480
    - IBM 7331-205
    - LAGO LS/380L DataWheel
    - Qualstar TLS 4210a, 4220, 4420, 4440, 4480, 4660, 46120
    - StorageTeK 9708, 9711
    - Transitional Technologies, Inc. Series 10
  - DLT tape libraries

- ADIC VLS 300, 400
- ADIC SCALAR 218, 224/M, 424/M, 248, 448, 458
- ATL Products (Odetics) ACL 2/28, 4/52, 9/88, 6/176, 2640
- Breece Hill Q7, Q47
- DEC TZ875/TZ875N, TZ877/TZ877N, TZ885/TZ885N, TL810, TL820
- MountainGate D-28, D-60, D-360, D-480
- OverlandData LXB 2110, 2210, 4210, 4110
- Quantum DLT 2500, 2500XT, 2700, 2700XT, 4500, 4700
- StorageTeK 9714, 9710 (SCSI-attached)
- Transitional Technologies, Inc. Series Q7, Q47

– DST tape libraries

- AMPEX 410

- SCSI-attached autochangers and libraries (ADSM device driver **not** required)

– Magstar devices as autochangers

- IBM 3575 Tape Library Dataserver
- IBM 3590 Model B11 (Random Mode)
- IBM Magstar MP Model B01, B11

NetTAPE TLC supports the StorageTek Client System Component (CSC) Developer's Toolkit Version 2.1 interface. StorageTek tape library devices such as the following, which are supported by the StorageTek CSC Toolkit Version 2.1 interface, are expected to function with NetTAPE TLC:

- StorageTek 4400 Automated Cartridge Subsystem
- StorageTek Wolfcreek 9360 Automated Cartridge System
- StorageTek Powderhorn** 9310/9311 Automated Cartridge Subsystem.

Chapter 4. Operation of NetTAPE with Other Products

This chapter describes the operation of NetTAPE with other products.

Operation with ADSM

NetTAPE can be used to share tape devices dynamically between multiple AIX applications, including ADSM for AIX (Version 2.1 or higher) servers.

NetTAPE provides an executable module named cladsmd, which the ADSM for AIX (Version 2.1 or higher) server uses to perform the following functions:

- Volume mounts (specific and scratch)
- Volume unmounts
- Freeing of library volumes (return to scratch)

See Chapter 10, “Using ADSM with NetTAPE” on page 85 for information on how to establish an existing storage pool or a new storage pool to be used with NetTAPE.

Coexistence with CLIO/S

The optional Tape Server feature of the Client Input Output/Sockets (CLIO/S) program (program number 5648-129) provides basic support of remote tapes. NetTAPE and CLIO/S can coexist on the same AIX system, providing complementary functions.

If you want to allow AIX users to access MVS tapes or allow MVS users to access AIX tapes, you must install CLIO/S (with the Tape Server feature) on both MVS and AIX.

If you install NetTAPE (with or without NetTAPE Tape Library Connection) and CLIO/S (with the Tape Server feature) on the same AIX workstation, they do not interfere with each other. On an AIX workstation that has both, NetTAPE looks at the syntax of the command or subroutine that was issued and passes it to CLIO/S if appropriate.

Integration with Non-AIX Workstations

This release of NetTAPE supports only AIX workstations.

© Copyright IBM Corp. 1996, 1997

Chapter 5. Notes for Users with Both NetTAPE and CLIO/S Installed

The following information is for installations that have both CLIO/S (program number 5648-129) and NetTAPE installed.

Compatibility of NetTAPE and CLIO/S Interfaces

NetTAPE fully supports CLIO/S 2.2 tape I/O-related command line and application programming interfaces for which there are NetTAPE equivalents. However, NetTAPE command line and application programming interfaces are not supported by CLIO/S. For instance, both NetTAPE and CLIO/S support the **cltalloc** tape device allocation command but the NetTAPE version is a superset of the CLIO/S version and is therefore not downwardly compatible.

NetTAPE uses the following differences between the NetTAPE and CLIO/S interfaces to recognize and properly route CLIO/S commands and subroutines:

- For the command line interface, the presence of **-f** /**dev**/**pst*** (where * is a character string) indicates a CLIO/S command.
- For the application programming interface, the presence of the **allocparms** parameter with either of the following values indicates a CLIO/S subroutine:
  - /**dev**/*, where * is a character string
  - **DD=**

Note that you can allocate and access NetTAPE devices only using NetTAPE commands and subroutines.

Using NetTAPE and CLIO/S Together

All devices in **nettape.adm.config** are controlled by NetTAPE and cannot be used by CLIO/s or any other tape access method.

Use CLIO/S commands and API only for accessing MVS tape devices. Use NetTAPE commands and API for all AIX-only processing.

Differences between NetTAPE and CLIO/S

- CLIO/S tape pseudo device drivers are configured by the administrator. They remain in existence until they are explicitly deleted.
- NetTAPE tape pseudo device drivers are created dynamically as part of device allocation and are deleted automatically as part of device unallocation. Therefore, the tape pseudo device driver files (device special files) for a particular tape pseudo device driver exist only in the interval between device allocation and unallocation.

© Copyright IBM Corp. 1996, 1997

Part 2. Installing, Configuring and Administering NetTAPE

Chapter 6. Installing NetTAPE and NetTAPE TLC 21

Chapter 7. Migrating from NetTAPE 1.1 to NetTAPE 1.2 27

Chapter 8. Once You've Installed NetTAPE 29

Chapter 9. Configuring and Customizing NetTAPE 33

Chapter 10. Using ADSM with NetTAPE 85

Chapter 11. Administering NetTAPE 91

Chapter 12. Administrative Commands 101

Chapter 13. Troubleshooting Tips for the Administrator 123

© Copyright IBM Corp. 1996, 1997

Chapter 6. Installing NetTAPE and NetTAPE TLC

This chapter tells you how to install NetTAPE, NetTAPE TLC, and ADSM device drivers. If you are installing both NetTAPE and NetTAPE TLC, install NetTAPE first, then go to "Installing NetTAPE TLC" on page 23. You can install the ADSM device drivers at any time.

If You Have CLIO/S Installed

If you have CLIO/S Version 2 Release 1 or earlier installed, you'll need to remove it. NetTAPE can run only with CLIO/S Version 2 Release 2 or higher. To remove CLIO/S, issue the following:

```
/usr/sbin/installp -ug fcf.clio
```

If you have CLIO/S Version 2 Release 2 perform the following steps before installing NetTAPE.

1. Login as root
2. Kill all CLIO/S cltclntd daemons as follows:
   a. See if any cltclntd daemons are running:

      ```
      ps -ef | grep cltclntd
      ```

      If cltclntd daemons are running, you should see command output like this:

      ```
      root 61652 1 0 10:48 – 0:00 /etc/drivers/cltclntd -f /dev/pst2
      root 61642 1 0 10:46 – 0:00 /etc/drivers/cltclntd -f /dev/pst3
      ```

   b. Kill any cltclntd daemons that are running by using the CLIO/S **cltterm** command. For example:

      ```
      cltterm -f /dev/pst2
      cltterm -f /dev/pst3
      ```

3. Remove any **pst***n* files:
   a. Check for **pst***n* files:

      ```
      ls /dev/pst*
      ```

      If there are any, you should see command output like this:

      ```
      /dev/pst2
      /dev/pst3
      ```

   b. Remove these files:

      ```
      rmdev -l pst2 -d
      rmdev -l pst3 -d
      ```

Installing NetTAPE

NetTAPE consists of two installp images:

- nettape
- clnettape

© Copyright IBM Corp. 1996, 1997

You must install both installp images on each host where NetTAPE will be running. The installation process varies depending on whether you are installing NetTAPE on an RS/6000 SP or on an RS/6000 workstation.

On an RS/6000 SP

Install NetTAPE as follows:

1. Copy the installp images to a Network File System (NFS) mounted file system that is accessible to each host where you are installing NetTAPE.

   If you are using SMIT, copy the installp images to this directory from the following SMIT menu:

   ```
   Install/Update Software
       Copy Software to Hard Disk for Future Installation
   ```

2. Create a working collective file containing the host names of each host where the NetTAPE installp images are to be installed. The format of the file is one host name per line, for example:

   ```
   spn01
   spn02
   spn03
   spn04
   ```

3. Enter either of these commands:

   ```
   export WCOLL=./nettape_host_name_file /* sh or ksh shell */
   setenv WCOLL ./nettape_host_name_file /*csh shell */
   ```

4. Enter the following command to install the installp images on the hosts named in the working collective file:

   ```
   dsh /usr/sbin/installp -ag -d /directory_with_installp_images/. \
   -X all | dshbak
   ```

On an RS/6000 Workstation

On an RS/6000 workstation, install NetTAPE as follows. If you have a globally-mounted /**usr** file system, install NetTAPE on the host where /**usr** is located:

1. To install from a tape, enter:

   ```
   /usr/sbin/installp -ag -d /dev/rmtn.1 -X all
   ```

2. To install from a disk, enter:

   ```
   /usr/sbin/installp -ag -d /full_path_name/. -X all
   ```

If you don't have a globally-mounted file system, do the following:

1. Copy the installp images to any directory on each host where NetTAPE is to run.

2. Enter this command on each host:

   ```
   /usr/sbin/installp -ag -d /full_path_name/. -X all
   ```

Installing NetTAPE TLC

NetTAPE TLC consists of two installp images:

- nettape_tlc
- nettape_tlc.scsipvr

Install NetTAPE TLC on each SP node or RS/6000 workstation acting as a tape library server. Install nettape_tlc.scsipvr on each SP node or RS/6000 workstation that contains SCSI attachment to robotics using the Atape device driver (3570, 3575 or 3590) or the ADSM device driver as listed in "NetTAPE Tape Device Support" on page 11.

On an RS/6000 SP

Install NetTAPE TLC as follows:

1. Copy the installp images to a Network File System (NFS) mounted file system that is accessible to each host where you are installing NetTAPE.

   If you are using SMIT, copy the installp images to this directory from the following SMIT menu:

   ```
   Install/Update Software
       Copy Software to Hard Disk for Future Installation
   ```

2. If you are installing NetTAPE TLC on a number of hosts:

   a. Create a working collective file containing the host names of each host where the NetTAPE TLC installp images are to be installed. The format of the file is one host name per line, for example:

      ```
      spn01
      spn02
      spn03
      spn04
      ```

   b. Enter either of these commands:

      ```
      export WCOLL=./nettape_tlc_host_name_file /* sh or ksh shell */
      setenv WCOLL ./nettape_tlc_host_name_file /*csh shell */
      ```

   c. Enter the following command to install the installp images on the hosts named in the working collective file:

      ```
      dsh /usr/sbin/installp -ag -d /directory_with_installp_images/. \
      -X all | dshbak
      ```

3. If you are installing NetTAPE TLC on a single host, install the installp image on the target host using the following command:

   ```
   /usr/sbin/installp -ag -d /
   directory_with_installp_images/. -X all
   ```

On an RS/6000 Workstation

On an RS/6000 workstation, install NetTAPE as follows. If you have a globally-mounted /**usr** file system, install NetTAPE TLC on the host where/**usr** is located:

1. To install from a tape, enter:

   ```
   /usr/sbin/installp -ag -d /dev/rmtn.1 -X all
   ```

2. To install from a disk, enter:

   ```
   /usr/sbin/installp -ag -d /full_path_name/. -X all
   ```

If you don't have a globally-mounted file system, do the following:

1. Copy the installp images to any directory on each host where NetTAPE is to run.
2. Enter this command on each host:

   ```
   /usr/sbin/installp -ag -d /full_path_name/. -X all
   ```

Installing ADSM Device Drivers

If you have libraries or autochangers that appear in the list of devices that are supported through the ADSM device drivers in “NetTAPE Tape Device Support” on page 11, you do not already have the device drivers installed as a result of installing ADSM, and you want NetTAPE to control the drives in the library or autochanger, you need to install the ADSM device drivers.

Install the latest version of the device drivers available, whether from the installation of ADSM or NetTAPE Tape Library Connection.

There are two installp images:

- adsm.devices
- v2r1m5f13.U449656.bff

Install both images because the second image is a PTF on the first image. As additional devices become supported through ADSM and as additional PTF levels become available, you can obtain additional PTF levels from the **index.storsys.ibm.com** anonymous FTP site under the /**adsm** directory. The **index.storsys.ibm.com** anonymous FTP site also contains the latest level of the Atape device driver under the /**devdrvr**/**AIX** directory.

To connect to the FTP site, use **ftp** to connect to **index.storsys.ibm.com** and login with user ID **anonymous**, using your Internet address as the password.

On an RS/6000 SP

Install ADSM device drivers as follows:

1. Copy the installp images to a Network File System (NFS) mounted file system that is accessible to each host on which you are installing the device drivers.

   If you are using SMIT, copy the installp images to this directory from the following SMIT menu:

   ```
   Install/Update Software
       Copy Software to Hard Disk for Future Installation
   ```

2. If you are installing the device drivers on a number of hosts:

   a. Create a working collective file that contains the host names of each host on which the device driver installp images are to be installed. The format of the file is one host name per line, for example:

```
spn01
spn02
spn03
spn04
```

b. Enter either of these commands:

```
export WCOLL=./driver_host_name_file /* sh or ksh shell */
setenv WCOLL ./driver_host_name_file /*csh shell */
```

c. To install the installp images on the hosts named in the working collective file, enter:

```
dsh /usr/sbin/installp -ag -d /directory_with_installp_images/. \
-X all | dshbak
```

3. If you are installing device drivers on a single host, install the installp image on the target host using the following command:

```
/usr/sbin/installp -ag -d /
directory_with_installp_images/. -X all
```

On an RS/6000 Workstation

On an RS/6000 workstation, install device drivers as follows. If you have a globally-mounted /**usr** file system, install device drivers on the host where/**usr** is located:

1. To install from a tape, enter:

```
/usr/sbin/installp -ag -d /dev/rmtn.1 -X all
```

2. To install from a disk, enter:

```
/usr/sbin/installp -ag -d /full_path_name/. -X all
```

If you do not have a globally-mounted file system, do the following:

1. Copy the installp images to any directory on each host where the device drivers are to run.
2. On each host, enter:

```
/usr/sbin/installp -ag -d /full_path_name/. -X all
```

What To Do Next

If you are installing NetTAPE for the first time, go to Chapter 8, “Once You've Installed NetTAPE” on page 29 to create the configuration and security files requires by NetTAPE.

If you are migrating to NetTAPE 1.2, go to Chapter 7, “Migrating from NetTAPE 1.1 to NetTAPE 1.2” on page 27.

Chapter 7. Migrating from NetTAPE 1.1 to NetTAPE 1.2

Migrating from NetTAPE 1.1 to 1.2 requires a change relating to NetTAPE security. In addition to the security method featured in Version 1 Release 1, which relied on the **.netrc** file, NetTAPE 1.2 provides three new security methods. These new methods avoid the problem of exposing userids and passwords in **.netrc** files. “Step 2: Defining NetTAPE's Security Method” on page 37 explains the new NetTAPE security methods and how to implement them.

If you prefer to remain with the NetTAPE 1.1 security method, however, you need only make the following change for migration:

1. Create a file called /**etc/nettape.security** on each system (client, server, and tape device host) in the NetTAPE configuration.
2. Place the following statement in the file:

   ```
   SUITE_NAME=nettape SECURITY_MODE=netrc DEVICE_ACL=no
   ```

   This statement informs NetTAPE that you are using the 1.1 security method. DEVICE_ACL=no informs NetTAPE that you are not restricting user access to device pools. The ability to restrict access to device pools is a new, optional feature of NetTAPE. You can use NetTAPE's 1.1 security method with or without device pool access restrictions. However, to migrate to NetTAPE 1.2 with the least number of changes, specify DEVICE_ACL=no. See “Establishing Restricted Access to Device Pools” on page 40 for more information.

Another change for NetTAPE 1.2 is that device pool names and device names specified in **nettape.adm.config** are now case sensitive. Be sure to check your **nettape.adm.config** file to ensure that the device pool names and device names are correctly specified.

No other migration changes are required. However, if you wish to take advantage of new NetTAPE features, go to Chapter 8, “Once You've Installed NetTAPE” on page 29 and review the new options you can add to your existing NetTAPE configuration files.

© Copyright IBM Corp. 1996, 1997

Chapter 8. Once You've Installed NetTAPE

Instructions for installing NetTAPE, and NetTAPE TLC are in the following README files:

- **/usr/lpp/nettape/README**
- **/usr/lpp/nettape_tlc/README**

You can also find NetTAPE and NetTAPE TLC installation instructions in Chapter 6, “Installing NetTAPE and NetTAPE TLC” on page 21. However, the latest information is in the README files, and information in the README files takes precedence over information in this manual

This chapter, which assumes that you have read and followed the instructions in the README files, guides you through the remaining steps to start NetTAPE and try out its functions.

Getting NetTAPE Up and Running

1. Go to Chapter 9, “Configuring and Customizing NetTAPE” on page 33 and create the necessary configuration files.
2. If you have NetTAPE TLC installed, follow the instructions in **/usr/lpp/nettape_tlc/doc/library_config.README** for configuring IBM 3494/3495, STK tape libraries, and SCSI tape libraries.

   For SCSI tape libraries, set the NLSPATH environment variable to the following on the node where you will run the SCSI tape library daemon :

   ```
   /usr/lib/nls/msg/%L/%N:/usr/lib/nls/msg/%L/%N.cat
   ```
3. Follow the instructions in **/usr/lpp/nettape/doc/nettape_gui.README** for customizing and starting the NetTAPE Operator Console GUI.

   You can find a sample Motif resource file in **/usr/lpp/nettape/samples/config/NETTAPE** and a list of supported fonts in **/usr/lpp/nettape/samples/config/font.choice**.

   Use either the **xcltopr** shell script or the the **cltoprg** command to start the GUI.

Starting NetTAPE

To start NetTAPE:

- At the workstation whose host name you specified for **stsdmn.hostname** in **nettape.config** (and only on this host), issue the following to start the NetTAPE status daemon:

  ```
  cltopr -S pvl
  ```
- If you have IBM 3494 or 3495 tape libraries, start the IBM tape library daemon using either of these commands:

  ```
  cltopr -S 3494d -L library_name (to start on local host)
  cltopr -S 3494d -L library_name -h host_name (to start on remote host)
  ```

  Once the IBM tape library daemon has started, the IBM tape library devices are placed in the up state in the operator GUI's device status display.

© Copyright IBM Corp. 1996, 1997

- If you have STK tape libraries, start the STK tape library daemon using either of these commands:

  ```
  cltopr -S silod -L library_name (to start on local host)
  cltopr -S silod -L library_name -h host_name (to start on remote host)
  ```

  Once the STK tape library daemon has started, the STK tape library devices are placed in the up state in the operator GUI's device status display.

- If you have SCSI tape libraries, start the SCSI tape library daemon using either of these commands:

  ```
  cltopr -S scsid -L library_name (to start on local host)
  cltopr -S scsid -L library_name –h host_name (to start on remote host)
  ```

  Once the SCSI tape library daemon has started, the SCSI tape library devices are placed in the up state in the operator GUI's device status display.

Trying out NetTAPE Commands

To allocate a manual device, open a tape file, and write to it:

1. From your host system, issue:

   ```
   cltalloc -f mytape -P poolname
   ```

   where *mytape* is a user-defined name that NetTAPE will link to the tape pseudo device driver, and *poolname* is a device pool name defined in **nettape.adm.config**. To see what pool names and devices are available, you can issue the **cltopr -q** command or you can look at the device status display in the NetTAPE operator GUI.

2. A tape mount message is displayed in the operator GUI. Select the message and click the **Mount** button to mount the tape.

3. If the command is successful:

   - Two device special files are created for you in the /**dev** directory on your host system. These are /**dev**/**pst***n*, a rewind-on-close device, and /**dev**/**pst***n***.1**, a no-rewind-on-close device, where *n* is an integer.
   - The files, *mytape* and *mytape***.1**, are created in your current directory and linked to /**dev**/**pst***n* and /**dev**/**pst***n***.1**, respectively.
   - A tape client daemon process, **cltclntd -f** /**dev**/**pst***n*, is started on your host system.
   - You are assigned a tape device from the device pool you have specified.

4. To write to the device, issue:

   ```
   tar -cvf mytape filename
   ```

5. When you are finished, unallocate the device by issuing:

   ```
   cltunall -f mytape
   ```

   The tape device is released and all related device special files are deleted, The *mytape* and *mytape***.1** files are also deleted. Finally, the tape client daemon is terminated.

Trying out the NetTAPE API

Several sample C and FORTRAN programs are located in the **/usr/lpp/nettape/samples/api** directory.

1. Modify one of them (for example, the **sample1.c** program) by changing `POOL=3480` to one of your device pool names and by changing `VOL=XYZ300` to your volser.
2. Use the **make** command to build the sample program:

   ```
   make -f Makefile.sample
   ```

3. Run the sample program.
4. A tape mount message is displayed in the operator GUI. Select the message and click the **Mount** button to mount the tape.
5. If the program is successful, informational messages are issued to tell you what the program is doing.

What To Do Next

Now that you've configured and brought up NetTAPE, and tried the command line and application programming interfaces, read Chapter 11, “Administering NetTAPE” on page 91 for a description of the administrative tasks you might need to perform.

Chapter 9. Configuring and Customizing NetTAPE

Follow the steps below to configure and customize NetTAPE:

- “Step 1: Ensuring Network Connectivity” on page 36
- “Step 2: Defining NetTAPE's Security Method” on page 37
- “Step 3: Customizing the nettape.adm.config File” on page 42
- “Step 4: Customizing the nettape.config File” on page 63
- “Step 5: Defining SCSI Tape Library Configuration Files” on page 70
- “Step 6: Defining Alternative Connections to Tape Device Hosts” on page 84

Table 1 on page 34 summarizes the system files and NetTAPE configuration files you'll need to create or modify. These are explained in detail in the configuration and customization topics that follow.

NetTAPE configuration files contain information that NetTAPE needs to run, such as the paths to each tape device and the specific attributes of each tape device in the network. Security-related files define the security method selected by your installation and provide NetTAPE with the necessary information to implement that method.

NetTAPE requires the files listed in Table 1 on page 34. In the table, "installed on all nodes" means that the file must be installed on all client, server, and tape device host nodes that you are using with NetTAPE.

© Copyright IBM Corp. 1996, 1997

Table 1 (Page 1 of 2). Configuration Files Used by NetTAPE

File Name	Created by	Purpose and Where Installed	Page
/etc/parconf	Administrator	Specifies alternative paths to tape device hosts for all users on a particular client node. Optionally installed on the user's (client) node.	
$HOME/parconf	User	Specifies alternative paths to tape device hosts for a particular user. Optionally installed on the user's (client) node.	84
84			
/etc/nettape.config	Administrator	Identifies the location of the status daemon. Each user needs access to this file. Installed on all nodes.	63
$HOME/nettape.config	User	Identifies the location of the status daemon and specifies options that can be customized by user. This file is optional for individual users. If the user has no local version, NetTAPE uses the version in **/etc/nettape.config**. Optionally installed on the user's (client) node.	63
/etc/nettape.adm.config	Administrator	Defines the tape devices in the configuration. Used by the status daemon. Installed on the node where the status daemon is running.	42
/etc/nettape.*library_name***.config**	Administrator	Used to define a library configuration for each SCSI tape library. These files, which contain the inventory for each library, are needed only if you are using SCSI tape libraries. They are used by the SCSI tape library daemon, also known as the SCSI Physical Volume Repository (PVR) daemon, **clscsid**. Installed on any node where a SCSI tape library daemon is running, one per library.	70
$HOME/.netrc	Administrator, user	Used only with the Remote Execution Using **.netrc** security method. Installed on all nodes.	37
/etc/clnettape.security	Administrator	Used to specify the security method NetTAPE is to use. Installed on all nodes.	39

/etc/hosts.equiv	Administrator	Used only with the Trusted Network Access security method. Installed on all nodes.	38
/etc/clhosts.equiv	Administrator	Used only with the Restricted Network Access security method. Installed on all nodes.	39
/etc/clnetrc	Administrator	Used only with the Encrypted Password security method. Installed on all nodes.	39

Step 1: Ensuring Network Connectivity

To allow NetTAPE to allocate and control tape devices throughout the network, ensure that your network routing files are defined so that:

- The host where the NetTAPE status daemon runs can reach each tape device host in the NetTAPE configuration.
- Each NetTAPE client can reach:
  - Each tape device host in the NetTAPE configuration
  - The host where the status daemon runs.

The status daemon controls NetTAPE and starts other daemons to handle different functions. A single instance of the status daemon runs on one host in the NetTAPE configuration. See "Understanding NetTAPE Daemons" on page 92 for more information. You specify the status daemon host using the keyword, **stsdmn.hostname**, in the configuration file, /**etc**/**nettape.config**. Instructions for creating this file are provided later in the chapter under "Step 4: Customizing the nettape.config File" on page 63.

Figure 2 shows the network connections required for your NetTAPE configuration. Although this figure depicts client nodes, tape device hosts, and the status daemon host as separate entities, a NetTAPE host can assume multiple roles or all roles. For instance:

- A NetTAPE tape device host can also be the host where the status daemon runs.
- A NetTAPE client node can also be a tape device host.

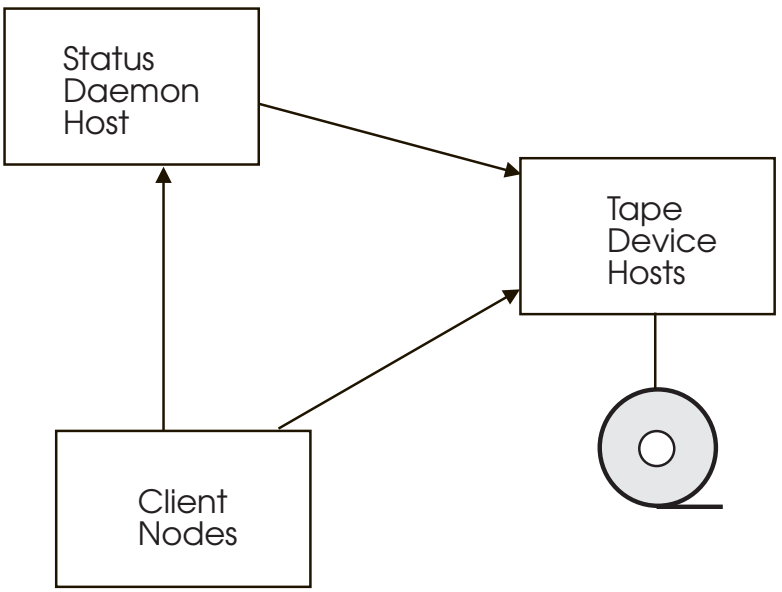

Figure 2. Network connections needed for NetTAPE.

Step 2: Defining NetTAPE's Security Method

NetTAPE lets you protect your NetTAPE configuration from unauthorized use by controlling user access to:

- The NetTAPE product
- Specific NetTAPE functions
- Specific NetTAPE device pools.

Each of these controls begins with *user authentication*, a process that determines whether a particular user is authorized to access NetTAPE. Once users are permitted to access NetTAPE, they can then be restricted in their use of the product by limiting their access to NetTAPE functions, NetTAPE device pools, or both.

This topic presents an overview of NetTAPE's security options and instructions for setting up the security method of your choice. First, read the overview, then read about the various user authentication methods, then follow the directions for establishing your NetTAPE security system.

At a high level, NetTAPE verifies the following when a user attempts to perform a NetTAPE function:

1. Product access — NetTAPE uses the authentication method selected by your installation to verify that the user is allowed to access NetTAPE. You specify the authentication method in the **/etc/clnettape.security** file. NetTAPE authentication methods are explained later in this topic.
2. Function access — NetTAPE checks the **/etc/nettape.adm.config** file's User Authority Control List to see whether the user has operator or administrator authorization. For information on the User Authority Control List, see “Defining the User Authority Control List” on page 44.
3. Device pool access — NetTAPE checks the **/etc/clnettape.security** file for the setting of the **DEVICE_ACL** keyword, which controls whether NetTAPE enforces device pool level authorization. If **DEVICE_ACL=yes**, NetTAPE checks the **nettape.adm.config** file to determine the user's authorization to use device pools. For more information, see “Controlling User Access to Specific Device Pools” on page 45.

NetTAPE's Options for User Authentication

NetTAPE lets you choose the way security is implemented by providing several methods for authenticating users and protecting the security of NetTAPE functions. The four methods are:

- The Encrypted Password method
- The Trusted Network Access method
- The Restricted Network Access method
- The Remote Execution Using **.netrc** Method. This method is supported only for backward compatibility with NetTAPE 1.1.

The Encrypted Password, Trusted Network Access, and Restricted Network Access methods all use the **clutild** daemon as a reference monitor. The **clutild** daemon on a server node receives information about a user that has been sent from a client

node, and then checks the information using the security method that you have selected. When you use one of these three methods, you must use the same method on all NetTAPE nodes (server and client).

The Remote Execution Using **.netrc** method uses the AIX **rexec** function to connect a NetTAPE client to a NetTAPE server and does not use the **clutild** daemon.

Note

Regardless of the user authentication method you choose, users must have a valid user ID on any node that they wish to access.

The Encrypted Password Method

The Encrypted Password method is the most secure method provided by NetTAPE, but it also requires the most work on the part of the system administrator.

The Encrypted Password method requires you to create and maintain an encrypted information file called **/etc/clnetrc**. Using the NetTAPE **clnetrc** utility (**/usr/bin/clnetrc**), you enter information that the utility encrypts and stores in the **/etc/clnetrc** file. Each entry includes a user ID and password, the host name of the client where the user will be logged on, and a user account number. The password is not the user's login password, but a key that is used only for NetTAPE security purposes. You can randomly generate these passwords. The user account number is not currently used by NetTAPE, but you must enter it. For more information on the **clnetrc** utility, see “clnetrc—Encrypting user password information” on page 102

The **/etc/clnetrc** file must contain the user IDs and passwords for each user on each NetTAPE node. The **/etc/clnetrc** files must contain identical information and must be propagated to each NetTAPE node.

When the Encrypted Password method is selected, NetTAPE authenticates a NetTAPE user as follows. First, the NetTAPE client searches for the user's credentials in the **/etc/clnetrc** file on the client's node and forms an encrypted ticket. The NetTAPE client sends the ticket to the NetTAPE server. The NetTAPE server then decrypts the ticket and compares the credential in the ticket with the credential in the server's **/etc/clnetrc** file. If the credentials match, NetTAPE grants the user access to devices and authority to run commands.

The Trusted Network Access Method

The Trusted Network Access method uses the information stored in the system's **/etc/hosts.equiv** file to authenticate NetTAPE users for access to devices and authority to run commands. This method is similar to AIX's Trusted Network control. Checking is performed by node, rather than by individual user. Once a node has been granted access to NetTAPE resources, all users that login to that node have access to NetTAPE resources.

The Trusted Network Access Method allows you to take advantage of existing network security, but it also means that you provide access to NetTAPE resources to your entire network.

To give users on a client node access to NetTAPE on a server node, the **/etc/hosts.equiv** file on the server node must contain the name of the client node. For instance, if users on Node A are to be given access to NetTAPE on Node B, then **/etc/hosts.equiv** file on Node B must contain Node A.

Note that this method does not permit you to restrict access to a subset of users on a particular node. If Node B's **/etc/hosts.equiv** file includes Node A, then all Node A users have access to NetTAPE on Node B.

A sample **/etc/hosts.equiv** file on node B might look like this:

```
NodeA                # all users on NodeA can access this node
NodeC                # all users on NodeC can access this node
```

The Restricted Network Access Method

The Restricted Network Access method uses a file called **/etc/clhosts.equiv** to authenticate NetTAPE users for access to devices and authority to run commands. This file can also be named **/etc/rthosts**. (If both files exist, NetTAPE uses the **/etc/clhosts.equiv** file.)

This authentication method is similar to the Trusted Network Access method but allows you to define a separate NetTAPE network that is different from the normal system trusted network that you have defined in **/etc/hosts.equiv** file.

This method allows you to restrict NetTAPE to a subset of your network and requires little work from the system administrator. However, it is not as secure as the Encrypted Password method.

Unlike the Trusted Network Access method, the Restricted Network Access method supports the following options:

- The host name can contain a wild card character (*)
- Partial user lists are supported, that is, access can be limited to specific users on a given host

A sample **/etc/clhosts.equiv** file might look like this:

```
NodeA                # all users on NodeA can access this node
NodeB user1 user2    # user1 and user2 on NodeB can access this node
NodeC*               # users on any node whose name starts with the
                     # string "NodeC" can access this node
```

The Remote Execution Using .netrc Method

The Remote Execution Method uses the **.netrc** file to authenticate NetTAPE users.

This method is supported only for backward compatibility with NetTAPE 1.1. and is documented in the NetTAPE 1.1 User's Guide.

Establishing Your NetTAPE Security System

Now that you are familiar with the user authentication options, you are ready to choose one and perform the necessary tasks to establish your NetTAPE security system. To set up your security system you need to take the following steps, each of which is discussed below:

1. Create an **/etc/clnettape.security** file on all NetTAPE nodes, that is, all client, server, or tape device host nodes that you are using with NetTAPE.

2. Select a user authentication method and define the necessary files as described under the information relating to that method.
3. If you want to implement device pool restrictions, update **nettape.adm.config** to specify these. You must also specify **DEVICE_ACL=yes** in the **/etc/clnettape.security** file.

Note: For user authentication methods other than Remote Execution Using .netrc, the NetTAPE security daemon, **clutild**, is used to receive and authenticate user credentials. For more information, see "Setting Up the Security Daemon" on page 41.

Creating the /etc/clnettape.security File

To let NetTAPE know what security methods you want to use, create a file called **/etc/clnettape.security** on each node in the NetTAPE configuration. A sample security file is provided in the **/usr/lpp/clnettape/samples/security/config** directory. The contents of **/etc/clnettape.security** must be identical on each node.

/etc/clnettape.security specifies the user authentication method to be used as well as whether there are to be restrictions on a device pool basis. Restrictions by NetTAPE function, on the other hand, are defined in **nettape.adm.config** See "Defining the User Authority Control List" on page 44 for more information.

The **/etc/clnettape.security** file consists of a single line that contains the following keywords:

SUITE_NAME Specifies the name of the product. Set this keyword to **nettape**.

SECURITY_MODE Specifies the user authentication method to be used:

encrypt	The Encrypted Password method
trusted	The Trusted Network Access method
restrict	The Restricted Network Access method
netrc	The Remote Execution Using .netrc method

DEVICE_ACL Specifies whether users are to be restricted by device pool. Set this keyword to either **yes** or **no**.

Here is an example of a **/etc/clnettape.security** file:

```
SUITE_NAME=nettape SECURITY_MODE=encrypt DEVICE_ACL=yes
```

Selecting a User Authentication Method

Select one of the four user authentication methods and create the necessary files as described previously.

Establishing Restricted Access to Device Pools

If you wish to restrict access to device pools, specify **DEVICE_ACL=yes** in your **/etc/clnettape.security** file. Also, you'll need to define authorizations for your device pools in **nettape.adm.config**. See "Controlling User Access to Specific Device Pools" on page 45 for instructions on how to do this.

Setting Up the Security Daemon

For any user authentication method other than the Remote Execution Using .netrc method, you'll need to set the system up so that the security daemon, clutild, can be automatically started by the inetd daemon. To do this, perform the following steps on each node in the NetTAPE configuration:

1. Verify that the /**etc**/**services** file contains the following line:

   ```
   clutild 7174/tcp
   ```

   During NetTAPE installation, the /**etc**/**services** file is changed automatically to include this line. Do not change the port number shown. The correct operation of the NetTAPE security daemon depends on it.

2. Verify that the /**etc**/**inetd.conf** file contains the following line:

   ```
   clutild stream tcp nowait root /usr/bin/clutild clutild
   ```

   During NetTAPE installation, the /**etc**/**inetd.conf** file is changed automatically to include this line. During normal operation, this is the line it should contain.

   If you need additional information for debugging purposes, add the **-v** flag, so that the line looks something like this:

   ```
   clutild stream tcp nowait root /usr/bin/clutild clutild -v file_name
   ```

   The **-v** flag creates a log file with the name *file_name.process_id* for each connection. Because many files will be created, you should use this flag only for debugging purposes. If you specify the the flag without specifying a file name, the log file is assigned the name /**tmp**/**clutild.***process_id*.

3. On all NetTAPE nodes, issue the command:

   ```
   /usr/bin/refresh -s inetd
   ```

Step 3: Customizing the nettape.adm.config File

The **nettape.adm.config** file specifies information needed by NetTAPE to allocate devices, manage mount queues, and display information through the GUI. You need to create **nettape.adm.config** file only on the server node where the status daemon is to run.

nettape.adm.config has the following functions:

- Controls access to NetTAPE functions
- Defines tape libraries
- Defines device pools and esoteric device pools
- Creates a default device pool
- Establishes default scratch and private categories for 3494/3495 libraries
- Configures mount queue characteristics
- Defines operator domains, allowing operators to see only the devices for which they are responsible.

You can copy and modify for your use one of the sample **nettape.adm.config** files located in **/usr/lpp/nettape/samples/config**. The customized file must be stored in **/etc/nettape.adm.config**. "Sample nettape.adm.config File" on page 58 shows the sample **nettape.adm.config** file. The information you need to specify in the **nettape.adm.config** file is explained below. Excerpts of the sample **nettape.adm.config** file shown in 58 are included with explanatory text in the following sections.

Note

The NetTAPE status daemon will not start if it encounters an error in **nettape.adm.config** or if any device is defined more than once.

Planning Your Device Pools

Before customizing **nettape.adm.config**, you need to:

1. Select the tape devices to be included in the NetTAPE configuration
2. Logically group those devices into pools by device type
3. Logically group the device pools into esoteric device pools
4. Select a default device pool
5. Define an access control list for the device pool

Device Pools

A *generic device pool*, also known as a *tape pool*, is a named group of tape devices **of a particular type** (such as 3490 or 3590).

Device pools make it easier for applications to obtain access to tape devices. A mount request for a device in a device pool can be satisfied by any device in that pool. A user or application issues a mount request specifying only the name of the device pool, rather than a specific device. Because any available device in the

device pool can be assigned to the application, the chance of satisfying the request is much greater.

Esoteric Device Pools

You can further organize your device pools into esoteric device pools. An *esoteric device pool* is a pool of device pools.

> **Note**
>
> All devices in a device pool or in an esoteric device pool must be the same device type. You cannot combine devices of different types.

Suppose you create two separate device pools of IBM 3490 devices to group your 3490 tape devices by server. You might then define an esoteric device pool consisting of all 3490 devices. The esoteric device pool would contain the two 3490 pools. Note that you are limited to a maximum of three pool levels:

- Level 1: a device pool
- Level 2: an esoteric device pool consisting of multiple device pools
- Level 3: an esoteric device pool consisting of esoteric device pools (as defined in Level 2) or a combination of esoteric pools and device pools.

Users and applications can specify esoteric device pools just as they would ordinary device pools, with the additional benefit of having an even larger pool of devices available from which to satisfy the request.

> **Note**
>
> To let users know the names of the esoteric device pools, you'll need to provide them with a list. You can, however, view the device pools comprising a specific esoteric pool by issuing the command: **cltopr** –**q** –**P** *esoteric_pool_name* . Note also that esoteric device pool mount queues cannot be viewed or changed using the NetTAPE operator GUI.
>
> Although the **cltopr** command and the operator GUI permit you to add devices to or delete devices from existing generic device pools in your configuration, you can define new generic or esoteric device pools only by adding them manually to the **nettape.adm.config** file.

If you have one or more manual device pools of a certain type, you should also define an esoteric device pool containing all of these device pools. Do this even if you have only a single device pool for that device type because you might need to add another one later on and having an esoteric device pool will make this easier.

Having an esoteric device pool for manual device pools also prevents users from having problems when they use the volume information file option (VFILE) for allocation or for opening tape files. Because each volume information file is permanently associated with the device pool where it was created, users who don't specify an esoteric device pool are limited to the device pool they selected when they created their volume information file. For more information, see “Obtaining Volume Information Using the VFILE Option” on page 131.

In a non-ADSM environment, you should avoid using esoteric device pools to group multiple library devices that are physically separated.

For ADSM users, you can configure multiple lookalike libraries (for example, IBM 3570 autochangers) in a NetTAPE esoteric device pool and define it as an external library in ADSM. However, you should ensure that there are no duplicated volume serial numbers within the library complex.

Default Device Pools

Once you have determined the device pools for your configuration, you need to select a default device pool. If a mount request omits a device pool name, a device from the default device pool is used to satisfy the request. Within the default device pool, a locally-attached device is chosen when possible. You can use an esoteric device pool as your default device pool.

Specifying the NetTAPE Utility Daemon Port Number

Specify a port number for the NetTAPE utility daemon (clutil) using **stsdmn.util.portno**. This daemon is internal to NetTAPE. You can use any port number except the one used by the status daemon. For example:

```
stsdmn.util.portno   9902        # port address for clutil daemon
```

Register the port number of the utility daemon in the **/etc/services** file for your network. This step is optional but recommended:

```
clutil port_num/tcp
```

Defining the User Authority Control List

The user authority control list specifies the user IDs that are authorized to perform certain tasks associated with using NetTAPE.

stsdmn.operators.view — The user IDs authorized only to view the NetTAPE GUI. If this keyword is omitted, all users are authorized to view the NetTAPE GUI. However, it is not recommended that you give all users the authority to view the NetTAPE GUI, because GUI performance would suffer.

stsdmn.operators — The user IDs authorized to perform operator functions using the NetTAPE GUI. If this keyword is omitted, all user IDs are authorized to perform all NetTAPE functions

stsdmn.operators.adm — The user IDs authorized to perform administrative functions using the NetTAPE GUI. You must specify at least one user ID with this keyword.

stsdmn.blp — The user IDs authorized to use the bypass label processing (BLP) option. If this keyword is omitted, all user IDs are authorized to use the BLP option.

The levels of authority from lowest to highest are:

- stsdmn.operators.view

Users with this level of authority can use the operator GUI to query tape mount requests and the current status of tape devices. However, they cannot control or operate tape devices or respond to mount requests.

If the **stsdmn.operators.view** key word is omitted, all users are granted stsdmn.operators.view authority.

- stsdmn.operators

  Users with this level of authority can operate tape devices and respond to mount requests, but they cannot start or stop the NetTAPE status daemon.

  If the **stsdmn.operators** key word is omitted, all users are granted stsdmn.operators authority.

- stsdmn.operators.adm

  Users with this level of authority can operate tape devices and respond to mount requests. In addition, they can start or stop the NetTAPE status daemon.

If a user ID is listed at more than one level of authority, for instance **stsdmn.operators.view** and **stsdmn.operators**, the highest level of authority prevails (**stsdmn.operators** in this case).

Any user who does not receive one of the three operator levels of authority is an ordinary user. An ordinary user can use the **cltopr** command line to query tape device status and the status of pending mount requests. An ordinary user cannot use the operator GUI, control or operate tape devices, or respond to mount requests, with the following exceptions:

- If the **stsdmn.operators.view** keyword is omitted, all users who would otherwise be ordinary users are given stsdmn.operators.view authority.
- If the **stsdmn.operators** keyword is omitted, all users who would otherwise be ordinary users are given stsdmn.operators authority.

Any user, whether an operator or an ordinary user, can make device allocation requests and use tape drives.

A sample section of **nettape.adm.config** is shown below. Comments are preceded by a pound sign (#).

```
#
# User Authority Control List
#                          User IDs
#                       -------------------
stsdmn.operators        oys ronglee elaw
stsdmn.operators.view   oddvar dag
stsdmn.operators.adm    oys
stsdmn.blp              oys ronglee
```

Controlling User Access to Specific Device Pools

You can control user access to specific device pools using device pool access control lists. Device pool access control lists do not affect user IDs with **stsdmn.operators** or **stsdmn.operators.adm** authority. These user IDs have access to all device pools. User IDs with **stsdmn.operators.view** authority are subject to device pool access control lists.

Using device pool access control lists, you can specify either:

- Access to a device pool
- No access to a device pool.

However, each device pool can have only one kind of list (access or no-access).

Once you have decided whether you will specify an access or no-access list for a particular device pool, you can specify the individual user IDs or AIX user groups in the list. Device pools can have both a list of users and a list of user groups.

An AIX user can gain access to a device pool based on any AIX group to which the user belongs, not just the current AIX group that is set for the user's session.

To specify the access list for a device pool, you can use either or both of the following keywords:

stsdmn.devpool.access.group *device_pool group_list*
: Specifies a list of AIX user groups that are to have access to a device pool. You may specify any number of groups.

stsdmn.devpool.access.user *device_pool userid_list*
: Specifies a list of user IDs that are to have access to a device pool. You may specify any number of user IDs.

To specify the no-access list for a device pool, you can use either or both of the following keywords:

stsdmn.devpool.no_access.group *device_pool group_list*
: Specifies a list of AIX user groups that are to be denied access to a device pool. You may specify any number of groups.

stsdmn.devpool.no_access.user *device_pool userid_list*
: Specifies a list of user IDs that are to be denied access to a device pool. You may specify any number of user IDs.

Note on Esoteric Device Pools

Access control lists cannot be specified for esoteric device pools. However, esoteric device pools can contain device pools that have access control lists. If a particular user requests a device from an esoteric pool and this user is permitted to access only certain device pools in the esoteric pool, then the user's request is routed only to those authorized pools.

To activate access control for specific device pools, you must enable device pool access control in general by specifying **DEVICE_ACL=yes** in the **/etc/clnettape.security** file. For more information, see “Creating the /etc/clnettape.security File” on page 40.

If device pool access control is enabled (via **DEVICE_ACL=yes**) and you do not define an access list for a device pool, the device pool is available to all users.

A sample section of **nettape.adm.config** is shown below. Comments are preceded by a pound sign (#).

```
#
# Device Pool Access Control Lists
#
# 3480_1 can be accessed only by group11, group12, wootton,
# jindal, and bidwell.
#
# 3490_3 can be accessed by all except group11, group 12,
# group14, wootton, ronglee, and elaw
#
# All other device pools are accessible to all NetTAPE users
#
stsdmn.devpool.access.group 3480_1 group11 group12
stsdmn.devpool.access.user  3480_1 wootton jindal bidwell
stsdmn.devpool.no_access.group 3490_3 group11 group12 group14
stsdmn.devpool.no_access.group 3490_3 wootton ronglee elaw
```

Specifying the Tape Libraries

To identify the type of tape library, use the following keywords:

stsdmn.ibmacs Identifies an IBM 3494 or 3495 tape library

stsdmn.stkacs Identifies an STK tape library

stsdmn.scsiacs Identifies a SCSI tape library.

To define a tape library to NetTAPE, you must specify its tape library name and its library server node. A tape library's *tape library server node* is the node on which its NetTAPE tape library daemon (cl3494d, clsilod, or clscsid) will run. Assuming you followed the configuration instructions in the **/usr/lpp/nettape_tlc/doc/library_config.README**, you have already chosen the tape library names and library server nodes you'll be using.

To define a tape library to NetTAPE, specify its library name and its NetTAPE library server node name (host) as follows.

For the IBM 3494 and 3495 Tape Library Dataservers, you must also specify the library manager control path special files. If the tape library has no asynchronous port, specify its command port as its asynchronous port. For LAN-based control path information, see *IBM SCSI Tape Drive and Library Device Drivers*. For parallel or ESCON channel library manager control path information, see *IBM AIX Parallel and ESCON Channel Tape Attachment/6000*.

For SCSI tape libraries and autochangers, you must also specify the robotics control path special file. The file name is /**dev**/**lb***n* for libraries and autochangers controlled by the ADSM device driver. The file name is /**dev**/**rmt***n* for Magstar and Magstar MP devices controlled by the Atape device driver. If you are configuring a 3590 device connected to multiple hosts, select one host for the SCSI tape library daemon. Do not specify the **smc** suffix for Atape devices.

A sample section of **nettape.adm.config** is shown below. Comments are preceded by a pound sign (#).

```
#
# Tape Library Definitions
#
#               lib_name     host            ctrl_path
#              -------------------------------------------------
#                                        cmd_port    asynch_port
#                                      --------------------------
# IBM 3494
stsdmn.ibmacs   ibm3494_1    k80n06    /dev/lmcp0  /dev/lmcp0
stsdmn.ibmacs   ibm3494_2    k80n07    /dev/lmcp0  /dev/lmnp0
# STK Silo
stsdmn.stkacs   stksilo_1    k80n06
# SCSI Libraries
stsdmn.scsiacs  3590a        K80n07    /dev/rmt3
stsdmn.scsiacs  exb120_3     K80n06    /dev/lb0
```

Specifying the Retry Interval for the Tape Library Daemon

Use **stsdmn.library.retry** to specify the interval (in minutes) between status daemon attempts to re-establish connection with the tape library daemon (cl3494d, clsilod, or clscsid) when hardware failure has broken the connection. For instance, if you specify an interval of two minutes, the status daemon attempts every two minutes to establish connection with the tape library daemon. For example:

```
stsdmn.library.retry  2
```

Handling Tape Library Tape Label Errors

When an output tape is mounted in a tape library, there is a mismatch occasionally between the tape label requested and the label found on the tape. You can use **stsdmn.library.volcheck** to specify how this problem is to be handled by NetTAPE. The options are:

Yes Inform the operator that intervention is required.

No Cancel the job instead of informing the operator that intervention is required. This is the default value.

Ignore Ignore the mismatch between tape label requested and tape label found and use the tape anyway.

For example:

```
stsdmn.library.volcheck  ignore
```

Defining the Devices and the Device Pools

In the **nettape.adm.config** file, the tape devices are defined, along with their pools, by specifying the following information for each device:

Host name The globally-known host name to which the device is attached. You can use the **parconf** file to specify an alternative high-speed connection to this tape device (through a High Performance switch, for example). See “Step 6: Defining Alternative Connections to Tape Device Hosts” on page 84 for more information.

Device pool name The device pool to which the device is assigned. The pool name should include the device type. Pool names can be up to 16 characters and are case sensitive.

When used with ADSM, this name is the external library name and must be in upper case.

Device type The type of device. Must be one of the following:

3420	IBM 3420 tape drive or compatible
3422	IBM 3422 tape drive or compatible
3480	IBM 3480 tape drive or compatible
3490	IBM 3490 tape drive or compatible
3590	IBM 3590 tape drive or compatible
3570	IBM Magstar MP tape drive or compatible
4mm	IBM 7206 Model 005 4mm tape drive or compatible or 4mm drives using ADSM device drivers
QIC	IBM 7207 Model 012 1/4 inch tape drive or compatible, or QIC drives using ADSM device drivers
8mm	IBM 7208 Model 011 8mm tape drive or compatible or 8mm drives using ADSM device drivers
DLT	DLT drives using ADSM device drivers
D2	Ampex DST 310 or 410 tape drive
9TRK	IBM 9348 Model 012 9-track tape drive or compatible
OST	All others

See Chapter 3, “Supported Hardware and Software” on page 11 for a complete list of supported devices.

Device name The name of the device special file. Device special file names are case sensitive.

Operation mode Indicates how the tape device is operated - manually or automatically. Specify one of the following:

Manual	Manual cartridge loading.
IBMACL	Automatic cartridge loader (ACL) with sequential volume access. NetTAPE's ACL support is based on the AUTO mode operation option within the tape device hardware. To use the ACL feature, command line users can use the –**a** flag on the **cltalloc** command and programmers can specify the **ACL** option on the **ctpalloc** subroutine.
IBMACF	The device is an IBM 3590 with an automatic cartridge facility (ACF) using random volume access mode. Note that you can also use the NetTAPE GUI to enable or disable ACF mode.

IBMACS The device is an IBM 3494 or IBM 3495 tape library

STKACS The device is an STK silo

SCSIACS The device is managed by the ADSM device driver, or is a 3590 or 3570 device operating as a library managed by the Atape device driver.

Note

If you add a tape device that is to run in IBMACL mode, ensure that the operation mode switch on the tape device is set to automatic mode.

Options

The options field is used to specify several different additional pieces of information.

Operator domain

The NetTAPE GUI lets you filter by operator domain the devices that are displayed. Operators see only information for devices they manage.

The format for specifying the operator domain is **od=***n*, where *n* is an integer. The default operator domain is 1.

For more information, see the **od=** option of the –**o** flag of the **cltopr** command on page 105.

Device state

The state in which NetTAPE is to place the device: up, down, or reserved. The default device state is up. For tape libraries, the device state must be either down or reserved.

For library devices marked as down, during startup, NetTAPE dismounts the cartridge and changes the device state to up after the tape library daemon comes up successfully.

For library devices marked as reserved, during startup, NetTAPE does not dismount the cartridge and leaves the device state as reserved after the tape library daemon comes up successfully.

Tape library name

The name of the tape library to which the device belongs. The tape library name can be up to 16 characters and must be one of the names specified with the **stsdmn.ibmacs**, **stsdmn.stkacs**, or **stsdmn.scsiacs** options. For a SCSI PVR there must be an accompanying SCSI catalog file for the library. For more information, see “Step 5: Defining SCSI Tape Library Configuration Files” on page 70.

SCSI tape library device address

The element number of the device, consisting of a number from 0 to 32766.

STK tape library device address
A four number tuple representing the device address in the STK library (for example: *n1,n2,n3,n4*), where:

n1 Specifies the automated cartridge system (ACS) number
n2 Specifies the library storage module (LSM) number within the ACS
n3 Specifies the panel number within the LSM
n4 Specifies the drive number within the panel.

AVR
When activated for a manual device, the Automatic Volume Recognition (AVR) daemon periodically scans the device and records the volser of any labeled tape that is loaded. Later, when a user attempts to allocate a tape with this volser, the tape's location is known to NetTAPE and the tape can therefore be mounted without operator intervention.

The AVR option can be activated for any device with a manual operation mode. However, only labeled tapes can be successfully scanned. AVR does not apply to tape libraries and ACF devices. Specify AVR if the AVR daemon is to be activated for a device during NetTAPE initialization, AVR can also be activated or deactivated using the NetTAPE GUI or the **cltopr** command.

You can control the interval between AVR scans using the keyword, **avrdmn.interval**. See "Specifying the AVR Daemon Scanning Interval" on page 56 for more information.

Device driver types
The type of device driver used by the device. NetTAPE uses this option primarily to manage differences in the way tape positioning is handled. You can omit the device driver type if it is an IBM MTDD, Atape, or ADSM device driver. Otherwise, specify one of the following:

OST Specify this device driver type if you have a SCSI tape device attached to the standard AIX SCSI tape device driver. However, if the device is one of the known OST lookalike devices (that is, it has a device type of 8mm, 4mm, QIC, DLT, 9TRK, or OST), you do not need to specify the **OST** option.
OMI Specify this device driver type if you have a SCSI tape device attached to the Open MicroSystem Inc. (OMI) SCSI tape device driver.

A sample section of **nettape.adm.config** is shown below. Comments are preceded by a pound sign (#).

```
#
# The following devices require manual tape mount operation
#
#hostname.device  pool_name  device_type  tape_name  op_mode  options
#-------------------------------------------------------------------
epacrs8.device      8mm        8mm       /dev/rmt0   manual
epacrs8.device      D2         d2        /dev/rmt6   manual
epacrs6.device      qIc1500    qic       /dev/rmt1   manual
epacrs6.device      qIc1500    qic       /dev/rmt0   manual
gb980.device        StK4280    3480      /dev/rmt7   manual  od=1,down
gb980.device        3480_1     3480      /dev/rmt3   manual
gb980.device        3480_1     3480      /dev/rmt4   manual
gb980.device        Stk4280    3480      /dev/rmt8   manual  od=2,down
gb980.device        StK4280    3480      /dev/rmt9   manual  od=1,down
bergen.device       STK4280    3480      /dev/rmt4   manual  OD=1,DOWN
v08n03.device       3490       3490      /dev/rmt1   manual  down
it2n01.device       4mm        4MM       /dev/rmt1   manual  od=1
it2n01.device       qic        QIC       /dev/rmt2   manual  od=2
it2n01.device       8mm        8MM       /dev/rmt3   manual  od=1
it2n01.device       9trk       9TRK      /dev/rmt5   manual  od=1
#
# The following devices have AVR mode ON
#
#hostname.device  pool    device  tape      operation  options
#                 name    type    name      mode
#-------------------------------------------------------------------
k80n05.device     3480_2   3480   /dev/386   manual    od=1,up,avr
k80n05.device     3480_2   3480   /dev/387   manual    od=1,up,avr

#
# The following 3590 devices have ACF function turned on.
#
#hostname.device  pool      device  tape      operation  options
#                 name      type    name      mode
#-------------------------------------------------------------------
#
k80n05.device     3590       3590   /dev/rmt0  ibmacf
epacrs8.device    3590       3590   /dev/rmt5  ibmAcf
#
# The following example shows both 3490 and 3590 tape devices attached to
# the same IBM 3494 library named ibm3494_1. In this case, each device
# type should have a unique device pool name assigned. For tape
# libraries, the device state must be either down or reserved.
#
#
#hostname.device  pool   device  tape      operation  options
#                 name   type    name      mode
#-------------------------------------------------------------------
k80n06.device    3490_2   3490   /dev/180  ibmacs    od=1,down,ibm3494_1
k80n06.device    3490_2   3490   /dev/181  ibmacs    od=1,down,ibm3494_1
k80n07.device    3590_2   3590   /dev/182  ibmacs    od=1,down,ibm3494_1
k80n07.device    3590_2   3590   /dev/183  ibmacs    od=1,down,ibm3494_1

#
# The following devices are attached to an STK Silo library
# Silo tape drives require additional device address information:
#
#
#
#hostname.device  pool   device  tape     operation  options
#                 name   type    name     mode
#-------------------------------------------------------------------
#                                          ACS,LSM,PANEL,DRIVE
#                                          ------------------
```

```
#                                                \       /
k80n03.device    3490_3  3490 /dev/rmt0   stkacs  0,0,1,0 od=1,down,stksilo_1
k80n03.device    3490_3  3490 /dev/rmt1   stkacs  0,0,1,2 od=1,down,stksilo_1
k80n03.device    3490_3  3490 /dev/rmt2   stkacs  0,0,2,0 od=1,down,stksilo_1
#
# The following devices are SCSI-attached devices in an Exabyte EXB-120
# library. This example is the same for any tape library managed by the
# SCSI daemon.
#
#
#hostname.device  pool   device  tape      operation  element options
#                 name   type    name      mode       number
#-------------------------------------------------------------------------------
k80n06.device    exb_2   8mm    /dev/mt0  scsiacs     116     od=1,down,exb120_3
k80n06.device    exb_2   8mm    /dev/mt1  scsiacs     117     od=1,down,exb120_3
k80n06.device    exb_2   8mm    /dev/mt2  scsiacs     118     od=1,down,exb120_3
k80n06.device    exb_2   8mm    /dev/mt3  scsiacs     119     od=1,down,exb120_3
#
# The following devices are STK Timberline tape devices attached
# to the OMI tape device driver.
#
#
#hostname.device  pool   device  tape      operation  options
#                 name   type    name      mode
#-------------------------------------------------------------------
sp14.device    stklib_3  9490  /dev/rmt6  stkacs  0,2,10,2 od=2,resv,omi,silo_1
sp14.device    stklib_3  9490  /dev/rmt7  stkacs  0,2,10,3 od=2,resv,omi,silo_1
```

Specifying Shared Devices

Devices that are physically connected to multiple host systems or nodes are called **shared devices**. NetTAPE allows a device to be shared by up to eight different hosts.

To specify a shared device, define it multiple times, once for each host or node to which it is connected. To indicate that the device is shared, you must add a suffix to each *hostname.device* specification. Use the format *hostname.device.suffix*, where *suffix* is number between 0 and 999. For each specification of the same shared device, use the same device suffix. The device names, however, do not have to be the same.

For instance, here is how you would define a 3490 device shared by two hosts. Each of the two specifications of the shared device identify a different device special file for that shared device. See “Understanding NetTAPE Tape Device States” on page 95 for further information on how NetTAPE handles shared devices.

```
1st_host.device.1  3490ESCON 3490 /dev/rmt0 ibmacl od=1,up,avr
2nd_host.device.1  3490ESCON 3490 /dev/rmt3 ibmacl od=1,up,avr
```

Here is how you would define a 3590 device using a SCSI tape library daemon and shared by two hosts, assuming that you have specified the SCSI tape library daemon using the **stsdmn.scsiacs** keyword elsewhere in the : pk.nettape.adm.config file as follows: `stsdmn.scsiacs 3590a host_one /dev/rmt3`

```
host_one.device.3  our3590s 3590  /dev/rmt3 scsiacs 16 od=1,down,3590a
host_two.device.3  our3590s 3590  /dev/rmt2 scsiacs 16 od=1,down,3590a
```

A sample section of **nettape.adm.config** is shown below. Comments are preceded by a pound sign (#).

```
#
# The following is the example for sharing device between two nodes.
# Devices with the same suffix number are shared.
#
#hostname.device  pool      device  tape      operation  options
#                 name      type    name      mode
#-------------------------------------------------------------------
k80n03.device.1   3490ESCON  3490   /dev/rmt0  ibmacl    od=1,up,avr
k80n06.device.1   3490ESCON  3490   /dev/rmt3  ibmacl    od=1,up,avr
k80n03.device.2   3490ESCON  3490   /dev/519   ibmacl    od=1,up,avr
k80n06.device.2   3490ESCON  3490   /dev/519   ibmacl    od=1,up,avr
k80n88.device.3   our3590s   3590   /dev/rmt3 scsiacs 16 od=1,down,3590a
k80n99.device.3   our3590s   3590   /dev/rmt2 scsiacs 16 od=1,down,3590a
```

Defining the Esoteric Device Pools

Define your esoteric device pools and the device pools they include using **stsdmn.esoteric**. A sample section of **nettape.adm.config** is shown below. Comments are preceded by a pound sign (#).

```
#
# Esoteric Device Pool Definitions
#                 esot_dev_pool   dev_pools
#                ------------------------------------------------
stsdmn.esoteric      all3480     3480_1 stk4280
stsdmn.esoteric      all3490     3490 3490escon 3490_2 3490_3
stsdmn.esoteric      all8mm      exb_2 8mm
```

Defining the Default Device Pool

If a mount request fails to specify a device pool, the request is directed to the default device pool. You can specify either a particular device pool as the default or you can specify an esoteric device pool. Use an esoteric device pool only if it makes sense for users to mount tapes on any of the devices comprising the esoteric device pool.

You can control user access to the default device pool by using a device pool access control list. For more information, see “Controlling User Access to Specific Device Pools” on page 45.

Define the default device pool using **stsdmn.devpool.default**. For example:

```
#
# Default Device Pool
# Note that the default device pool can be an esoteric device pool.
#                       dev_pool
#                      ----------
stsdmn.devpool.default  all3490
```

Specifying Default Scratch and Default Private Tape Categories

Notes

1. STK uses the term *scratch pool* rather than scratch category, but the meaning is the same. Private categories do not apply to STK tape libraries.
2. SCSI daemons have only one scratch category and one private category. These categories are set by the system and must not be specified in this section of the configuration file. They also have two other categories:
   - Ejected, for cartridges that have been ejected from the library and may be returned at a later time
   - Clean, for cartridges reserved as cleaning cartridges.

The default scratch category for a tape library device pool is the ID of the category from which scratch tapes are to be taken when a mount request fails to specify a scratch tape source.

Define a default scratch category for each tape library device pool. The scratch category ID must be a hexadecimal value from X'1' to X'FEFF'.

The default private category for a tape library device pool specifies the ID of the category where private tapes are to be stored when a mount request fails to specify a target location. The private category ID must be a hexadecimal value from X'1' to X'FEFF'.

You must specify different values for the default scratch category and the default private category.

Notes:

1. All tape devices sharing a default scratch category or a default private category must have the same tape library controller.
2. If you are using NetTAPE with ADSM, the default scratch category is used to mount scratch tapes for ADSM and the default private category is used to store ADSM tapes.

A sample section of **nettape.adm.config** is shown below. Comments are preceded by a pound sign (#).

```
#
# Default Scratch/Private Category
#                           dev_pool  cat_id
#                          ------------------
stsdmn.devpool.cat.scratch  3490_2     FBC          #(1 to 0xFEFF)
stsdmn.devpool.cat.private  3490_2     F11          #(1 to 0xFEFF)
stsdmn.devpool.cat.scratch  3490_3     900          #(1 to 0xFEFF)
stsdmn.devpool.cat.private  3490_3     100          #(1 to 0xFEFF)
stsdmn.devpool.cat.scratch  3590_2     5D0          #(1 to 0xFEFF)
stsdmn.devpool.cat.private  3590_2     6D0          #(1 to 0xFEFF)
```

Controlling Mount Queue Processing

Use the following keywords to customize the processing of generic device pool mount queues. Esoteric device pool mount queue processing is not customizable.

mount.queue

Specifies whether mount requests are to be queued when no device is available to satisfy the request.

YES	Queue mount requests that can't be satisfied
NO	Reject mount requests that can't be satisfied

Note that mount requests from the ADSM server are not queued.

mount.queue.scan.interval

The interval (in minutes) between NetTAPE scans for mount requests that have exceeded the maximum mount queue wait time specified by **mount.queue.max.wait**.

If you wish to have mount requests remain queued until they can be satisfied (no scan required then), omit this keyword. If you specify this keyword, also specify **mount.queue.max.wait**.

mount.queue.max.wait

The maximum time (in minutes) a mount request is to remain queued for a tape device. After a mount request has been queued for the specified time, the mount request is rejected.

If you wish to have mount requests remain queued until they can be satisfied, omit this keyword. If you specify this keyword, also specify **mount.queue.scan.interval**.

A sample section of **nettape.adm.config** is shown below. Comments are preceded by a pound sign (#).

```
#
# Mount Queue Values
#
mount.queue                yes  # queue request if device is busy
mount.queue.scan.interval  5    # interval in minutes for timeout
                                 # scanning
mount.queue.max.wait       30   # max tape client wait time in minutes
```

Specifying the AVR Daemon Scanning Interval

Specify the interval (in minutes) between automatic volume recognition scans using **avrdmn.interval**. For instance, if you specify an interval of five minutes, NetTAPE performs an AVR scan every five minutes. For example:

```
#
# AVR Daemon Values
#
avrdmn.interval        5        # interval in minutes for timeout
#                                 scanning
```

Specifying a Volume Check Installation Exit

You can optionally use the **stsdmn.volcheck** keyword to specify an installation-written exit that NetTAPE is to call either instead of or before calling its own internal volume check routine. “Customizing NetTAPE's Volume Check Process” on page 66 provides information on writing a volume check installation exit.

The installation exit must reside on a system in a directory that is accessible to the status daemon. You must specify the fully-qualified path name of the volume check installation exit. The format for the keyword is the following:

```
#
# Give Control to Volume Check Installation Exit
#
stsdmn.volcheck  exit_path_name
#
```

Specifying a Scratch Tape Mount Installation Exit

When a user requests a scratch tape, the NetTAPE operator GUI displays a pop-up window to prompt the operator for the volser of the scratch tape. The user's allocation request proceeds only after the operator responds to this prompt. You can automate this process by using an installation exit to eliminate the need for operator intervention when a scratch tape is requested.

Use the optional keyword, **stsdmn.scratch.mount** to specify an installation-written exit that NetTAPE is to call instead of prompting the operator. “Customizing NetTAPE's Scratch Tape Mount Process” on page 68 provides information on writing a scratch tape mount installation exit.

The installation exit must reside on a system in a directory that is accessible to the status daemon. You must specify the fully-qualified path name of the scratch tape mount installation exit. The format for the keyword is the following:

```
#
# Give Control to Scratch Tape Mount Installation Exit
#
stsdmn.scratch.mount  exit_path_name
#
```

Sample nettape.adm.config File

This sample **nettape.adm.config** file is located in **/usr/lpp/nettape/samples/config**.

```
#
# /etc/nettape.adm.config sample file
#
#
# NetTAPE Utility Daemon Values
#
stsdmn.util.portno   9902        # port address for clutil daemon
#
# User Authority Control List
#                          User IDs
#                       -------------------
stsdmn.operators        oys ronglee elaw
stsdmn.operators.view   oddvar dag
stsdmn.operators.adm    oys
stsdmn.blp              oys ronglee
#
#
# Device Pool Access Control Lists
#
# 3480_1 can be accessed only by group11, group12, wootton,
# jindal, and bidwell.
#
# 3490_3 can be accessed by all except group11, group 12,
# group14, wootton, ronglee, and elaw
#
# All other device pools are accessible to all NetTAPE users
#
stsdmn.devpool.access.group 3480_1 group11 group12
stsdmn.devpool.access.user  3480_1 wootton jindal bidwell
stsdmn.devpool.no_access.group 3490_3 group11 group12 group14
stsdmn.devpool.no_access.group 3490_3 wootton ronglee elaw
#
#
# Tape Library Definitions
#
#               lib_name     host            ctrl_path
#              -------------------------------------------------
#                                        cmd_port    asynch_port
#                                      --------------------------
# IBM 3494
stsdmn.ibmacs   ibm3494_1    k80n06    /dev/lmcp0  /dev/lmcp0
stsdmn.ibmacs   ibm3494_2    k80n07    /dev/lmcp0  /dev/lmnp0
# STK Silo
stsdmn.stkacs   stksilo_1    k80n06
# SCSI Libraries
stsdmn.scsiacs  3590a        K80n07    /dev/rmt3
stsdmn.scsiacs  3590b        K80n88    /dev/rmt3
stsdmn.scsiacs  exb120_3     K80n06    /dev/lb0

# Specifies the time (in minutes) between status daemon attempts to
# communicate with the tape library manager for 3494, STK and SCSI
# tape libraries. If NetTAPE cannot communicate successfully with a
# tape library manager, it retries at the specified interval.
```

```
stsdmn.library.retry  2

#
# Option to enable tape library volcheck operator intervention
# notification. The valid options are "yes", "no", or "ignore".
#
stsdmn.library.volcheck  ignore


#
# Esoteric Device Pool Definitions
#                 esot_dev_pool   dev_pools
#                ------------------------------------------------
stsdmn.esoteric      all3480     3480_1 stk4280
stsdmn.esoteric      all3490     3490 3490escon 3490_2 3490_3
stsdmn.esoteric      auto3590    3590_2 3590_3
stsdmn.esoteric      all8mm      exb_2 8mm

#
# Default Device Pool
# Note that the default device pool can be an esoteric device pool.
#                       dev_pool
#                      ----------
stsdmn.devpool.default  all3490

#
# Default Scratch/Private Category
#                          dev_pool  cat_id
#                         ------------------
stsdmn.devpool.cat.scratch  3490_2     FBC          #(1 to 0xFEFF)
stsdmn.devpool.cat.private  3490_2     F11          #(1 to 0xFEFF)
stsdmn.devpool.cat.scratch  3490_3     900          #(1 to 0xFEFF)
stsdmn.devpool.cat.private  3490_3     100          #(1 to 0xFEFF)
stsdmn.devpool.cat.scratch  3590_2     5D0          #(1 to 0xFEFF)
stsdmn.devpool.cat.private  3590_2     6D0          #(1 to 0xFEFF)

#
# Mount Queue Values
#
mount.queue                yes  # queue request if device is busy
mount.queue.scan.interval  5    # interval in minutes for timeout
                                # scanning
mount.queue.max.wait       30   # max tape client wait time in minutes

#
# AVR Daemon Values
#
avrdmn.interval        5        # interval in minutes for timeout
#                                 scanning
#                                 scanning
# Give Control to Volume Check Installation Exit
#
stsdmn.volcheck  /usr/local/bin/volcheck
#
#
#
# Give Control to Scratch Tape Mount Installation Exit
#
```

```
stsdmn.scratch.mount  /usr/local/bin/scratch_mount
#
#
#
# Device Pool Definitions
#
# Note that the following are the valid verbs for operation mode and
# option values:
#
#    op_mode - manual (Manual tape mount operation)
#              ibmacl (Automatic cartridge loader with sequential access)
#              ibmacf (Automatic cartridge facility with random access)
#              ibmacs (IBM 3494/3495 tape library)
#              stkacs (STK Silo tape library)
#              scsiacs (SCSI tape library)
#    options - od=i (operator domain) where 'i' is an integer
#              up   (device in up state)
#              down (device in down state)
#              resv (device in reserved state)
#              avr  (turns on the automatic volume recognition flag)
#
# The following devices require manual tape mount operation
#
#hostname.device  pool_name  device_type  tape_name  op_mode  options
#------------------------------------------------------------------------
epacrs8.device      8mm        8mm       /dev/rmt0   manual
epacrs8.device      D2         d2        /dev/rmt6   manual
epacrs6.device      qIc1500    qic       /dev/rmt1   manual
epacrs6.device      qIc1500    qic       /dev/rmt0   manual
gb980.device        StK4280    3480      /dev/rmt7   manual  od=1,down
gb980.device        3480_1     3480      /dev/rmt3   manual
gb980.device        3480_1     3480      /dev/rmt4   manual
gb980.device        Stk4280    3480      /dev/rmt8   manual  od=2,down
gb980.device        StK4280    3480      /dev/rmt9   manual  od=1,down
bergen.device       STK4280    3480      /dev/rmt4   manual  OD=1,DOWN
v08n03.device       3490       3490      /dev/rmt1   manual  down
it2n01.device       4mm        4MM       /dev/rmt1   manual  od=1
it2n01.device       qic        QIC       /dev/rmt2   manual  od=2
it2n01.device       8mm        8MM       /dev/rmt3   manual  od=1
it2n01.device       9trk       9TRK      /dev/rmt5   manual  od=1
#
# The following devices have AVR mode ON
#                                                               options
#                                                              ----------
k80n05.device       3480_2     3480     /dev/386    manual  od=1,up,avr
k80n05.device       3480_2     3480     /dev/387    manual  od=1,up,avr

#
# The following is the example for sharing a device between two nodes.
# Devices that have the same suffix number (e.g. hostname.device.1) are
# in share mode. For example, k80n06 and k80n03 share /dev/518.
#
#     dev_option
#     ----------
k80n03.device.1   3490ESCON  3490     /dev/rmt0   ibmacl  od=1,up,avr
k80n06.device.1   3490ESCON  3490     /dev/rmt3   ibmacl  od=1,up,avr
k80n03.device.2   3490ESCON  3490     /dev/519    ibmacl  od=1,up,avr
k80n06.device.2   3490ESCON  3490     /dev/519    ibmacl  od=1,up,avr
```

```
k80n88.device.3   our3590s   3590     /dev/rmt3 scsiacs 16 od=1,down,3590a
k80n99.device.3   our3590s   3590     /dev/rmt2 scsiacs 16 od=1,down,3590a

#
# The following 3590 devices have ACF function turned on
#                                                    op_mode
#                                                    -------
k80n05.device      3590       3590     /dev/rmt0   ibmacf
epacrs8.device     3590       3590     /dev/rmt5   ibmAcf

#
# The following example shows both 3490 and 3590 tape devices attached to
# the same IBM 3494 library named ibm3494_1. In this case, each device
# type should have a unique device pool name assigned.
#                                                                    lib_name
#                                                                    --------
k80n06.device    3490_2      3490     /dev/180   ibmacs  od=1,down,ibm3494_1
k80n06.device    3490_2      3490     /dev/181   ibmacs  od=1,down,ibm3494_1
k80n07.device    3590_2      3590     /dev/182   ibmacs  od=1,down,ibm3494_1
k80n07.device    3590_2      3590     /dev/183   ibmacs  od=1,resv,ibm3494_1

#
# The following devices are attached to an STK Silo library
# Silo tape drive requires additional dev_addr information:
#
#                                          ACS,LSM,PANEL,DRIVE
#                                          -------------------
#                                                \       /
k80n03.device   3490_3  3490 /dev/rmt0   stkacs  0,0,1,0 od=1,down,stksilo_1
k80n03.device   3490_3  3490 /dev/rmt1   stkacs  0,0,1,2 od=1,down,stksilo_1
k80n03.device   3490_3  3490 /dev/rmt2   stkacs  0,0,2,0 od=1,down,stksilo_1
#
# The following devices are SCSI-attached devices in an Exabyte EXB-120
# library. This example is the same for any tape library managed by the
# SCSI daemon.
#
#
#hostname.device  pool   device  tape      operation  element options
#                 name   type    name      mode       number
#-------------------------------------------------------------------------------
k80n06.device    exb_2   8mm    /dev/mt0  scsiacs     116     od=1,down,exb120_3
k80n06.device    exb_2   8mm    /dev/mt1  scsiacs     117     od=1,down,exb120_3
k80n06.device    exb_2   8mm    /dev/mt2  scsiacs     118     od=1,down,exb120_3
k80n06.device    exb_2   8mm    /dev/mt3  scsiacs     119     od=1,down,exb120_3
#
# The following is a 3590 acting as a SCSI library
k80n07.device    3590_3  3590   /dev/rmt3 scsiacs    16 od=1,down,3590a
```

Making Changes to nettape.adm.config Using the NetTAPE GUI

You can use the NetTAPE GUI to modify the **nettape.adm.config** file. You can add devices to or delete devices from **nettape.adm.config** and you can change certain device attributes such as:

- Device state
- AVR status

The **nettape.adm.config** file defines the NetTAPE configuration at the start of each GUI session. Once the GUI is active, authorized users can make configuration changes either temporarily or permanently.

Temporary changes remain in effect only for the duration of the current status daemon session and leave **nettape.adm.config** unchanged. To make a permanent change, you must update the **nettape.adm.config** in any of the following ways:

- Editing the file directly while the status daemon is not active and then restarting the status daemon (this is the only way to define a new device pool)
- Using the GUI to make changes and to save them in **nettape.adm.config**
- Using the **cltopr** command with the **–U** option.

For more information about using the NetTAPE GUI, see its online help system.

Step 4: Customizing the nettape.config File

The **nettape.config** file is used to specify information needed by NetTAPE to configure the status daemon and to specify additional features that can be customized by node or by user. You need to create the /**etc**/**nettape.config** file on each node where NetTAPE is to be installed. In addition, individual users can create their own versions of **nettape.config** (**$HOME**/**nettape.config**) to customize certain aspects of tape processing to meet their own requirements.

When the NetTAPE status daemon is started, it looks for the **nettape.config** file only in the /**etc** directory.

When a user issues a NetTAPE command or invokes a NetTAPE subroutine, NetTAPE searches directories in the following order for **nettape.config**:

1. The user's current directory
2. The user's home directory
3. The node's /**etc** directory.

To define a new **nettape.config** file, copy and modify for your use one of the sample **nettape.config** files located in /**usr**/**lpp**/**nettape**/**samples**/**config**. Then store the customized file in /**etc**/**nettape.config** or if you are a NetTAPE user, store the file in your home directory or the directory from which you'll be running your NetTAPE application.

Note

If you're not already familiar with the NetTAPE daemons and their roles, read "Understanding NetTAPE Daemons" on page 92. This information will help you understand the values that you must set in the NetTAPE configuration files.

Customize your **nettape.config** file as follows:

1. Specify the name of the host where the NetTAPE status daemon (called nettaped) is to run using **stsdmn.hostname**. The host where the status daemon runs must be able to **ping** each tape device host in the NetTAPE configuration. This host name must match the host name listed in the /**etc**/**nettape.config** file. Do not use a High Performance Switch node ID as the host name.

   Specify only the host name, not its domain, for example:

   ```
   stsdmn.hostname  k80n05    # host the NetTAPE status daemon runs on
   ```

   Note

   For NetTAPE to work correctly, there must only be one instance of the status daemon running and it must run on the host you specify here.

2. Specify the port number where the NetTAPE status daemon is to run using **stsdmn.portno**. This port number must match the port number listed in the /**etc**/**nettape.config** file. For instance:

   ```
   stsdmn.portno    3401      # port number for NetTAPE status daemon
   ```

3. If a host name in your NetTAPE configuration changes and you'd rather not update each of your NetTAPE configuration file to reflect the change, you can

use the optional keyword, **client.hostname** to map the new host name to the old one. This keyword must be specified in the /**etc**/**nettape.config** file on the host whose name has changed. The format is:

```
client.hostname old_host_name
```

4. Register the port number of the status daemon in the /**etc**/**services** file for your network. This step is optional but recommended:

   ```
   nettaped port_num/tcp
   ```

5. Specify the interval (in number of tape records) between updates of the tape position information on the NetTAPE GUI's device status display using **client.tapepos**.

   Tape position information is shown in the status display under the headings "File" and "Blocks", where the value for File is the current file number and the value for Blocks is the current block being processed. This information is useful to the operator for monitoring tape drive activity. However, there is a performance cost due to the data gathering involved.

   Because the ADSM server handles its own data path when NetTAPE assigns a local tape device to it, the tape position information is not updated on the GUI status display for ADSM devices.

   If you omit this option, tape position information is neither collected nor displayed.

   client.tapepos must be an integer of 100 or greater. For instance:

   ```
   client.tapepos  100
   ```

6. Use the **client.cross.tm** keyword to specify how NetTAPE is to handle tape marks when it skips records. The options are:

   Yes NetTAPE should cross tape marks when it skips records and encounters a tape mark, regardless of the label type.

   This option is not supported for NSAL tapes. If you are using an NSAL tape and have set the **client.cross.tm** keyword to **yes**, the setting is ignored.

   This is the default value.

   No NetTAPE is not to cross tape marks when it skips records and encounters a tape mark.

   For complete information about how this keyword affects tape positioning after various tape operations, see “Tape Positioning After NetTAPE Operations” on page 137.

   For example:

   ```
   client.cross.tm yes
   ```

7. Specify the optional keyword, **client.alias_poolname**, to define an alias pool name for a particular device pool or esoteric pool. If you omit this keyword, NetTAPE searches the installation's **nettape.adm.config** file for the pool name you have specified for your allocation. The format for specifying the keyword is:

   ```
   client.alias_poolname alias_pool_name pool_name
   ```

With this keyword, you can define a different preferred pool (for instance, the local pool) for each host, but specify the same alias pool name wherever you allocate the device.

To take advantage of this feature, include the **client.alias_poolname** keyword in each local version of **nettape.config** and assign the same alias name to whatever device pool or esoteric device pool you want as your preferred pool on that system. For instance, suppose you want to use the name, mypool, as your alias pool name on hosts **rs6k01**, **rsk02**, and **rs6k03**:

- In your local **nettape.config** on **rs6k01**, specify:

  ```
  client.alias_poolname mypool rs6k1_3480_pool
  ```

- In your local **nettape.config** on **rs6k02**, specify:

  ```
  client.alias_poolname mypool rs6k2_3480_pool
  ```

- In your local **nettape.config** on **rs6k03**, specify:

  ```
  client.alias_poolname mypool rs6k3_3480_pool
  ```

8. Use the keyword, **client.error.retry**, to specify how NetTAPE should handle particular file opening errors encountered by the following:

   - cltalloc command
   - ctpalloc subroutine
   - cltopen command
   - ctpopen subroutine.

   The format for specifying this keyword is:

   ```
   client.error.retry error_code number_of_retries retry_interval
   ```

   Where:

   error_code Is a NetTAPE error code returned by one of the following:

   - cltalloc command
   - ctpalloc subroutine
   - cltopen command
   - ctpopen subroutine.

   For a list of valid error codes, see “NetTAPE Messages and API Return Values” on page 196.

   Note that you must specify the error code as a number; you cannot use its name. For example, you must specify –**10** rather than **NetTAPE_ALLINUSE**.

   number_of_retries The number of times NetTAPE is to retry opening the file. You may specify a minimum of 1 and a maximum of 10 retries.

   retry_interval The number of seconds NetTAPE is to wait before retrying. You may specify a minimum of 10 and a maximum of 3600 seconds.

9. By default, NetTAPE uses write-behind buffers to improve performance when writing to a remote tape device. When the data requires a volume switch, NetTAPE automatically flushes the write-behind buffers to the new volume after the switch.

   The **client.wbh** and **client.flush** keywords let you specify whether write-behind buffers are used and whether the buffers are automatically flushed. Your options depend on whether you are using NetTAPE's command line interface or

API, and whether you want to write an internal header at the beginning of each volume.

If you do not wish to write a header at the beginning of each volume, simply omit the two keywords and take the defaults.

If you are using the NetTAPE API and you wish to write an internal header at the beginning of each volume, you can flush the write-behind buffers manually, after writing your header, by using the **ctpflush** subroutine. Here is a summary of the options available with the NetTAPE API:

- Use write-behind buffering and have the buffers flushed by NetTAPE automatically (this is the default setup) by specifying:

```
client.wbh yes
client.flush yes
```

- Use write-behind buffering and flush the buffers manually by specifying:

```
client.wbh yes
client.flush no
```

If you choose to flush write-behind buffers manually, be sure to read "Understanding and Controlling Write-Behind Buffers" on page 140, which explains when and how write-behind buffers need to be flushed.

The NetTAPE command line interface does not provide a command for manually flushing the write-behind buffers. If you wish to write an internal header at the beginning of each volume, you must disable write-behind buffering. Here is a summary of the options available with the NetTAPE command line interface:

- Use write-behind buffering and have the buffers flushed by NetTAPE automatically (this is the default setup) by specifying:

```
client.wbh yes
client.flush yes
```

- Disable write-behind buffering by specifying:

```
client.wbh no
```

Note

IBM recommends that you specify non-default values for **client.wbh** and **client.flush** only in your own **$HOME/nettape.config** file.

Customizing NetTAPE's Volume Check Process

NetTAPE provides you with the ability to customize its volume check processing by means of an installation-written volume check exit. You can use the volume check installation exit for a variety of purposes, for instance, to verify that the user issuing the open file request is authorized to access the specified tape volume.

You can have NetTAPE give control to the installation-written volume check exit either before or instead of calling its own volume check processing routine. NetTAPE volume check processing verifies that the tape label specified on the open file request matches the tape label found on the tape volume.

Note that the installation volume check exit is called only when a **ctpopen** subroutine or a **cltopen** command causes NetTAPE to perform volume checking.

An allocation request using **ctpalloc** or **cltalloc** does not result in volume checking. Also, if initial error checking causes the allocation request to fail before NetTAPE would normally call its volume check routine, the installation's volume check exit is not called either.

To have NetTAPE call a volume check installation exit before or instead of calling its own volume check routine, specify the keyword, **stsdmn.volcheck**, in the **nettape.adm.config** file. The installation exit must reside on a system in a directory accessible to the status daemon. See "Specifying a Volume Check Installation Exit" on page 56 for more information.

A sample volume check installation exit is included in the **/usr/lpp/nettape/samples/api/exits** directory.

For input to and output from your volume check installation exit, use the **VOLCHECK_EXIT_INFO** structure. Your exit receives this structure from NetTAPE by issuing a read operation to STDIN for the length of the structure and must return the updated structure to NetTAPE by writing it to STDOUT. On output, the structure must contain an updated return code so that NetTAPE can continue processing. To compile correctly, your exit must include the **/usr/lpp/clnettape/fcftpint.h** file.

The **VOLCHECK_EXIT_INFO** structure has the following definition:

```
#include <fcftpint.h>

struct VOLCHECK_EXIT_INFO {
int version;
char clientnode[MAXHOSTNAME_1+1];
char clientusername[USERNAME_1+1];
char label[MAXLAB_1];
char volserE[L_VSN+1];
char volserI[L_VID+1];
int mode;
int returncode;
};
```

where:

version Is the current version of the structure

clientnode Is the client's node name

clientusername Is the user name on the client node

label Is the type of tape label (AL,SL,BLP, or NSAL)

volserE Is the tape's external volser

volserI Is the tape's internal volser

mode Is an integer (INTEGER*4) value specifying the tape mode:

- **1** Read
- **2** Output: open for output and allow rewinding
- **3** Update: open for update (read/write) and allow rewinding

	4	Input with no rewind: open for input and avoid rewinding
	5	Output with no rewind: open for output and avoid rewinding
	6	Update with no rewind: open for update (read/write) and avoid rewinding
returncode	Is the return code from the exit. The exit should set the return code as follows:	
	0	The installation exit's volume check was successful. NetTAPE is to continue normal processing.
	1	The installation exit's volume check was successful. NetTAPE is to skip its internal volume check processing.
	–1	The installation exit's volume check failed. Tape access is to be denied.

Customizing NetTAPE's Scratch Tape Mount Process

When a user requests a scratch tape for a manual tape drive, the NetTAPE operator GUI displays a pop-up window to prompt the operator for the volser of the scratch tape. The user's allocation request proceeds only after the operator responds to this prompt. You can automate this process by using an installation exit to eliminate the need for operator intervention when a scratch tape is requested.

You may write a scratch tape mount installation exit for use with manual tape drives only.

To have NetTAPE call the scratch tape mount installation exit instead of prompting the operator for a volser, specify the keyword, **stsdmn.scratch.mount**, in the **nettape.adm.config** file. The installation exit must reside on a system in a directory accessible to the status daemon. See “Specifying a Scratch Tape Mount Installation Exit” on page 57 for more information.

The scratch tape mount installation exit can do any of the following:

- Return the volser for the scratch tape
- Request that NetTAPE prompt the operator for a volser through the Operator GUI
- Reject the scratch tape mount request.

A sample scratch tape mount installation exit is included in the **/usr/lpp/nettape/samples/api/exits** directory.

For input to and output from your scratch tape mount installation exit, use the **TAPE_EXIT_INFO** structure. Your exit receives this structure from NetTAPE by issuing a read operation to STDIN for the length of the structure and must return the updated structure to NetTAPE by writing it to STDOUT. On output, the structure must contain an updated return code and, if applicable, the tape's assigned volser, so that NetTAPE can continue processing. To compile correctly, your exit must include the **/usr/lpp/clnettape/fcftpint.h** file.

The **TAPE_EXIT_INFO** structure has the following definition:

```
#include <fcftpint.h>

struct TAPE_EXIT_INFO {
int version;
char clientnode[MAXHOSTNAME_1+1];
char clientusername[USERNAME_1+1];
char label[MAXLAB_1];
char devicetype[MAXDEV_1+1];
char poolname[MAXPOOL_1+1];
char volser[L_VSN+1];
int returncode;
};
```

Where:

version Is the current version of the structure

clientnode Is the client's node name

clientusername Is the user name on the client node

label Is the type of tape label (AL,SL,BLP, or NSAL)

devicetype Is the type of tape device

poolname Is the pool name requested by the user

volser Is the tape's external volser, which is assigned by the exit. The volser must be 1 to 6 characters, ending with "\0" to indicate the end of a character string.

returncode Is the return code, which is set by the exit. The exit should set the return code as follows:

- **0** The installation exit has returned a volser for the scratch tape. NetTAPE is to skip the operator prompt for the volser.
- **1** The installation exit has not returned a volser for the scratch tape. NetTAPE is to prompt the operator for a volser.
- **–1** The scratch tape mount request is denied.

Step 5: Defining SCSI Tape Library Configuration Files

If you are using SCSI tape libraries with NetTAPE, you must define a SCSI library configuration file for each tape library that describes the tape library to NetTAPE. The SCSI library configuration file acts as a catalog of the contents of the library and is maintained by the SCSI tape library daemon during processing.

To create a SCSI library configuration file, copy and customize the sample file located in **/usr/lpp/nettape_tlc/sample**. For each SCSI tape library, define a SCSI library configuration file as described below and place it in the **/etc** directory of the workstation that controls that SCSI tape library.

Naming the file

The flat file, which is in the **/etc** directory on the host that has connectivity to the robotics, must be named:

```
/etc/nettape.library_name.config
```

Where:

library_name Is the name of the SCSI tape library as named in the tape library definition in the NetTAPE Configuration File (**nettape.adm.config**). The library name cannot begin with the characters “CLN” because CLN is reserved for naming cleaning cartridges.

For example, if the library definition in **nettape.adm.config** is as follows:

```
stsdmn.scsiacs  scsia    pisces     /dev/lb0
```

the SCSI library configuration file for that library should be named

```
/etc/nettape.scsia.config
```

File Format

The SCSI tape library daemon, **clscsid**, reads the SCSI library configuration file during initialization and updates it as operations are performed on the library. As specified by the administrator, the contents of the file are written to disk. While the SCSI tape library daemon is running, no other application or user should attempt to write to the SCSI library configuration file. Otherwise, changes will be lost.

The SCSI library configuration file contains the following records:

- Comment records
- A Version Indicator record associated with the flat file format.
- Library Definition record
- Drive Definitions records
- Element Definition records
- Volume Definition records

As a volume is moved through the library from slot to drive to Entry/Exit (EE) port, the configuration is updated in memory and, if requested, is committed to disk to reflect the exact state of the library at that point in time.

The following paragraphs give detailed definitions of each type of supported record in the SCSI library configuration file.

Comment Record

Comment records are for the customer to use to place free-form text information into NetTAPE SCSI Catalogs. They are ignored by the SCSI tape library daemon, except that they are rewritten when the file is written to disk. A comment record is distinguished by a "#" character in column 1 of the record. Comment records may be placed anywhere in the file, but no comments are allowed within a non-comment record.

Version Indicator Record

The first record, other than a comment record, must be the Version Indicator. It has the following format:

```
vers.1.0 tracelvl
```

Where:

vers.1.0 Must be specified exactly as indicated here starting in column 1

tracelvl Is a numeric integer that specifies the amount of trace data that is written to the daemon log during SCSI tape library daemon operation. You should set this to either blank or "0" unless instructed to change it by IBM service personnel. Values of 0 through 4 may be specified.

The following is an example of a Version Indicator Record:

```
#
# Library Configuration File Record
#vers.PVR_level trace_level
#-------------------------------------------------------------------
vers.1.0 0
```

Library Definition Record

The second record must be the Library Definition Record in the file. It must be placed after the Version Indicator record, but before any other record, except for comment records. The format of the Library Definition record is:

```
lib.libn lib_t auto_cl audit_init barcode fileupd slots drives ports
```

Where:

lib. Must be specified exactly as indicated here starting in column 1

libn The library name, which matches the Library name in the NetTAPE Configuration File and the name of this SCSI library configuration file.

lib_t The library type, which may be any of the following values:

- 4mm - For a 4mm library
- 8mm - For an 8mm library
- dlt - For a DLT library
- qic - For a quarter-inch library
- dst - For an ampex dst library
- magstar - For a 3590 with an automatic cartridge loader

- magstar-mp - For a 3570 with an automatic cartridge loader or a Magstar-MP library

If you are using the SCSI tape library daemon to manage a 3590 or Magstar MP server as a SCSI library, the device must be in random mode.

autocl Specify **yes** if the library hardware has an automatic cleaning capability and you want the library hardware to clean the drives. If you specify "yes" for this library, the SCSI tape library daemon does not attempt to clean any of the drives, regardless of whether mount_i and time_i are specified on a Drive Definition record.

Specify **no** if the library hardware has no automatic cleaning capability; or the library hardware has an automatic cleaning capability, but you want the SCSI tape library daemon to clean the drives according to the mount_i and time_i settings in the Drive Definition record in addition to the cleanings performed by the hardware.

audit_init Specify **yes** if you want the library audited during initialization of the SCSI tape library daemon. This means that the robot moves through the slots of the library and the device driver table is refreshed. Depending on the size of the library and the hardware characteristics of the library, auditing may require a significant amount of time. However, it may be necessary to synchronize the device driver tables and the hardware. Auditing might be necessary if:

- A power failure occurs
- A hardware problem occurs
- Errors are detected or caused during SCSI tape library processing.
- The door to the library is opened
- Volumes are manually inserted or removed from the library
- Volumes are moved around the library

Specify **no** if you just want the inventory map obtained from the device driver.

You can also perform an audit from the NetTAPE Operator Console GUI.

The With many libraries, you can specify **yes** the first time the library is brought up, and specify **no** under normal circumstances after that. You should not normally need to synchronize the device driver tables and the hardware again unless one of the conditions listed above occurs.

barcode Specify **yes** if the library has a bar code reader and you want the SCSI tape library daemon to use the bar code reader. Specify, **no** if the library has no bar code reader, or it has a bar code reader, but you don't wish to use it.

fileupd Specifies how often the SCSI tape library daemon writes the contents of the NetTAPE SCSI Catalog to the disk.

Specify **-1** for the contents to be written to disk only when the daemon terminates. This will give maximum performance. However, the NetTAPE SCSI Catalog could lose synchronization with the

hardware if there is a failure that prevents the catalog from being rewritten.

Specify **0** to have the file rewritten after each transaction. This is the safest setting, but it will cause a slight performance degradation.

Specify a positive integer n from 1 to 32766 if you wish the contents of the file to be rewritten to the disk for each n transactions. A transaction is defined as an operation sent to a library, such as MOUNT, DISMOUNT, EJECT, etc. In any case, when the SCSI tape library daemon terminates, all unwritten transactions are written to disk.

If you leave this field blank, the option is set by default to a value of **-1**.

slots Specifies an integer indicating the total number of slots supported by the library, whether or not they can be accessed at the current time (for example, not all magazines are installed.) The value is checked by the daemon and updated if it differs from the actual hardware.

If you leave this field blank, the option is set by default to the number of slots that are reported by the device driver.

drives Specifies an integer indicating the maximum number of drives that the library supports. The value is checked by the daemon and updated if it differs from the actual hardware.

If you leave this field blank, the option is set by default to the number of drives that are reported by the device driver.

ports Specifies an integer indicating the maximum number of Entry/Exit ports the library supports. The value is checked by the daemon and updated if it differs from the actual hardware.

If you leave this field blank, the option is set by default to the number of ports that are reported by the device driver.

The following is an example of a Library Definition record for an IBM 7331 library:

```
#
#lib.lib_n lib_t auto_cl audit_init barcode fileupd slots drives ports
#-------------------------------------------------------------------
lib.scsia   8mm      no       no       yes       0    22     2    0
```

Element Definition Record

An Element Definition record maps SCSI elements to drives, slots, and EE ports. The format of the Element Definition record is:

```
ele.ele_no ele_type ele_contents
```

where:

ele. Must be specified exactly as indicated here in column 1

ele_no Specifies a decimal integer value that corresponds to the SCSI element id of the item being defined.

ele_type The element type, which must be one of the following:

- slot
- drive
- port

ele_contents If this element is occupied, this field contains the corresponding volume id; otherwise, this field is blank.

You must specify one Element Definition record in the NetTAPE SCSI Catalog for each drive in the library. When you specify an Element Definition record for a drive, you must also specify a corresponding Drive Definition record.

The rules for specifying Element Definition Records are more flexible for slots and EE ports than for drives. This is in recognition that not all slots or EE ports may be in use, that volumes may be injected into and ejected from the library from time to time, that many volumes are bar coded, and you would like to have software that automatically defines volumes to the catalog.

The rules for specifying Element Definition Records are as follows:

- When you define a Volume Definition record in the NetTAPE SCSI catalog, you must also define a corresponding Element Definition Record.
- When you define a private or cleaning volume to the SCSI tape library daemon, you must also define an Element Definition record and corresponding Volume Definition record.
- When you define a scratch volume to the SCSI tape library daemon, you must also define an Element Definition record and corresponding Volume Definition record.
- When you define an ejected volume to the SCSI tape library daemon, no Element Definition Record is required. However, if the volume is to be injected into the library, there needs to be an empty slot and corresponding empty Element Definition Record.

During its initialization, the SCSI tape library daemon automatically generates some Element Definition and Volume Definition records. See “Automatic NetTAPE SCSI Catalog Definition” on page 82 for details. Following is an example of an element definition for a drive in an IBM 7331 library, which has no volume mounted in it.

```
#ele.ele_no      ele_type        ele_contents
# ---------------------------------------------
ele.23           drive
```

Drive Definition Record

Specify one Drive Definition record in the NetTAPE SCSI Catalog for each tape device definition in the **nettape.adm.config**. The Drive Definition records may be specified anywhere after the Library Configuration record in the file, but IBM recommends that all Drive Definition Records be grouped together somewhere after the Library Configuration record. You also need to provide a corresponding Element Definition Record for each Drive Definition Record. The format of the Drive Definition record is:

```
dr.dr_id dr_ele_no dr_type mount_i time_i contents mount_cl mount_cl
         time_cl last_slot
```

Where:

dr. Must be specified exactly as indicated here in column 1

dr_id Specifies the device special file without the leading “/dev/” characters. If you are specifying a device that is supported by the ADSM device driver, specify an ADSM device driver special file,

which has the leading characters “mt” in its name. If this is a Magstar device, use the “rmt” special file that defines it. If the tape device is shared by multiple hosts, specify the device special file for just one of them.

dr_ele_no The drive element number. Specifies a decimal integer value that is the SCSI element number of the drive.

dr_type Specifies one of the following types of drive:

- 4mm
- 8mm
- dlt
- dst
- qic
- magstar
- magstar-mp

mount_i Specifies a non-negative integer value indicating the number of mounts to occur before drive cleaning is initiated by the SCSI tape library daemon. This value is ignored if the **auto_cl** value in the Library Definition record is set to **yes**. If you want the drive to be cleaned by the SCSI tape library daemon after a certain time interval (time_i), specify 0 for mount_i and specify an appropriate value for time_i.

Specify a positive integer value n here (between 1 and 32766) if you want the drive cleaned after n mounts have occurred.

time_i Specifies a non-negative integer value that indicates the time interval (in hours) before drive cleaning is initiated by the SCSI tape library daemon. This value is ignored if the **auto_cl** value in the Library Definition record is set to **yes**. If you want the drive cleaned by the SCSI tape library daemon after a specific number of mounts have occurred, specify 0 for time_i and specify an appropriate value for mount_i.

Specify a positive integer value n here (between 1 and 32766) if you want the drive cleaned n hours since the last drive cleaning.

contents If a volume is in the drive, specifies the volume ID of the mounted volume. If there is no volume mounted, place a period (.). For each volume ID you specify here, you must define a corresponding Volume Definition record and Element Definition record.

mount_cl Specifies a non-negative integer value (between 1 and 32766) indicating the number of mounts that have occurred since the drive was cleaned as initiated by the SCSI tape library daemon. Generally, you set this field to 0, but you can set this value to a non-zero integer to cause the drive to be cleaned sooner than if 0 were specified. When drive cleaning occurs, this field is reset to 0.

time_cl This is a value of the format *yyyy/mm/dd-hh:mm* which indicates the last time drive cleaning was initiated by the SCSI tape library daemon. Generally, when you are initially defining the Drive Definition records, you leave this and subsequent fields in the record blank and let the SCSI tape library daemon manage these fields. Or, you can specify `0000/00/00-00:00` for this field to indicate that the drive has not been cleaned and allow the SCSI tape library daemon

to manage this field thereafter. When the drive is cleaned, this field is set to the current date and time.

yyyy, *mm*, *dd*, *hh*, *mm* are decimal integer values. If a value is expressible as a single digit, the leading zero must be specified anyway. For example 1:04 p.m. on January 3, 1992 would be specified as follows:

```
1992/01/03-13:04
```

yyyy is the year. *mm* is the month from 01 through 12. *dd* is the day of the month from 01 through 31. *hh* is the hour on a 24-hour clock from 00 through 23. *mm* is the minute from 00 through 59. If you modify this field, you must ensure that dates are meaningful because the SCSI tape library daemon does only minimal field checking.

last_slot Leave this field blank.

When a tape is mounted, the **last_slot** field is set to the element number of the slot that contained the tape before it was mounted. When the tape is later unmounted, it is returned to its original slot and the **last_slot** field is set to 0.

The following is an example of a drive definition for a drive in an IBM 7331 library that has no volume mounted in it.

```
#dr.ele_no type mount_i time_i contents mount_cl time_cl last_slot
# ------------------------------------------------------------------
dr.mt0 023 8mm   25     0       .       6   1996/09/05-08:35 0
```

Volume Definition Record

There must be one Volume Definition Record in the NetTAPE SCSI Catalog for each volume that is being managed by the SCSI tape library daemon. You can specify these yourself, or under some conditions, these records can be generated by the SCSI tape library daemon when it starts up.

Volume Definition records may be located anywhere in the file after the Library Configuration Record, but IBM recommends that all Volume Definition Records be grouped together somewhere after the Library Configuration Record. For volumes that are physically present in the library, you also need to define a corresponding Element Definition record for each Volume Definition record that you define.

If the SCSI tape library daemon generates the Volume Definition records, it also generates the corresponding Element Definition records. To have the SCSI tape library daemon control volumes that are not physically in the library, you need to provide an ejected Volume Definition record without a corresponding Element Definition Record. An ejected volume has an element number of -1 and a status of **ejected**.

If the SCSI tape library daemons generates the Volume Definition records and you are not using bar codes, all generated Volume Definition records are given the status **scratch**.

If the SCSI tape library daemon generates the Volume Definition records and you are using bar codes:

- The bar code becomes the volume ID

- The volume is given the status **scratch** unless the bar code begins with the characters “CLN,” in which case the volume is given the status **clean**.

The format of the Volume Definition Record is:

```
v.vol_id ele_no type status mounts datetime_mt
```

Where:

v. Must be specified exactly as indicated here in column 1

vol_id Specifies the volume ID of the volume and must be unique to the library.

If **barcode** on the Library Definition record is **yes**, the volume is bar coded, and the bar code is less than seven characters in length, specify the bar code.

If **barcode** on the Library Definition record is **yes**, the volume is bar coded, and the bar code is seven characters or greater in length, specify the first six characters of the bar code.

If bar code on the Library Definition record is **yes**, but there is no bar code on the volume, or if **barcode** on the Library Definition record is **no**, specify a volume ID of up to six characters, keeping in mind that some applications (for example, ADSM) require that the volume ID be equal to the internal volume ID.

The first six characters in each bar code must be unique in a library.

ele_no The SCSI element number of the storage slot, if the volume is in the library, or -1 if the volume is ejected.

type The media type of the volume. For the volume to be mounted, it must match the media type in a Drive Definition record. Specify one of the following:

- 4mm
- 8mm
- dlt
- dst
- qic
- magstar
- magstar-mp

status The category of the volume.

scratch The volume is not owned by anyone or any application and is available to anyone that requests a scratch tape mount. After a scratch volume is mounted, its category is changed to private

private The volume is owned by someone or some application and is not available for a scratch tape mount.

clean Specifies that the volume is a cleaning cartridge and will be mounted during drive cleaning processing.

ejected Specifies that the volume has been ejected from the library, but is still defined to the SCSI tape library daemon.

mounts A non-negative integer value less than 32767 that specifies the number of times the volume has been mounted. If you leave this field blank, the SCSI tape library daemon sets it to zero after daemon initialization.

datetime_mt Specifies the date and time when the volume was last mounted. It has the same format as the **time_cl** in the Drive Definition record. If you leave this field blank, the SCSI tape library daemon sets it to zero after daemon initialization.

Following are examples of volume definitions for volumes in an IBM 7331 library:

```
#v.volid ele_no type status mounts datetime_mt
#-------------------------------------------------
v.ABC123  001   8mm   private 21   1996/09/16-16:45
v.ABC234  002   8mm   scratch  6   1996/08/26-15:33
v.CLN567  005   8mm   clean    9   1996/09/12-06:22
v.ABC890  -1    8mm   ejected
```

Sample SCSI Library Configuration File

This sample file is located in the **/usr/lpp/nettape_tlc/sample** directory.

```
# START COPYRIGHT
#*******************************************************************
#
#     Licensed Materials - Property of IBM
#
#     5765643
#
#     (C) COPYRIGHT IBM CORP. 1996, 1997
#     All rights reserved.
#     US Government Users Restricted Rights - Use,
#     duplication or disclosure restricted by GSA ADP
#     Schedule Contract with IBM Corp.
#
#*******************************************************************
# END COPYRIGHT
#
# /etc/nettape.libname.config sample file - This example shows how
#                          to define the library configuration file
#                          for SCSI libraries.  The statistics on a
#                          volume persist only as long at the volume
#                          definition is in the file. Ejected volumes
#                          will be maintained as long as they are
#                          injected back in the same library.
#
# The /etc/libname.config file must be placed on the host containing
# the PVR for the intended library.  Replace libname with the
# library name for the SCSI library.
#
# SCSI library configuration files contain the following types of
# definitions:
#    Version
#    Library definition
#    Element definitions
#    Drive definitions
#    Volume definitions
#
```

```
# Certain portions of the configuration can be generated
# automatically, namely, element numbers of empty elements.
# Because of the persistent data kept on volumes and drives, it is
# best to leave these definitions alone once they are created.
#
# The configuration file is generated with an editor, using this
# example as a template.  Take care with the order of information
# on each definition since the PVR requires the information in a
# specified order.  Fields are not case sensitive except for volIDs.
#
#******************************************************************
#
# Library Configuration File Record
#    PVR level refers to the format of the file
#    trace level can be 0 for no trace, 1 - 4 depending on amount of
#                      trace to be requested
#vers.PVR level   trace level
#---------------------------
vers.1.0              0
#******************************************************************
#
# Library Definition (one record per SCSI library file)
#   lib_n   - your name for the library - maximum of 16 characters
#   lib_t   - select one of the following families of libraries:
#                   4mm, 8mm, dlt, dst, half_inch, magstar, optical
#   auto_cl    - library has an automatic cleaning function
#   audit_init - PVR will move the transport to perform initial
#                   inventory at PVR start
#   barcode    - a barcode reader exists and the cartridges contain
#                   barcodes
#   fileupd    - number of transactions before file is updated (opt)
#                     -1 = file is updated at exit of PVR  (default)
#                      0 = file is updated every transaction
#                     nn = file is updated after nn transactions
#   slots      - number of slots in the library            (optional)
#   drives     - number of drives in the library           (optional)
#   ports      - number of entry/exit ports in the library (optional)
#                    no_slots+no_drives+no_ports=no_elements
# This information can be obtained from the hardware manual for the
# library
#
#lib.lib_n lib_t auto_cl audit_init barcode fileupd slots drives ports
#-------------------------------------------------------------------
lib.7331a 8mm       no     no        no      6    22      2      0
#******************************************************************
#
# Element Definitions (one record for each element address)
#   ele_no       - element number
#   ele_type     - element type (slot, drive, port)
#   ele_contents - volid if occupied, blank if empty
#ele.ele_no         ele_type        ele_contents
# ---------------------------------------------
ele.001           slot            ABC123
ele.002           slot            ABC234
ele.003           slot            ABC345
ele.004           slot            ABC456
ele.005           slot            CLN567
ele.006           slot            ABC678
```

```
ele.007           slot            ABC789
ele.008           slot
ele.023           drive           ABC890
ele.024           drive
#*********************************************************************
#
# Drive Definitions (one record for each drive)
#   dr_id     - drive special file id (less the /dev/)
#   dr_ele_no - drive element number
#   dr_type   - type of drive, one of the following families of
#               drives:
#                 4mm, 8mm, dlt, dst, half_inch, magstar, optical
#   mount_i   - number of mounts between cleanings: if 0, not used
#   time_i    - number of hours between cleanings: if 0, not used
#   contents - volid if occupied, blank or period(.) if empty
#   mount_cl - number of mounts since last cleaned
#   time_cl  - date & time last cleaned: yyyy/mm/dd-hh:mm
#   last_slot - when volume is mounted, the last slot it occupied.
#               when volume not mounted, last_slot is 0 or blank.
#dr.id ele_no type mount_i time_i contents mount_cl time_cl last_slot
# ---------------------------------------------------------------
dr.mt0  023   8mm   25     0   ABC890    6 1996/09/16-08:35    008
dr.mt1  024   8mm   25     0   .         1 1997/02/21-09:14    0
#*********************************************************************
#
# Volume Definitions (one record for each volume)
#            volumes can be in any order
#   volid  - volume id of the volume, if barcoded, full bar code
#            (first 6 char of bar code must equal internal label
#             if labeled)
#   ele_no - volume element number
#   type   - family type of media, one of the following:
#              4mm, 8mm, dlt, dst, half_inch, magstar, optical
#   status     - scratch | private | clean | ejected
#   mounts     - number of mounts (optional)
#   datetime_mt- date last mounted  yyyy/mm/dd-hh:mm (optional)
#v.volid ele_no type status mounts datetime_mt
#-----------------------------------------------------------------
v.ABC123 001   8mm   private 21 1996/09/16-16:45
v.ABC234 002   8mm   scratch  6 1996/08/26-15:33
v.ABC345 003   8mm   private  1 1996/06/13-11:01
v.ABC456 004   8mm   scratch 14 1996/07/08-08:59
v.CLN567 005   8mm   clean    9 1996/09/12-06:22
v.ABC678 006   8mm   scratch
v.ABC789 007   8mm   scratch
v.ABC890 023   8mm   private  2 1996/09/16-22:53
v.ABC012 -1    8mm   ejected  3 1997/02/21-09:14
```

Cleaning Support

The SCSI tape library daemon supports three types of drive cleanings:

- Hardware-based cleaning
- Software-based cleaning
- A combination of both

Hardware-based cleaning is done exclusively by the hardware. If your library supports hardware-based cleaning, set **autocl** in the Library Definition record to **yes** and ensure that you configure the library according to the hardware specifications for the library. If the slot address (or slots) for the cleaning cartridges appear in the device driver map, define these in the SCSI library configuration file as cleaning cartridges; however, since the cleaning operation is exclusively under hardware control, the SCSI tape library daemon will not update these records when cleaning occurs.

Software-based cleaning is cleaning that is initiated by the SCSI tape library daemon. This type of cleaning is initiated only when a volume is dismounted, so cleaning by time criteria time_i is strictly enforced only if there is mount and dismount activity on the drive.

To enable software-based cleaning, do the following:

- Stop the SCSI tape library daemon if it is running.
- Set **autocl** in the Library Definition record to **no**.
- Place one or more cleaning cartridges into the library in storage element slots.
- Define Volume Definition records for each cleaning cartridge. If you are using bar codes and the bar code begins with "CLN," allow the Volume Definition record to be automatically generated.
- Specify the criteria to determine when the drives are to be cleaned using the **mount_i** and **time_i** fields in the Drive Definition Record appropriately.
- Restart the SCSI tape library daemon.

If you have a library that features hardware-based cleaning, but find that additional cleaning needs to be done on the drives, you can augment the hardware-based cleaning with software-based cleaning, as previously documented. However, note that there is no coordination between the hardware-initiated cleaning and the software-initiated cleanings. For example, if the cleaning cartridge used by the hardware is the same cartridge that is used by the software, the **mounts** field is incremented only when a software-initiated cleaning occurs.

Generally, it is expected that one or the other of **mount_i** or **time_i** on the Drive Definition Records will be zero, but you can choose to have a drive cleaned using both criteria. In this case, when a dismount occurs, both criteria are checked. If the drive meets either criteria, it is cleaned.

After a drive is cleaned, the **mount_cl** field in the Drive Definition record is set to 0 and the **time_cl** field in the Drive Definition record is set to the time cleaned — irrespective of whether the cleaning was invoked based upon **mount_i** or **time_i**.

As the cleaning cartridges are mounted and dismounted, the statistics on the cleaning cartridge are updated. You should monitor the number of mounts that have occurred on the cartridge to ensure that cleaning cartridge is not overused. If more than one cleaning cartridge is in a library, the SCSI tape library daemon chooses the cleaning cartridge that has been mounted the least number of times.

Automatic NetTAPE SCSI Catalog Definition

During SCSI tape library initialization (each time the SCSI tape library is started), it automatically define some of its records.

For each empty slot element (as detected by the device driver) that is not already defined, an Element Definition record is generated. The **ele_type** is set to **slot** and the **ele_contents** field is set to blank.

For each empty EE port element (as detected by the device driver) that is not already defined, an Element Definition record is generated. The **ele_type** is set to **port** and the **ele_contents** field is set to blank.

For each full slot element (as detected by the device driver) that is not already defined, an Element Definition record and a corresponding Volume Definition record are generated. The **ele_type** is set to **slot** and the **ele_contents** field is set to the label. For details on how the SCSI tape library daemon handles labels, see "NetTAPE SCSI Label Generation." In the Volume Definition record:

- **status** is set to **scratch** or **clean**
- **mounts** is set to zero
- **datetime_mt** is set to zeros.

NetTAPE SCSI Label Generation

The SCSI tape library daemon supports libraries with and without bar code readers. It can automatically generate Volume Definition records using the bar code as the label or a generated label. It can also support volumes with bar codes and volumes without bar codes in the same library.

The **barcode** field in the Library Definition record is key to how the SCSI tape library daemon uses (or does not use) bar codes. Specify **yes** if the library has a bar code reader and you want the SCSI tape library daemon to use the bar code reader. Specify, **no** if the library has no bar code reader, or if it has a bar code reader, but you don't wish to use it.

If **barcode** in the Library Definition record is set to **yes** and there is a valid bar code on the volume (as detected by the device driver), the first six characters of the bar code are used for the **ele_contents** field of the Element Definition record and the **volid** field of the Volume Definition record.

If **barcode** is set to **no** on the Library Definition record, a six-character volume ID is generated by concatenating as many characters as is required from the library name with the decimal equivalent of the element ID. The following table indicates the generated volume ID, given the library name and the slot address of the volume. Generated Volume IDs are in upper case for compatibility with certain existing applications.

```
lib_name       slot address         Generated volume id
 scsia            42                   SCSI42
 dltx             8                    DLTX8
 newlibrary       116                  NEW116
```

If **barcode** is set to **yes** on the Library Definition record, but there is no valid bar code on the volume, processing continues as if **barcode** were set to **no** on the Library Definition record.

Note that some applications (for example, ADSM) may require that the internal label match the generated label. You must use a labeling utility to ensure that the generated label matches the internal label on the volume.

Step 6: Defining Alternative Connections to Tape Device Hosts

In NetTAPE 1.2., the **parconf** file is used only to specify alternative connections to tape device hosts, for cases where faster connections are available to speed data transfer. A sample **parconf** file, which you can customize, is located in **/usr/lpp/nettape/samples/config**.

The **parconf** file maps a tape device host's globally-known name to its high-speed connection name. A **parconf** entry has the following syntax:

```
host_name   client_node_name   high_speed_host_name
```

Where:

host_name The name of the tape device host as specified in **nettape.adm.config**. See "Defining the Devices and the Device Pools" on page 48 for more information.

client_node_name The globally-known client node name. Wild card definitions for the client node name are supported. This lets you use the same **parconf** file entry for a cluster of similarly-named workstations or for an RS/6000 SP.

high_speed_host_name The alternative, high-speed connection host name.

Here is a sample entry that uses a wildcard definition for the client node name. It specifies that all client nodes beginning with the characters `client` can connect to the tape device host, it1n15, through the high-speed connection host name, it1n15_fast.

```
it1n15    client*    it1n15_fast
```

A **parconf** file can be located on a client node in the /**etc** directory, in a user's home directory, or in both. The **parconf** file in the /**etc** directory, if there is one, applies to all NetTAPE users on that client node. However, a **parconf** file in a user's home directory overrides the **parconf** file in the /**etc** directory.

Note

If the **parconf** file contains entries in the NetTAPE 1.1 format, you must comment those lines out or delete them.

Chapter 10. Using ADSM with NetTAPE

ADSTAR Distributed Storage Manager (ADSM) is IBM's backup and restore, archive and retrieve, and space management product. ADSM traditionally performed these jobs while managing the devices and media that have been defined to it. Now ADSM can pass control of the devices to products like NetTAPE for a better drive sharing environment for all of your tape usage. This section describes the setup and use of NetTAPE and ADSM together.

The following components allow ADSM and NetTAPE to work together:

- An ADSM External Library Manager Interface that is part of the ADSM product.
- A function of NetTAPE that maps the ADSM External Manager Interface to the NetTAPE internal communication to mount, dismount, release, inject, eject, and query volumes.

To set up your environment to use the two products together, perform the following steps:

1. Configure NetTAPE devices to use either the ADSM device drivers or the Atape or MTDD standard device drivers for both libraries and drives.

   Note: The ADSM device drivers are included with the NetTAPE_TLC package and can be used for most SCSI drives and libraries. See *ADSTAR Distributed Storage Manager: Device Configuration* for a definitive list of supported libraries.

2. Define an External Library in ADSM for each storage pool to contain devices managed by NetTAPE.
3. Ensure there are scratch media with IBM standard labels in the NetTAPE managed libraries.
4. Start NetTAPE and ADSM in any order.

Defining a New Storage Pool

To set up a new storage pool in ADSM that uses NetTAPE as an external library, perform the following steps:

1. Authorize the ADSM server to access NetTAPE.
2. Define ADSM external managers.
3. Label scratch cartridges.
4. Optionally, adjust the ADSM idle timeout value.

Authorize the ADSM Server to Access NetTAPE

Any user ID under which you will run ADSM must be authorized to access NetTAPE, and the way in which you authorize a user ID depends on the security method you select. First, determine the user IDs that need to be able to start the ADSM server. Then, authorize those user IDs to access NetTAPE, using the information in “Step 2: Defining NetTAPE's Security Method” on page 37.

© Copyright IBM Corp. 1996, 1997

You must also give these userids administrator authority using the **stsdmn.operators.adm** keyword in the **nettape.adm.config** file.. See “Defining the User Authority Control List” on page 44 for more information.

Define ADSM External Managers

For ADSM to use an external library manager, you must define the library to point to the manager module. In the following example, a library is defined to ADSM for a storage pool called COPYPOOL. The library name associated with the storage group must be the same name as either an esoteric or generic device pool defined to NetTAPE. When used to specify a device pool name in **nettape.adm.config**, an ADSM external library name must be in upper case. See “Defining the Devices and the Device Pools” on page 48 for more information.

Note

In defining an esoteric NetTAPE pool, be sure that all the devices in the esoteric support the same cartridge type. In other words, if you want an esoteric to include all the 3590s in your shop, ADSM could use that pool. But if you mixed 3490s and 3590s in an esoteric, ADSM would not function properly.

Next, the ADSM administrator must issue the three commands that follow:

```
DEFINE LIBRARY 3590A LIBTYPE=EXTERNAL
               EXTERNALMANAGER=/usr/lpp/nettape/bin/cladsmd
DEFINE DEVCLASS EXT3590 DEVTYPE=3590 MOUNTLIMIT=3
               LIBRARY=3590A MOUNTRETENTION=10
DEFINE STGPOOL COPYPOOL EXT3590 POOLTYPE=COPY RECLAIM=100
               MAXSCRATCH=5000
```

The storage pool specifies the DEVCLASS, that specifies the library. All three are needed to complete the definition. The library name must match the NetTAPE device pool name to complete the connection, and the device type must be able to mount and use the specified cartridge type.

The default time in ADSM for a drive to remain mounted is 60 minutes. Because the idea is to share the drives, you may want to lower this time in the DEVCLASS definition to something less exclusive with the MOUNTRETENTION parameter.

From this example, you can see that as far as ADSM knows, there are at least three drives of type 3590 within the NetTAPE device pool, but it does not know if there are three or 10; or if they are in one or more automated libraries or stand-alone drives. To limit the number of drives that ADSM has mounted at any one time, you can set the MOUNTLIMIT to less than the number of drives in the device pool

The ADSM MOUNTLIMIT parameter on the DEVCLASS definition controls the number of volumes that can be mounted at one time. Considerations for setting the MOUNTLIMIT depend on the number and distribution of drives of the type specified in the DEVCLASS. NetTAPE introduces a level of indirection between ADSM and the drives that can and should be controlled through the MOUNTLIMIT parameter. If, for example, you have a group of 3590s operating in random mode as single drive libraries, set the MOUNTLIMIT to 1 because it is the only way to avoid contention among ADSM processes for the single drive if cartridges are resident in the same 3590 loader.

Note: When the MOUNTLIMIT is set to 1, set RECLAIM= 100 on the DEFINE STGPOOL to disable reclamation of fragmented volumes.

For more information on the ADSM commands, refer to *ADSTAR Distributed Storage Manager for AIX: Administrator's Reference*.

Note: The path to the NetTAPE ADSM program is specified here as */usr/lpp/nettape/bin/cladsmd*. This is the path in which installation places the module.

Labeling Scratch Cartridges

ADSM requires that cartridges with IBM standard labels be used, and that for each instance of the server, the cartridges contain a unique volume serial. If your libraries have bar code readers, be sure you make the internal label match the first 6 characters of the bar code. That way automatic means can recognize the cartridge bar codes and use those to determine what cartridge to mount. This works for any bar coded library. If your libraries do not have bar code readers, you must make sure the volume name known to the library is the same as the internal volume name. You can use DSMLABEL to label the tapes while the library is not under NetTAPE control.

Other Considerations

You are now ready to start using ADSM with NetTAPE. But there is one more tuning change you might want to make. In the options file for ADSM, the IDLETIMEOUT value is set to 15 minutes. This setting causes a drive to be held for 15 minutes before ADSM terminates an idle client session. You may want to decrease the time to something less than 15 minutes.

Migrating an Existing Storage Pool

When you migrate an existing ADSM storage pool to NetTAPE management, you must be careful to ensure no data is lost. ADSM does not delete any data entries when a library is deleted, but it does check out the volume entries for the library. Follow the steps outlined in this section.

Note

Perform the following steps when there is no ADSM activity on the storage pool that is being migrated. Without a static environment, the setup will be suspect.

Identify the Media in the ADSM Library

Before doing anything else, find out what media is in the ADSM library that is about to be converted to NetTAPE management. If you are using a 3494 or a Silo, the library manager keeps an inventory of the media it contains by bar code. The internal volume serials are the same. To identify the media in the ADSM library, use the following command:

```
QUERY LIBVOLUME libraryname
```

Output from this command is as follows:

```
Library Name     Volume Name       Status       Last Use
-----------    -----------      ------      --------
AUTO             WPD001            Private      Data
AUTO             WPD002            Private      Export
AUTO             WPDV00            Scratch
AUTO             WPD003            Private      DbBackup
```

You may receive more output on the screen than it can contain. If you redirect STDOUT to a file, you can edit that file to make a shell script for the remaining steps.

To identify the categories that are defined in a 3494 or a 3495 library, enter the following command:

```
QUERY LIBRARY libraryname
```

The output from this command indicates the categories and the operating system device name, both of which NetTAPE requires.

```
Library      Library    Device     Private          Scratch
Name         Type                  Category         Category
--------   ------   -------   ----------    --------
AUTO         3494    /dev/lmcp0    5d0          6d0
```

NetTAPE also needs the operating system device name for each drive in the library. You can issue the following command to get this information:

```
QUERY DRIVE libraryname
```

Output from this command is as follows:

```
Library     Drive     Device   Device       Element
Name        Name      Type
--------   ------   -------   ------------- -------
AUTO        8MM.0     8MM       /dev/mt1        116
AUTO        8MM.2     8MM       /dev/mt2        118
```

Define the Library and Drives to NetTAPE

Start off with defining the library, drives and categories in the **/etc/nettape.adm.config file**. Here's an example showing one 3494 with four 3590 drives connected to two hosts.

```
stsdmn.ibmacs my3494 myhost /dev/lmcp0 /dev/lmcp0
stsdmn.devpool.cat.private 3590a 5d0
stsdmn.devpool.cat.scratch 3590a 6d0
myhost.device.1 3590a 3590 /dev/rmt0 ibmacs od=1,down,my3494
myhost.device.1 3590a 3590 /dev/rmt1 ibmacs od=1,down,my3494
myhost.device.1 3590a 3590 /dev/rmt2 ibmacs od=1,down,my3494
myhost.device.1 3590a 3590 /dev/rmt3 ibmacs od=1,down,my3494
myotherhost.device.2 3590a 3590 /dev/rmt0 ibmacs od=1,down,my3494
myotherhost.device.2 3590a 3590 /dev/rmt1 ibmacs od=1,down,my3494
myotherhost.device.2 3590a 3590 /dev/rmt2 ibmacs od=1,down,my3494
myotherhost.device.2 3590a 3590 /dev/rmt3 ibmacs od=1,down,my3494
```

Define the New Library to ADSM

Carefully do the following steps checking each for successful completion before going to the next:

1. Define the New ADSM Library.

   The example builds 3590a into NetTAPE so the command DEFINE LIBRARY must have a library name equal to 3590a.

   ```
   DEFINE LIBRARY 3590a LIBTYPE=EXTERNAL
            EXTERNALMANAGER=/usr/lpp/nettape/bin/cladsmd
   ```

2. Issue a CHECKOUT LIBVOL... REMOVE=NO for each volume in the library belonging to ADSM.

3. Change the DEVCLASS of the old library to point to the new library. AUTO was the name of the old library and you can find the name of the DEVCLASS by issuing QUERY DEVCLASS * FORMAT=DETAILED. Then look for the library called AUTO.

   To change the DEVCLASS issue:

   ```
   UPDATE DEVCLASS devclassname LIBRARY=3590a
   ```

   Because the Storage Pool already points to the devclass, no update is needed.

4. Remove the ADSM defined drives

   It is not possible to delete the library in ADSM without first deleting the drives. Use the following command to delete the drives.

   ```
   DELETE DRIVE AUTO 3590.0
   ```

5. Remove the old ADSM library definition with the following example:

   ```
   DELETE LIBRARY AUTO
   ```

6. Change the active volumes to the new ADSM external library.

   Issue the Update Volume command to ADSM to point to the new library for documentation and check the active volumes in as follows:

   ```
   UPDATE VOLUME WPD001 ACCESS=READWRITE
   ```

Now you are ready to run both NetTAPE and ADSM and have them work together along with your other applications.

Chapter 11. Administering NetTAPE

The tasks required to configure and administer NetTAPE are listed in Table 2. The table also shows where each task is explained. Some of these tasks have already been discussed in the previous chapter because they are required for both for configuring and administering NetTAPE.

Table 2. Administration Tasks for NetTAPE

Task	Where Explained
Installing NetTAPE or NetTAPE Tape Library Connection	21
Creating and customizing NetTAPE configuration files	33
Defining NetTAPE's security system	37
Configuring the IBM and STK tape libraries	**/usr/lpp/nettape_tlc/doc/library_config.README**
Configuring NetTAPE to work with ADSM	15
Customizing the NetTAPE operator GUI	**/usr/lpp/nettape/doc/nettape_gui.README**
Understanding the NetTAPE daemons	92
Starting or restarting NetTAPE	94
Stopping NetTAPE	94
Starting the operator GUI	94
Adding or removing a tape device from the NetTAPE configuration	95
Understanding the NetTAPE device states	95
Resetting a tape device	97
Reserving a tape device	98
Sharing a NetTAPE tape device with MVS	98
Managing device pool mount queues	99
Creating a bootable system image on a remote tape with **mksysb**	99
Troubleshooting	123

© Copyright IBM Corp. 1996, 1997

Understanding NetTAPE Daemons

This section describes the NetTAPE daemons and their different roles. References to some of these daemons appear throughout the book. You might also need this information to identify NetTAPE daemon processes running on your system.

A node where a NetTAPE user or application resides is referred to as a *client* node. A node where a device is attached is referred to as a *tape server* node. A *library server* is a node where a tape library daemon (cl3494d, clsilod, or clscsid) is running. However, if the library server is also the node to which the tape library is attached, then the library server is also a tape server node. Table 3 lists the NetTAPE daemons and describes their functions. The NetTAPE configuration in Figure 3 on page 93 shows where the different NetTAPE daemons might run.

Table 3. NetTAPE Daemons

Daemon name	Description	Started and stopped by:
nettaped	The status daemon, also known as the physical volume library (pvl) daemon. Starting this daemon brings up NetTAPE. A single instance of the status daemon controls the NetTAPE product and starts other daemons to handle various functions. The status daemon runs only on the host identified by **stsdmn.hostname** in **nettape.config**.	cltopr command
clsilod (NetTAPE TLC only)	The STK tape library daemon. Runs on the node where the STK Client System Component (CSC) Toolkit Storage Server Interface (SSI) daemon is installed. Works with the SSI daemon to process NetTAPE mount and unmount requests.	cltopr command
cl3494d (NetTAPE TLC only)	The IBM 3494/3495 Tape Library daemon. Runs on the node where the IBM 3494/3495 Library Manager Control Point (LMCP) interface is installed. Works with the Library Manager to process NetTAPE mount and unmount requests.	cltopr command
clscsid (NetTAPE TLC only)	The SCSI tape library daemon, also known as the SCSI Physical Volume Repository (PVR) daemon. Runs on the node where the SCSI Robotics Control Point interface is installed. Works with the ADSM or Atape device driver to process NetTAPE mount and unmount requests. One SCSI tape library daemon is needed per SCSI device.	cltopr command
cltclntd	The tape client daemon. Each tape pseudo device driver is associated with a tape client daemon, which runs on the client node. Handles access to the physical tape device. If the device is remote, starts a tapesrv daemon on it.	By NetTAPE internally
tapesrv	The tape server daemon. Runs on the server node, handles functions related to remote tape access.	By NetTAPE internally
clutild	The security daemon. Handles user authentication methods other than the Remote Execution Using .netrc method.	By NetTAPE internally
clutil	Handles the creation and deletion of the tape pseudo device driver's special file, as well as other functions.	By NetTAPE internally
avrdmn	The automatic volume recognition (AVR) daemon. Runs on the server node, if AVR is enabled for that device in **nettape.adm.config** or using the NetTAPE operator GUI.	cltopr or NetTAPE GUI

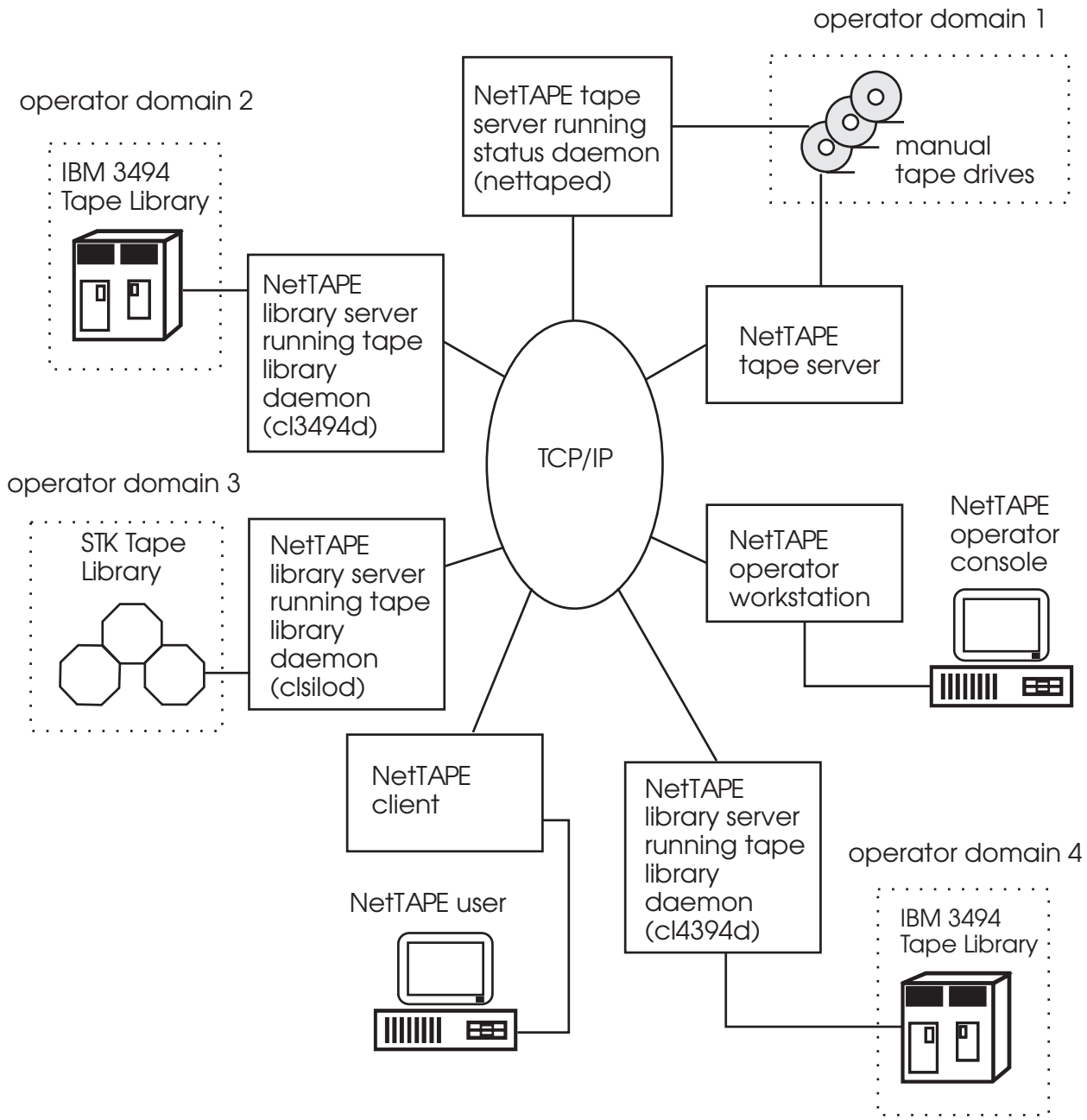

Figure 3. NetTAPE configuration showing locations of NetTAPE daemons

Starting or Restarting NetTAPE

The keyword **stsdmn.hostname** in **nettape.config** identifies the host where the status daemon is to run. Start the status daemon **only** on this host. For NetTAPE to work correctly, there must only be one instance of the status daemon running and it must run on the host you specify here.

The NetTAPE operator GUI should be active at all times. Otherwise, operator intervention messages will be lost.

To start NetTAPE, issue the following sequence of commands.

1. Start the status daemon using either of these commands:

   ```
   cltopr -S pvl (to start on local host)
   cltopr -S pvl -h host_name (to start on remote host)
   ```

2. Bring up the operator GUI:

   ```
   cltoprg
   ```

3. If you have IBM 3494 or 3495 Tape Libraries, start the IBM tape library daemon using either of these commands:

   ```
   cltopr -S 3494d -L library_name (to start on local host)
   cltopr -S 3494d -L library_name -h host_name (to start on remote host)
   ```

4. If you have STK Tape Libraries, start the STK tape library daemon using either of these commands:

   ```
   cltopr -S silod -L library_name (to start on local host)
   cltopr -S silod -L library_name -h host_name (to start on remote host)
   ```

5. If you have SCSI tape libraries, start the SCSI tape library daemon using either of these commands:

   ```
   cltopr -S scsid -L library_name (to start on local host)
   cltopr -S scsid -L library_name –h host_name (to start on remote host)
   ```

For more information, see “cltopr—Issuing a NetTAPE operator command” on page 105 and “cltoprg—Starting the NetTAPE Operator Graphical User Interface” on page 117.

Stopping the NetTAPE Status Daemon

Before stopping NetTAPE, verify that no tape jobs are currently running. Then, to stop all NetTAPE daemons and bring down the operator GUI, enter:

```
cltopr -H pvl
```

For more information, see “cltopr—Issuing a NetTAPE operator command” on page 105.

Starting the NetTAPE GUI

To start the NetTAPE operator GUI, issue the **cltoprg** command.

You should keep at least one NetTAPE operator GUI running at all times. Otherwise, operator intervention messages might be lost. For more information, see “cltoprg—Starting the NetTAPE Operator Graphical User Interface” on page 117.

Adding or Deleting Devices from NetTAPE

You can use the NetTAPE GUI or the **cltopr** command to add devices to or delete devices from the NetTAPE configuration. Such a change can be either temporary or permanent, depending on whether you update **nettape.adm.config**.

Temporary changes remain in effect only for the life of the status daemon session and leave **nettape.adm.config** unchanged. To make a permanent change, you must update the **nettape.adm.config** either by:

- Editing the file directly while the status daemon is not active and then restarting the status daemon
- Using the GUI to make changes and to save them in **nettape.adm.config**
- Using the **cltopr** command with the –**U** option.

Note

The userid that started the status daemon must have write access to **/etc/nettape.adm.config**.

If you are adding a tape device that runs in ACL mode, ensure that the switch on the tape device is set to automatic mode.

If you delete a device under the following circumstances, NetTAPE will fail due to an invalid esoteric pool when it is restarted:

- The device is the last one in a device pool
- The device pool that now contains no devices is part of an esoteric pool
- You update the **/etc/nettape.adm.config** file to make the change permanent.

"Defining the Devices and the Device Pools" on page 48 explains how to add a device directly to the **nettape.adm.config** file. The online help system for the NetTAPE GUI explains how to use the GUI to add or delete a device from the NetTAPE configuration. See "cltopr—Issuing a NetTAPE operator command" on page 105 for more information about using **cltopr** for this purpose.

Understanding NetTAPE Tape Device States

As a result of operator or user action, tape devices under NetTAPE control can be in any of the states described below.

Up The device is available for allocation. However, the tape drive might not have the cartridge loaded or the cartridge might be loaded but the tape drive might not be online.

Down The device is not available for allocation. A device can be in the down state due to any of the following:

- The operator placed it in the down state
- The device has a hardware problem
- The tape server host is down
- The device special file is currently opened (EBUSY) by another application. This application might be running a

tape job from the previous NetTAPE session, before the operator restarted NetTAPE. See “Device Down Due to Tape Job from Previous Session” on page 124 for information on handling this situation.

In use The device is being used by a NetTAPE tape job.

Shared use This state applies only the shared devices. When one shared device path is in use, that path is marked as in use while all the other paths for that device are marked as in shared use.

Pending reserved The state assigned to an in-use device that has been reserved. The device is marked as pending reserved until its current job completes. Then, the device is reserved.

Reserved The device is not available for allocation by NetTAPE users.

For a shared device, device states are somewhat complicated. A shared device has multiple device paths, one for each connection to a host or node. Some device states apply to all device paths of a shared device that are in the up state. While others apply only to a particular device path. For instance, a shared device could have two device paths in the up state and another device path in the down state. When you reserve a shared device, the two device paths in the up state are placed in the reserved state (or first in the pending reserved state if necessary). For more information on shared devices, see “Specifying Shared Devices” on page 53.Figure 4 on page 97 shows:

- How the different device states relate to each other
- The NetTAPE commands, APIs, and GUI functions that operate on each state.

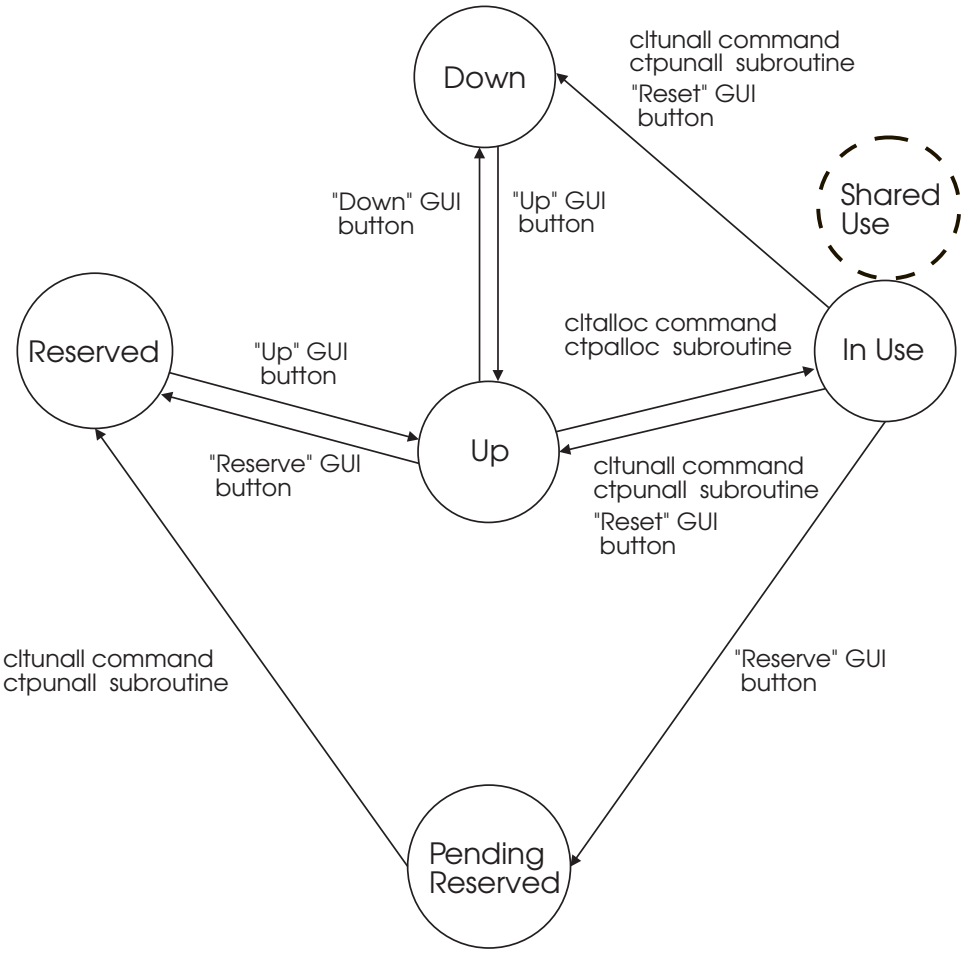

Figure 4. Tape device states and associated NetTAPE GUI buttons, commands, and subroutines.

Resetting a Tape Device

NetTAPE's reset function is a software reset, which is entirely different from the hardware reset accomplished using the RESET button on the tape device. In general, you use NetTAPE's reset function to correct an error condition such as a hanging job or a hardware problem. Resetting a tape device stops the job running on the device and if possible, returns the device to the up state.

When the running job is stopped:

- For a manual device, the tape is rewound.
- For a device in a tape library, the cartridge is returned to a storage slot.

Note

Resetting a device could take several minutes, depending on the system load and the device speed.

Resetting a device path belonging to a shared tape device also resets to the up state the other device paths belonging to that shared device. However, if the shared device has device paths in the down state, these are left as is.

If There's a Hardware Problem

If the tape device has a hardware problem, the reset puts the device in the down state. However, NetTAPE cannot release a hanging tape application process if it is waiting for an I/O response from the tape device driver. In this case, you must do a hardware reset on the tape device. The hardware reset might be able to send a signal to the device driver to release the hanging process. If the hardware reset works, you can then change the device state from down to up. If the hardware reset doesn't work, you will have to reboot the system to release the fenced device. If the device still remains in the down state, you'll need to perform more extensive troubleshooting on the device.

Accessing the NetTAPE Reset Function

To reset a tape device, use the operator GUI. The online help system for the GUI explains how to use the GUI to reset a device. You can also use the **cltopr** command for this purpose. See “cltopr—Issuing a NetTAPE operator command” on page 105 for more information.

Reserving a Tape Device

You can reserve a device using the operator GUI or the **cltopr** command. The online help system for the GUI explains how to use the GUI to reserve a device. You can also use the **cltopr** for this purpose. See “cltopr—Issuing a NetTAPE operator command” on page 105 for more information.

Reserving a device makes it unavailable for allocation. If the device is not in use, it goes directly into the reserved state.

When you reserve a device that is currently in use, NetTAPE marks the device as pending reserved. The device becomes reserved when either:

- The running job completes and the current user unallocates the device
- The job doesn't finish but reaches the end of the current tape.

To handle the unfinished job, NetTAPE:

1. Places the device in the reserved state
2. Sends a new mount request message to the operator to move the job to another device in the same device pool.

You can then assign the request to a new device. If the request is queued, you can resume the job by moving the mount request to the top of the mount queue using the GUI's mount queue management window. See “Managing Device Pool Mount Queues” on page 99 for more information.

Sharing a NetTAPE Tape Device with an MVS System

NetTAPE and MVS can share twin-tailed tape devices but you must assign the tape device to each manually. To assign to MVS a tape device currently assigned to NetTAPE:

- Place the tape device in the down state using either the NetTAPE operator GUI or the **cltopr** command.

- Vary the tape device online to MVS.

To assign to NetTAPE a tape device that is currently assigned to MVS:

- Vary the tape device offline to MVS.
- Place the tape device in the up state using either the NetTAPE operator GUI or the **cltopr** command.

Managing Device Pool Mount Queues

Each device pool and esoteric device pool has its own mount queue. Jobs, which NetTAPE queues in FIFO order, are placed on the mount queue for the device pool or esoteric device pool specified (or taken as the default) on the allocation request.

The NetTAPE GUI's mount queue management window lets you view each device pool mount queue and reorder or delete queued jobs. Esoteric device pool mount queues cannot be viewed or changed.

See the NetTAPE operator GUI's online help system for more information about the mount queue management window.

Creating a Bootable System Image on a Remote Tape with mksysb

You can use NetTAPE's own version of the AIX **mksysb** command to create a bootable system image on a remote tape. To boot an RS/6000 workstation or SP node from a tape you have created this way, you must mount the tape on an OST 8mm device, local to the system you are booting up, which can be defined as /**dev**/**rmt***n*.

To use NetTAPE's **mksysb** command with a remote tape device, do the following:

1. Allocate an unlabeled tape using the **cltalloc** command with the option –**o** “MAX_DATA=51200”

   Make a note of the **pst** suffix your files have been assigned (for instance, 0, as in **pst0**). You'll need this information later.

2. Go to the directory /**usr**/**lpp**/**nettape**/**samples**/**mksysb**, which contains NetTAPE's version of **mksysb**. NetTAPE provides two versions of **mksysb**: **mksysb.41** for AIX 4.1 and **mksysb.42** for AIX 4.2. Select the file you need for your version of AIX and rename it **mksysb**. Do not modify the bosboot scripts.
3. Issue **su root**
4. Issue **./mksysb** [*flags*] /**dev**/**pst***n*, where *n* is the pst suffix discussed in the previous step. Refer to AIX's **mksysb** man page for information about the flags you can specify.
5. When **mksysb** completes, exit back to initial user ID.
6. Unallocate the device using the **cltunall** command.

Chapter 12. Administrative Commands

Table 4 lists the NetTAPE administrative commands and where they are described.

Table 4. NetTAPE Administrative Commands

Command	Description	Where Explained
clnetrc	Encrypt user information for the Encrypted Password security method.	102
cltopr	Issue a NetTAPE operator command	105
cltoprg	Bring up the NetTAPE operator GUI (command)	117
cltterm	Stop the NetTAPE tape client daemon	120
xcltopr	Bring up the NetTAPE operator GUI (shell script)	121

© Copyright IBM Corp. 1996, 1997

clnetrc—Encrypting user password information

Syntax

clnetrc [–**f** *file_name*]
[–**encrypt** | –**verify** | –**delete**]

Parameters

–**f** *file_name*
Specifies the name of a file to be used for bulk input. If this flag is not used, the **clnetrc** command prompts you to enter the information manually.

–**encrypt** Specifies that you wish to encrypt information and place it in the /**etc**/**clnetrc** file. This action is the default.

–**verify** Specifies that you wish to verify entries in the /**etc**/**clnetrc** file.

–**delete** Specifies that you wish to delete an entry from the /**etc**/**clnetrc** file.

Description

The **clnetrc** command lets you encrypt user information and place it in the /**etc**/**clnetrc** file. You must be the root user to issue this command.

The /**etc**/**clnetrc** file is used with the Encrypted Password security method, which is described in “The Encrypted Password Method” on page 38. The **clnetrc** command also lets you verify or delete user information that you have placed in the /**etc**/**clnetrc** file.

After you change the /**etc**/**clnetrc** file, you must propagate it to all of the other NetTAPE nodes, that is, all client, server, or physical device host nodes that you are using with NetTAPE.

To encrypt information, enter the **clnetrc** command with the –**encrypt** parameter. If you have a lot of input, prepare an input file, whose format is described later, and use the **-f** flag to specify the name of the file to the **clnetrc** command. If you do not specify the **-f** flag, the **clnetrc** command prompts you to enter the information needed to create one or more user entries in the /**etc**/**clnetrc** file.

If the /**etc**/**clnetrc** file already exists, new entries are added. If the /**etc**/**clnetrc** file does not exist, it is created.

Once you have entered information for a user entry, the command asks you if you wish to repeat the process for another user. To end the command, respond "n".

In encryption mode, you can either add a new entry or change the password of an existing entry. In active mode, all information except the password is echoed back to you. The following example shows information being entered for a user:

```
Encryption mode >>
entry name: fbassow
Server System name: fordn01
fordn01 userid: bassow
bassow's passwd:
fordn01 account for bassow: 24789
Updating encrypt file /etc/clnetrc.
Encrypt another one [y]:
```

entry name
A name to associate with this record. The name must consist of between 8 and 31 characters and must consist of only alphanumeric characters and underscores. Case is significant. This name is used as an eye catcher in the **clnetrc** file. All other information is encrypted.

Server System name
The name of the NetTAPE host. The name must consist of between 4 and 31 characters and must consist of only alphanumeric characters and underscores. Case is significant.

For each user/node combination, you must specify a separate entry for each node in the NetTAPE configuration, which includes NetTAPE client nodes, NetTAPE server nodes, and NetTAPE physical device host nodes.

For example, if there are three nodes in your NetTAPE configuration and you have five users that you want authorize to use NetTAPE, you must create 15 entries to authorize all users to all nodes. To use NetTAPE, you must specify an entry for each user/node combination.

host_name **userid**
The user ID authorized to that NetTAPE host. The user ID must consist of between 3 and 31 characters and must consist of only alphanumeric characters and underscores. Case is significant.

*userid***'s password**
The password for the specified user ID. The password must consist of between 4 and 31 characters and must consist of only alphanumeric characters and underscores. Case is significant.

host_name **account for** *userid*
The user's account number on the host. The account number can be any integer value and must consist of between 4 and 31 numeric characters. The account number must be specified; however, it is not used by NetTAPE.

To verify information, enter the **clnetrc** command with the –**verify** parameter, which prompts you to specify the user information just as you specified it when you created the entry. NetTAPE verifies that what you have entered matches an entry in the /**etc**/**clnetrc** file. If no match can be found, NetTAPE issues an error message to indicate the error. Once you have verified a user entry, the command asks you if you wish to repeat the process for another user. To end the command, respond "n". You can also use the **-f** flag to verify information from an input file.

To delete information, enter the **clnetrc** command with the –**delete** parameter, which prompts you to specify the entry name of the user entry that you wish to delete. If the entry exists, NetTAPE deletes it. Once you have deleted a user entry, the command asks you if you wish to repeat the process for another user. To end the command, respond "n". Note that the **clnetrc** command does not ask you for a password when it deletes a user entry.

The input file used with the **-f** flag contains multiple fields per line, one line per user entry. Fields must be separated by one or more blank characters.

The format of a new user entry is:

```
entry_name host_name user_id password user_account_number
```

The format of an entry for updating a password is:

entry_name host_name user_id old_pass new_pass user_account_number

Note that the password does not have to be the same as a user's login password. It can be any random combination of alphanumeric characters. It is up to the system administrator to decide whether the password should be changed at regular intervals.

Files

/etc/clnettape.security	File for selecting a NetTAPE security method and other security information.
/etc/clnetrc	File for NetTAPE security (Encrypted Password method).

cltopr—Issuing a NetTAPE operator command

Syntax

cltopr [−**a** *action*]
[−**A**]
[−**c** *device_control_option*]
[−**C** [PRIVATE | SCRATCH]]
[−**D** *device* | *device@host*]
[−**e** −**P** *poolname* −**v** *volser* −**V** *vault*]
[−**f** *force_action*]
[−**h** *hostname*]
[−**H** *daemon_type* [−**L** *library_name*]]
[−**i** −**P** *poolname* −**v** *volser* −**V** *vault* −**C** [PRIVATE | SCRATCH]]
[−**l** *daemon_log_name*]
[−**L** *library_name*]
[−**m** [*messagenum* | **all**]]
[−**o** *options*]
[−**P** *poolname*]
[−**q**]
[−**Q** −**P** *poolname* −**v** *volser*]
[−**r** *messagenum*]
[−**s** [**on** | **off**]]
[−**S** *daemon_type* [−**L** *library_name*]]
[−**t** *device_type*]
[−**U**]
[−**v** *volser*] [−**V** *vault*]
[−**?**]

Parameters

The **cltopr** command has parameters for:

- Device specification
- Device and message control
- Volume specification
- Tape Library control
- Daemon operation
- Command syntax

Before you can issue any other **cltopr** command, you must issue the **cltopr** −**S pvl** command to start the NetTAPE status daemon.

Device Specification Parameters

−**D** *device* | *device@hostname*
Specifies the name of the tape device, for example, /**dev**/**rmt0**. The device name is case sensitive. If you use −**D** *device@hostname*, you may not use −**h**.

−**h** *hostname*
Specifies the name of the host to which the device is physically attached or the host where a daemon is to be started or stopped. If you do not specify *hostname* and do not specify a host using −**D** *device@hostname*, the local host is taken as the default. If you use −**D** *device@hostname*, you may not use −**h**.

–o "*options***"**

Specifies device-specific options to use when adding a device with **–c add**. The options string must be enclosed in double quotes and can include any of the following:

mode=*mode*

Specifies the operation mode for the tape device. *mode* must be one of the following:

IBMACF Automatic cartridge facility supporting random volume access

IBMACL Automatic cartridge loader with sequential volume access

IBMACS IBM 3494 or 3495 tape library

MANUAL Manual cartridge loading mode

SCSIACS SCSI-attached tape library

STKACS STK tape library

addr=*address*

A four number tuple representing the device address in the STK library (for example: *n1,n2,n3,n4*), where:

n1 Specifies the automated cartridge system (ACS) number
n2 Specifies the library storage module (LSM) number within the ACS
n3 Specifies the panel number within the LSM
n4 Specifies the drive number within the panel.

This option can be used only with the **mode=STKACS** option.

od=*operator_domain*

Specifies the operator domain of the device

lib=*tape_library*

Specifies the name of a tape library. Can be up to 16 characters. This keyword is required if you specify **mode**=**STKACS**.

opt=*other_options*

Specifies additional options relating to the tape device, each separated by a comma. You can specify any of the following:

up The device state is up. This is the default for all except tape library devices.

down The device state is down.

This option causes the device to remain down after it is added. Tape library devices must be added in the down state. For tape library devices, this is the default.

avr The device is to be enabled for AVR. This option is supported only for manual devices and labeled tapes. For more information, see the description of the AVR option in "Defining the Devices and the Device Pools" on page 48.

Examples of options strings:

```
-o "mode=STKACS addr=0,1,2,3 lib=stksilo_1 opt=down"
-o "mode=MANUAL opt=up,avr od=123"
```

-P *poolname*

Specifies the name of a device pool defined in **nettape.adm.config**. The pool name is case sensitive. If you omit **-P**, the default pool defined in **nettape.adm.config** is used. The following cannot be specified:

- Esoteric device pools
- Device pools not already defined in **nettape.adm.config**. The system administrator must add new device pools manually to **nettape.adm.config**.

-t *device_type*

Specifies the device type of the device to be added. Used with the with the **-c add** option. *device_type* can be one of:

3420 IBM 3420 tape drive or compatible

3422 IBM 3422 tape drive or compatible

3480 IBM 3480 tape drive or compatible

3490 IBM 3490 tape drive or compatible

3570 IBM Magstar MP tape drive or compatible

3590 IBM 3590 tape drive or compatible

4mm IBM 7206 Model 005 4mm tape drive or compatible

QIC IBM 7207 Model 012 1/4 inch tape drive or compatible

8mm IBM 7208 Model 011 8mm tape drive or compatible

DLT DLT drive using an ADSM device driver

D2 Ampex DST 310 or 410 tape drive

9TRK IBM 9348 Model 012 9-track tape drive or compatible

OST All others

See Chapter 3, "Supported Hardware and Software" on page 11 for a complete list of supported devices.

Device and Message Control Parameters

-a *action* Specifies the operator's action in response to an operator message for a manual device. Specify **-a** with **-r**. Valid *action*s are:

cancel Specifies that the mount request should be discarded.

move Specifies that the mount request is to be moved to a different device than the one requested in the message. This change is invisible to the user requesting the device. If you are moving a scratch mount, you must also specify the volser using **-v** option.

mount Specifies that a mount request is to be satisfied. Either a device is allocated as requested or the mount request is queued to wait for an available device. If you are mounting

a scratch tape, you must also specify the volser using –**v** option.

NetTAPE displays one of the following messages on the tape drive display where the volume is to be mounted:

- `M` *`external_volser`*, if the mount request is for a specific tape
- `M SCR SL`, for a standard label scratch tape mount request
- `M SCR AL`, for an ANSI label scratch tape mount request
- `M SCR NL`, for an unlabeled scratch tape mount request.
- `M SCR NA`, for a non-standard ANSI label (NSAL) scratch tape mount request.

When a scratch tape is mounted, NetTAPE updates the tape drive display to show the external volser of the tape.

When the tape is unmounted, NetTAPE displays the following message on the tape drive display: `K` *`external_volser`*.

–**c** *device_control_option*
Specifies a device control option. Valid *device_control_option*s are:

add Adds device to the configuration. With the **add** option, you must specify the device name (–**D**), device type (–**t**), host (–**h**), and device pool (–**P**).

delete Deletes device from configuration. With the **delete** option, you must specify the device name (–**D**) and host (–**h**).

Note: If you delete all devices in a device pool from **nettape.adm.config**, and that device pool is also part of an esoteric pool, be sure to delete the empty device pool from the esoteric pool. Otherwise, when you restart NetTAPE, it will fail due to an invalid esoteric pool.

down Bring the device down. To bring a device down, AVR must be deactivated if applicable. To deactivate AVR, halt the AVR daemon through the operator GUI or by issuing the **cltopr -H avr** command.

reserve Put the device in the reserved state. To reserve a device, AVR must be deactivated if applicable. To deactivate AVR, halt the AVR daemon through the operator GUI or by issuing the **cltopr -H avr** command.

The reserved state prevents the device from being assigned to a user. The reserved device can be used by the operator.

If the device is not in use, it goes immediately into the reserved state. If the device is in use, the device is put into the reserved state at the next End Of Tape or when the user invokes **cltunall** or **ctpunall**.

When the device reaches End Of Tape, NetTAPE allocates another similar tape device, mounts the next new volume on it, and then resumes the user's tape I/O operation.

reset Change the state of a device from in-use to up. Resetting a device forces the cancellation of the job running on it. Resetting a device in a tape library forces the volume to be ejected and returned to its slot.

To reset a device, AVR must be deactivated if applicable. To deactivate AVR, halt the AVR daemon through the operator GUI or by issuing the **cltopr -H avr** command.

up Bring a device up. A device in the up state is available for allocation.

To bring up a device, AVR must be deactivated if applicable. To deactivate AVR, halt the AVR daemon through the operator GUI or by issuing the **cltopr -H avr** command.

For more information about device states, see Figure 4 on page 97.

–**f** Force an action. Use –**f** to avoid the prompt for confirmation that NetTAPE issues when you specify **cltopr** to perform certain actions such as deleting a device or cancelling a mount request.

–**m [***messagenum* | **all]**
Displays messages for pending mount requests. If you specify *messagenum*, that message is displayed. If you specify **all**, all pending mount request messages are displayed.

–**q** Displays device information. If a device was specified with –**D** *device*, information for that device is displayed. Otherwise, information for all devices is displayed.

If the –**q** flag is used with the –**D** and –**h** flags, that is, when querying a specific device, additional information for the device, such as the results of a scan ACF action, is displayed if it is available.

If the –**q** flag is used with the –**P** flag, information is displayed for all devices in the pool. If the specified pool is an esoteric pool, information is displayed for all devices that are in all of the generic pools that are included by the esoteric pool.

–**L** *library_name*
Specifies the name of a tape library that is defined in **nettape.adm.config**. –**L** is required with the –**S** and –**H** options.

–**r** *messagenum*
Indicates that you are responding to a message. Specify the number of the message to which you are replying with the *messagenum* parameter and use –**a** *action* to specify the action in response to the message.

–**A** Specifies that an audit of a SCSI library is to be performed. During an audit of a SCSI library, the robotics move through the library and report a new inventory to the device driver. The device driver then synchronizes the new inventory with the inventory in the library configuration catalog.

–s [on | off]

Specifies whether a scan of a SCSI library or an automatic cartridge facility (ACF) magazine is to be performed (**on**) or not (**off**).

A scan of a SCSI library synchronizes the device driver tables with the library configuration catalog without moving the robotics.

A scan of an ACF magazine mounts and reads the internal label of each cartridge that the magazine contains.

Volume Specification Parameters

–C [PRIVATE | SCRATCH]

Specifies whether the volume being injected is to be placed in the tape pool's default private category or default scratch category. These categories are specified in the **nettape.adm.config** file.

If you want to place the volume being injected in the tape pool's default private category, specify **PRIVATE**. This is the default.

If you want to place the volume being injected in the tape pool's default scratch category, specify **SCRATCH**.

If you omit this option, the volume being injected is placed in the tape pool's default private category,

For a SCSI library, the volume status is set to **PRIVATE** or **SCRATCH**, as specified by the user.

–v *volser* The volser of the volume, as follows:

- When specified with the **–i** option, *volser* specifies the volser of the volume to be injected.
- When specified with the **–e** option, *volser* specifies the volser of the volume to be ejected.
- Otherwise, *volser* specifies a scratch volser when specified with the **–a mount** option.

–V *vault* A text string, of up to 255 characters, describing the location of the volume. If the string contains blanks, it must be surrounded by double quotes ("). For example: **"**`Building 56 Room 4 Shelf 4`**"**

- When specified with the **–i** option, *vault* specifies the vault or shelf location of the volume to be injected.
- When specified with the **–e** option, *vault* specifies the vault or shelf location where the ejected volume is to be placed.

Tape Library Control Parameters

–e Ejects a tape volume from a tape library. With the **–e** option, you must specify the pool name (**–P**), the volser of the volume (**–v**), and the vault location (**–V**). Once the tape device ejects the volume, NetTAPE sends a message to the operator for the specified NetTAPE device pool to remove the volume from the convenience station or EE port.

–i Sends a command to the operator to have a tape volume injected into a tape library. With the **–i** option, you must specify the pool name (**–P**), the volser of the tape volume (**–v**), the vault location (**–V**), and the category where to place the volume (**–C**).

–Q Queries whether a specified tape volume is in a particular tape pool. With the **–Q** option, you must specify the pool name (**–P**) and the volser of the volume (**–v**). The response to this command is a message stating whether the tape volume is in the specified tape pool.

Daemon Operation Parameters

–H *daemon_type*

Halts a NetTAPE daemon. *daemon_type* can be one of:

avr Used with the **–D** and **–h** flags, this option halts an AVR daemon for the specified device.

pvl Physical Volume Library Daemon (nettaped, the status daemon).

3494d 3494 Tape Library Daemon (cl3494d)

scsid SCSI tape library daemon (clscsid)

silod STK Tape Library Daemon (clsilod)

The **–L** parameter must be specified if you specify **3494d**, **silod**, or **scsid**.

See "Understanding NetTAPE Daemons" on page 92 for more information about the NetTAPE daemons.

–l *daemon_log_name*

Specifies the name of the file where daemon error messages are to be logged on the node where the daemon runs.

You can optionally specify **–l** with **–S**. If you omit the **–l** option, status daemon (nettaped) error messages are saved in **/tmp**/*daemon_type***.log.** IBM 3494/3495 Tape Library daemon, STK Tape Library daemon, and SCSI tape library daemon error messages are saved in **/tmp**/*daemon_type_library_name***.log.**

Note

IBM recommends that you specify the **–l** option to prevent the possibility of filling up your **/tmp** directory.

–S *daemon_type*

Starts a NetTAPE daemon. *daemon_type* can be one of:

avr Used with the **–D** and **–h** flags, this option starts an AVR daemon for the specified device.

pvl Physical Volume Library daemon (the status daemon).

3494d 3494 Tape Library daemon

scsid SCSI tape library daemon (clscsid)

silod STK Tape Library daemon

The **–L** parameter must be specified if you specify **3494d** or **silod**.

See "Understanding NetTAPE Daemons" on page 92 for more information about the NetTAPE daemons.

Starting the Status Daemon

You must start the status daemon (pvl) on the host specified in **nettape.config** with the **ststdmn.hostname** keyword, which indicates where the status daemon is to run.

If you specify the –**h** option, the host name must be what is specified in **nettape.config**. If you omit the –**h** option, you must be starting the status daemon from the host specified in **nettape.config**.

To verify that the status daemon has started successfully:

- If you specified the –**h** option, issue `rsh host_name "ps -ef | grep nettaped"`
- If you omitted the –**h** option, issue `ps -ef | grep nettaped`

–**U** Updates the **nettape.adm.config** file. This parameter changes the **/etc/nettape.adm.config** file by updating the current file with the parameters specified on the **cltopr** command. Any daemons currently running are unchanged. To pick up the configuration changes, you need to restart the status daemon. See "Starting or Restarting NetTAPE" on page 94 for more information.

Command Syntax Parameters

–**?** Displays the command syntax.

Description

The **cltopr** command lets you perform certain operator functions. Normally, the recommended method for performing operator functions is through the NetTAPE operator GUI. **cltopr** should be used only when the NetTAPE operator GUI is not accessible.

You must have **stsdmn.operators** authority or higher to issue the **cltopr** command with all options except –**q**. Any user can issue the **cltopr** –**q** command.

Authority is set in the user authority control list section of the **nettape.adm.config** file. See "Defining the User Authority Control List" on page 44 for more information.

You can use **cltopr** to do any of the following:

- Display outstanding operator messages
- Reply to an operator message
- Query the status of a tape device
- Initiate an ACF scan
- Add or delete a device
- Change the state of a device
- Start or halt a NetTAPE daemon
- Inject or eject a Tape Library volume
- Query whether a tape volume resides in a particular tape pool.

Messages and Responses

The following messages are issued by **cltopr**. See “NetTAPE Messages and API Return Values” on page 196 for additional messages.

Missing Option: *option*

Explanation: An option needed for a request was omitted.

User Response: Retry the command with the specified option.

Request failed: communication error

Explanation: A request could not be sent to the status daemon.

User Response: Ensure that the NetTAPE status daemon and Tape Library daemons are running. Also, ensure that the AIX **inetd** daemon is running. Then retry the command.

Request Failed: library error

Explanation: An error occurred when a Tape Library daemon tried to communicate with a Tape Library.

User Response: Ensure that the Tape Library device is up and that the device is configured and available to the operating system. Also, ensure that the device is connected to the appropriate host. Then retry the command.

Request failed: volume error

Explanation: The volume with the specified volser was not found in the specified tape pool.

User Response: Ensure that you have specified a valid volser. Use the **–Q** option to verify that the volume is in the specified tape pool. Then retry the command.

Request failed: cancelled

Explanation: The operator cancelled the inject or eject request.

User Response: Retry the command or contact the operator for further information.

Request failed: invalid pool name

Explanation: The specified pool name was not valid.

User Response: Retry the command with a valid pool name.

Request failed: user unauthorized

Explanation: You are not authorized to use this NetTAPE option.

User Response: Contact the system administrator.

Request failed: internal error

Explanation: An unexpected internal error occurred.

User Response: Retry the command. If the error occurs again, contact support personnel.

Examples

1. To start the PVL (status) daemon on host gecko, issue:

   ```
   cltopr -h gecko -S pvl
   ```

2. To start the 3494 Tape Library daemon on host **gecko** for the 3494 tape library defined in **nettape.adm.config** as **ibm3494_1**, issue:

   ```
   cltopr -h gecko -S 3494d -L ibm3494_1
   ```

3. To halt the PVL daemon on host **gecko**, issue:

   ```
   cltopr -h gecko -H pvl
   ```

4. To halt the Silo Tape Library daemon on host **gecko** for the STK silo tape library defined in **nettape.adm.config** as **stksilo_1**, issue:

   ```
   cltopr -h gecko -H silod -L stksilo_1
   ```

5. To update **nettape.adm.config** with changes made by the **cltopr** command, issue:

   ```
   cltopr -U
   ```

6. To start an Automatic Cartridge Facility (ACF) scan of device /**dev**/**rmt1** on host bonaire.kgn.ibm.com, issue:

   ```
   cltopr -h bonaire.kgn.ibm.com -D /dev/rmt1 -s on
   ```

7. To halt an ACF scan of device /**dev**/**rmt0** on host **opus40**, issue:

   ```
   cltopr -h opus40 -D /dev/rmt0 -s off
   ```

8. To change the state of device /**dev**/**rmt0** on host **opus40** to UP, issue:

   ```
   cltopr -D /dev/rmt0@opus40 -c up
   ```

   You can also use this equivalent command:

   ```
   cltopr -D /dev/rmt0 -h opus40 -c up
   ```

9. To change the state of device /**dev**/**rmt0** on host **opus40** to DOWN, issue:

   ```
   cltopr -D /dev/rmt0@opus40 -c down
   ```

10. To change the state of device /**dev**/**rmt0** on host **opus40** to RESERVE, issue:

    ```
    cltopr -h opus40 -D /dev/rmt0 -c reserve
    ```

11. To add device /**dev**/**rmt0** on host **opus40** to the device pool **scratch**, issue:

    ```
    cltopr -D /dev/rmt0 -h opus40 -P scratch -o "down" -c add
    ```

12. To delete device /**dev**/**rmt0** on host **opus40** from the device pool **3480pool**, issue:

    ```
    cltopr -D /dev/rmt0 -h opus40 -P 3480pool -c delete
    ```

13. To display all currently outstanding operator messages, issue:

    ```
    cltopr -m all
    ```

14. To display outstanding operator message number 15, issue:

    ```
    cltopr -m 15
    ```

15. To display current device allocation status, issue:

    ```
    cltopr -q
    ```

16. To display the current status of device /**dev**/**rmt1** on host **bonaire**, issue:

    ```
    cltopr -q -h bonaire -D /dev/rmt1
    ```

17. To respond to message number 15 by issuing a mount, issue:

    ```
    cltopr -r 15 -a mount
    ```

    This example assumes that the mount message had already specified the volser for the tape.

18. To mount a scratch tape with the volser **scr001** in response to message 15, issue:

    ```
    cltopr -v scr001 -r 15 -a mount
    ```

    This example assumes that the mount message did not specify a volser for the tape, so it had to be specified on the **cltopr** command.

19. To cancel message number 15 and ask for confirmation, issue:

    ```
    cltopr -r 15 -a cancel
    ```

20. To move a mount request specified by message 15 to the device /**dev**/**rmt6** on host **gecko**, issue:

    ```
    cltopr -h gecko -D /dev/rmt6 -r 15 -a move
    ```

21. To inject the tape volume with volser, `vol001`, from the tape pool's default private category, into the Tape Library represented by pool, `tapelib_tp`, issue:

    ```
    cltopr -i -P tapelib_tp -v vol001 -V "Vault 2 Shelf 6" -C PRIVATE
    ```

22. To eject the tape volume with volser, `vol001` from the Tape Library represented by pool, `tapelib_tp`, issue:

    ```
    cltopr -e -P tapelib_tp -v vol001 -V "Vault 2 Shelf 6"
    ```

23. To query whether tape volume, `vol001`, is in the Tape Library pool, `tapelib_tp`, issue:

    ```
    cltopr -Q -P tapelib_tp -v vol001
    ```

Files

/etc/nettape.adm.config	File used to configure NetTAPE devices, device pools, device pool security, mount queues, operator domains, and overall user authority
/etc/nettape.config	File used to configure the NetTAPE status daemon and NetTAPE operational characteristics.
/etc/nettape.*lib_name***.config**	File used to configure the NetTAPE SCSI tape libraries.
/etc/clnettape.security	File for selecting a NetTAPE security method and other security information.
/etc/clnetrc	File for NetTAPE security (Encrypted Password method).
/etc/hosts.equiv	File for NetTAPE security (Trusted Network Access method).
/etc/clhosts.equiv	File for NetTAPE security (Restricted Network Access method).
/etc/rthosts	File for NetTAPE security (Restricted Network Access method).
$HOME/.netrc	File for NetTAPE security (Remote Execution method).

Related Topics

Commands: **cltoprg**

cltoprg—Starting the NetTAPE Operator Graphical User Interface

Syntax

cltoprg [–**display** *hostname:session_number*]
[–**l** *log_file_path*]
[*operator_domain*]
[–**w**]

Parameters

–**display** *hostname:session_number*

Specifies the X-Windows session in which the GUI screen is to appear.

–**l** *log_file_path*

Specifies where the NetTAPE Operator GUI is to log messages and operator actions. Each logged message or action is time stamped.

The following messages are logged:

Mount messages Displayed in the GUI's mount message area

Unmount messages Displayed in the GUI's mount message area)

Operator intervention messages Displayed in the GUI's operator intervention pop-up window

Informational messages Displayed in the GUI's general message area.

Operator actions

- Processing a mount request
- Cancelling a mount request
- Moving a mount request to a different device.

operator_domain

Specifies the operator domain of the devices to be displayed. For instance, if you specify **all**, the NetTAPE operator GUI displays all of the devices assigned to any operator domain.

If you omit this keyword, operator domain 1 devices are displayed.

–**w**

Requests the maximum width for the GUI screen to display host names and device names of up to 16 characters without truncation.

If you omit this keyword, the GUI screen truncates host names and device names greater than 12 characters.

Description

The **cltoprg** command brings up the NetTAPE operator GUI.

To issue this command, you must have operator authority, defined in the **nettape.adm.config** file using one of the following keywords: **stsdmn.operators**, **stsdmn.operators.view**, or **stsdmn.operators.adm**. These keywords also control

the tasks that you can perform once you bring up the GUI. For more details, see "Defining the User Authority Control List" on page 44.

Before issuing this command, you must set the following environment variables or have them set in your **.profile** file.

```
Korn Shell:
  export LIBPATH=/usr/lpp/clnettape/lib:${LIBPATH}
/* Type the next command all on one line, without the backslashes (\) */
  export DTHELPUSERSEARCHPATH=/usr/lpp/nettape/help/%H:\
                              /usr/lpp/nettape/help/%H.hv:\
                              /usr/lpp/nettape/help/%H.sdl

C Shell:
  setenv LIBPATH /usr/lpp/clnettape/lib:${LIBPATH}
/* Type the next command all on one line, without the backslashes (\) */
  setenv DTHELPUSERSEARCHPATH /usr/lpp/nettape/help/%H:\
                              /usr/lpp/nettape/help/%H.hv:\
                              /usr/lpp/nettape/help/%H.sdl
```

Note: A shell script called **xcltopr** is also available. It automatically sets up the required environment variables and issues the **cltoprg** command.

Messages and Responses

For information about messages, see "NetTAPE Messages and API Return Values" on page 196 and Appendix D, "SCSI Tape Library Messages" on page 219.

Examples

1. Bring up the operator GUI in X-Windows session 0, with all devices displayed.

   ```
   cltoprg -display myhost:0
   ```

2. Bring up the operator GUI at maximum width with all devices assigned to operator domain 2. Log messages and operator actions to **my_log_file**.

   ```
   cltoprg -l /mydir/my_log_file -w 2
   ```

Files

/$HOME/nettape.config
: File used to configure the NetTAPE status daemon and NetTAPE operational characteristics.

/etc/nettape.adm.config
: File used to configure NetTAPE devices, device pools, device pool security, mount queues, operator domains, and overall user and operator authority.

/usr/lpp/nettape/samples/config/NETTAPE
: Sample Motif resource file for the NetTAPE Operator Console GUI.

/usr/lpp/nettape/samples/config/font.choice
: List of supported fonts for the NetTAPE Operator Console GUI.

Related Topics

Commands: **cltopr**

cltterm—Stopping the NetTAPE Tape Client Daemon

Syntax

cltterm –**f** *device*

Parameters

–**f** *device* Specifies the tape device associated with this daemon's instantiation (for example, /**dev**/**pst0**).

Description

This command signals the pseudo device driver to terminate the local tape client, the **cltclntd** daemon.

Under normal circumstances, NetTAPE starts and stops the NetTAPE tape client daemon as needed. However, if NetTAPE terminates abnormally, some tape devices might remain allocated even though they are no longer in use. In this case, you must use the **cltterm** command to stop the tape client daemons that are associated with the still-allocated devices.

Security Restrictions

You must have **root** authority to use this command.

Messages and Responses

This command displays one of the following messages upon completion:

- `cltterm: daemon on /dev/pst`*n*` is now terminated`
- `cltterm: Error - can only be run by root`
- `cltterm: Usage: cltterm -f device`

xcltopr—Starting the NetTAPE Operator Graphical User Interface

Syntax

xcltopr [**xrdb**]
[–**l** *log_file_name*]
[*operator_domain*]
[–**w**]
[*others*]
[–**?**]

Parameters

–**xrdb**

Runs **xrdb** before starting the GUI, to read in the default Motif resource file.

–**l** *log_file_name*

Specifies where the NetTAPE Operator GUI is to log messages and operator actions. Each logged message or action is time stamped.

The following messages are logged:

Mount messages Displayed in the GUI's mount message area

Unmount messages Displayed in the GUI's mount message area)

Operator intervention messages Displayed in the GUI's operator intervention pop-up window

Informational messages Displayed in the GUI's general message area.

Operator actions

- Processing a mount request
- Cancelling a mount request
- Moving a mount request to a different device.

operator_domain

Specifies the operator domain of the devices to be displayed. For instance, if you specify **all**, the NetTAPE operator GUI displays all of the devices assigned to any operator domain.

If you omit this keyword, operator domain 1 devices are displayed.

–**w**

Requests the maximum width for the GUI screen to display host names and device names of up to 16 characters without truncation.

If you omit this keyword, the GUI screen truncates host names and device names greater than 12 characters.

others

Any standard Motif options such as –display or –bg.

–**?**

Displays the command syntax.

xcltopr—Starting the NetTAPE Operator Graphical User Interface

Description

The **xcltopr** shell script sets the NetTAPE Operator GUI environment variables, **LIBPATH** and **DTHELPUSERSEARCHPATH** and brings up the GUI.

To use this shell script, you must have operator authority, defined in the **nettape.adm.config** file using one of the following keywords: **stsdmn.operators**, **stsdmn.operators.view**, or **stsdmn.operators.adm**. These keywords also control the tasks that you can perform once you bring up the GUI. For more details, see "Defining the User Authority Control List" on page 44.

Messages and Responses

For information about messages, see "NetTAPE Messages and API Return Values" on page 196 and Appendix D, "SCSI Tape Library Messages" on page 219.

Examples

1. Bring up the operator GUI at maximum width with all devices assigned to operator domain 2. Log messages and operator actions to **my_log_file**.

   ```
   xcltoprg -l /mydir/my_log_file -w 2
   ```

2. Bring up the operator GUI at maximum width, showing all devices in each operator domain. Run xrdb first. Set the background color to black.

   ```
   xcltoprg -xrdb  -w  all -bg black
   ```

Files

/$HOME/nettape.config
: File used to configure the NetTAPE status daemon and NetTAPE operational characteristics.

/etc/nettape.adm.config
: File used to configure NetTAPE devices, device pools, device pool security, mount queues, operator domains, and overall user and operator authority.

/usr/lpp/nettape/samples/config/NETTAPE
: Sample Motif resource file for the NetTAPE Operator Console GUI.

/usr/lpp/nettape/samples/config/font.choice
: List of supported fonts for the NetTAPE Operator Console GUI.

Related Topics

Commands: **cltoprg**

Chapter 13. Troubleshooting Tips for the Administrator

Finding NetTAPE Error Logs

NetTAPE logs informational and error messages in a variety of logs to help you monitor NetTAPE activities and diagnose possible errors.

The Status Daemon and Tape Library Daemons

Status daemon (nettaped), IBM 3494/3495 Tape Library daemon (cl3494d), STK Tape Library daemon (clsilod), and SCSI tape library daemon (clscsid) error messages are saved in log files on the nodes where the daemons run:

- Status daemon error messages are logged by default to **/tmp/nettaped.log.**.
- IBM 3494/3495 Tape Library daemon error messages are saved by default in **/tmp/cl3494d_***library_name***.log.**
- STK Tape Library daemon error messages are saved by default in **/tmp/clsilod_***library_name***.log.**
- SCSI tape library daemon error messages are saved by default in **/tmp/clscsid_***library_name***.log.**

The **–l** option on the **cltopr** command lets you specify different log file paths for saving the daemon log files. It is recommended that you specify the **–l** option to prevent the possibility of filling up your **/tmp** directory.

Tape Client Daemon

The tape client daemon (cltclntd) records information about its activities by:

- Writing to a daemon log file, one file per daemon
- Using AIX error logging services.

The tape client daemon writes informational and error messages into the log file **/tmp/cltclntd.pst***n*, where *n* is the number of its associated device special file. These numbers are assigned sequentially by NetTAPE.

For example, the tape client daemon associated with tape pseudo device driver **/dev/pst1** records activities in the log file **/tmp/cltclntd.pst1**. When the daemon stops, the log remains on the system; when the daemon is restarted, the new log replaces the old one.

GUI Message Log

This log, saved in the directory specified using the **–l** option on the **cltoprg** command, provides a time-stamped record of the following:

Mount messages	Displayed in the GUI's mount message area
Unmount messages	Displayed in the GUI's mount message area
Operator intervention messages	Displayed in the GUI's operator intervention pop-up window
Informational messages	Displayed in the GUI's general message area.

© Copyright IBM Corp. 1996, 1997

Operator actions

- Processing a mount request
- Cancelling a mount request
- Moving a mount request to a different device.

See “cltoprg—Starting the NetTAPE Operator Graphical User Interface” on page 117 for more information.

System Error Log

The tape client daemon puts records into the system error log using the AIX error logging facility. Read the system error log using the **errpt** command with the **–a** option. This log contains information about all NetTAPE tape client daemons and is unaffected by stopping or restarting a daemon.

Device Down Due to Tape Job from Previous Session

If a tape job from a previous NetTAPE session, the one before NetTAPE was restarted, is still running on a tape device, the device will be in the down state. To begin using the tape device again after the current job completes, you must reset the tape device to the up state. See “Resetting a Tape Device” on page 97 for more information.

If the current tape job is blocked in an I/O failure condition, you should try to remove the job using `kill -9` *`process_id`* and then place the device in the up state.

Tape Device Reset Slow to Complete

The tape device reset function can take several minutes to complete, depending on the system load and the device speed. Be sure to give the function plenty of time to finish before assuming that the system is hung. If there is no response after five minutes, there might be a problem. Refer to “Resetting a Tape Device” on page 97 for information on handling errors that might be preventing a reset from completing successfully.

Failure to Deallocate Tape Devices

Under normal circumstances, NetTAPE starts and stops the NetTAPE tape client daemon as needed. If NetTAPE terminates abnormally, however, some tape devices might remain allocated even though they are no longer in use. In this case, you must manually stop the tape client daemons that are associated with the still-allocated devices, as follows:

1. Find any tape client daemons that are still running:

   ```
   ps -ef | grep cltclntd
   ```

2. Stop the tape client daemons by issuing the following for each:

   ```
   cltterm -f /dev/pstn
   ```

   For more information about the **cltterm** command, see “cltterm—Stopping the NetTAPE Tape Client Daemon” on page 120.

For more information about NetTAPE daemons, see “Understanding NetTAPE Daemons” on page 92.

Failure Restarting NetTAPE

NetTAPE will fail on restart if it detects an esoteric device pool that includes a device pool having no devices. This situation can occur if the last device in a device pool is deleted from **/etc/nettape.adm.config** but the empty device pool is still part of an esoteric pool. To correct the problem, delete the device pool from the esoteric pool in **/etc/nettape.adm.config**.

Setting NetTAPE Environment Variables for Debugging

When NetTAPE starts, it checks the values of the NetTAPE environment variables. Under normal circumstances, you should leave these variables set to the defaults assigned by NetTAPE. Information about changing the values of NetTAPE environment variables is included here for debugging purposes only. If you call IBM support to report a NetTAPE problem, you might be asked to set these variables to capture diagnostic information.

The CLIODEB environment variable has three settings that control the level of debugging information produced:

256 Produces a moderate level of debugging information. Use this setting when a problem occurs after a large amount of I/O has been performed, for instance at the end of a volume.

1792 Produces a more detailed level of debugging information. Use this setting when the problem occurs relatively early in the I/O stream. This setting is used the most often.

–1 Produces the most detailed level of debugging information. Shows all TCP/IP connections to NetTAPE's internal tape server daemon and to the status daemon. This setting is used only rarely.

To Debug Status Daemon Problems

Set NetTAPE's debugging environment variables as follows:

- CLIODEB to 1792
- DBG to –1.

For example, if you are a Korn shell user, specify:

```
export DBG=-1
export CLIODEB=1792
```

These settings will activate debug message logging in the default status daemon log file, **/tmp/nettaped.log**. Now restart the status daemon. Once you have captured the debugging messages in the log file, unset the CLIODEB and DBG environment variables and restart the status daemon again.

To Debug Client Daemon Problems

When an error occurs during I/O to a remote tape device, you'll need to activate client daemon message logging. Instructions for doing this are provided below. If the problem occurs while running GUI functions such as AVR, ACF scan, or Move Mount, then you'll need to activate both client daemon logging and status daemon logging (described in “To Debug Status Daemon Problems” on page 125). You'll also need both the status daemon and client daemon logs for problems that occur at the very beginning of tape device allocation.

To activate client daemon debug message logging, you must create the file, /**tmp**/**cliodeb.pst***n* on the client machine. *n* is an integer between 0 and 32 that represents the pseudo tape device driver assigned to you when you allocate a tape device.

Since you must create this file before you allocate the device, you'll have to figure out what number you'll be assigned. Luckily, these numbers are assigned sequentially. So if the last number in use is 5, for instance, and you are the next person on the client machine to allocate a tape device, then you know you will be given the number 6. To determine the correct number to specify when you create the /**tmp**/**cliodeb.pst***n* file, check to see which tape pseudo device drivers have already been assigned on your machine by entering: `ls /dev/pst*`.

pst0 is the first tape pseudo device driver assigned. If you see no pst files when you enter the **ls** command, then you will be assigned pst0. If there are existing pst files, then you will be assigned the next number in sequence.

Create /**tmp**/**cliodeb.pst***n***:** with the the following statement in it, starting in the first column:

```
CLIODEB=1792
```

You do not need to restart the status daemon. Now allocate a tape device. Once you have captured the debugging messages in the client daemon log, /**tmp**/**cltclntd.pst***n*, either remove /**tmp**/**cliodeb.pst***n* or set CLIODEB=0.

Part 3. Using NetTAPE

Chapter 14. Introduction to Using NetTAPE 129

Chapter 15. Commands 141

Chapter 16. Application Programming Interfaces 165

Chapter 17. Troubleshooting Tips for Users 201

© Copyright IBM Corp. 1996, 1997

Chapter 14. Introduction to Using NetTAPE

Note

Use CLIO/S commands and APIs only for accessing MVS tape devices. Use NetTAPE commands and APIs for all AIX-only processing.

The tasks you need to perform to use NetTAPE are listed in Table 5. The table also shows where each task is explained.

Table 5. Tasks Associated with Using NetTAPE

Task	Where Explained
Allocating and using tapes	129
Understanding MVS tape formats	132
Compiling, linking, and running with the NetTAPE API	165
Understanding tape positioning	136
Understanding End of Tape handling	139
Obtaining volume information using the VFILE option	131
Finding NetTAPE API usage examples	165
Determining the available device pools for your allocation request	130
Troubleshooting errors	201

Allocating and Using Tapes

With NetTAPE, you can read tapes created on either AIX or MVS and write tapes to be read on either AIX or MVS.

To read a tape created on MVS or write a tape to be read on MVS, NetTAPE provides allocation parameters equivalent to those found on MVS. See "Understanding MVS Tape Formats" on page 132 for more information about MVS tape formats.

Using NetTAPE Commands

In general, you perform the following steps to read or write a tape using NetTAPE commands:

1. Allocate the tape device using the **cltalloc** command, p.143.
2. Use standard AIX commands to access the tape device.
3. Optionally re-access the same tape file with different parameters or access a different file on the same volume using the **cltopen** command, p.155. Once you have done this, repeat steps 2 through 3 as many times as needed. Then proceed to step 4 to finish.
4. Unallocate the tape device using the **cltunall** command, p.162.

Appendix B, "How to Use NetTAPE Commands" on page 209 provides examples of using NetTAPE commands to perform different tape operations.

© Copyright IBM Corp. 1996, 1997

Using the NetTAPE API

In general, you perform the following steps to read or write a tape using NetTAPE subroutines:

1. Allocate the tape device using the **ctpalloc** subroutine, p.166
2. Open the tape file using **ctpopen** p.178.
3. Read from or write to the tape file using **ctpread**, p.186 , or **ctpwrite**, p.194.
4. Close the tape file using **ctpclose**, p.173.
5. Optionally re-access the same tape file with different parameters or access a different file on the same volume using the **ctpopen** command. Once you have done this, repeat steps 3 through 5 as many times as needed. Then continue with step 6 to finish.
6. Close the tape file using **ctpclose**.
7. Unallocate the tape device using **ctpunall**, p.191.

Appendix C, “NetTAPE API Usage Examples” on page 213 provides examples of using the NetTAPE API to perform different tape operations.

Stopping a NetTAPE command or Subroutine

You can use <**ctrl-c**> to stop a NetTAPE command or a program running NetTAPE subroutines. However, depending on the system load and the device speed, it might take several minutes for the command or program to terminate

---

Determining the Available Device Pools for Your Allocation Request

Before you submit an allocation request using **cltalloc** or **ctpalloc** you need to see which device pools are available. You can get this information by using the **cltopr** command with the –**q** option.

The output of this command is a status line for each device defined to NetTAPE. The pool name associated with the device is the first item of information on the line. The device might also belong to one or more esoteric device pools but these are not shown. To find out the names of the esoteric device pools, contact your system administrator.

Here is an example of the output from **cltopr –q**:

```
Current status for all known devices...
Shr Pool_name  Host_name  Device_name  Dev_type  State  Op_mode
=====================================================================
    3480_1     k144n01    /dev/380     3480      InUse  MANUAL
    3480_1     k144n01    /dev/381     3480      Up     MANUAL
    3480_1     k144n01    /dev/382     3480      InUse  MANUAL
1   3490_1     k144n05    /dev/513     3490      Up     MANUAL
1   3490_1     k144n07    /dev/510     3490      Up     MANUAL
    3490_1     k144n05    /dev/511     3490      Up     MANUAL
    3490_1     k144n05    /dev/512     3490      InUse  MANUAL
    3494       k144n05    /dev/rmt1    3490      Down   IBMACS
    3494       k144n05    /dev/rmt0    3490      Down   IBMACS
    3494_2     k144n02    /dev/rmt1    3590      Resrv  IBMACS
    3494_2     k144n02    /dev/rmt0    3590      Resrv  IBMACS
    3590       k144n02    /dev/rmt2    3590      Up     IBMACL
    SILO_1     sp10.swa.ibm.com  /dev/stk901      4490      Resrv  STKACS
    SILO_1     sp10.swa.ibm.com  /dev/stk902      4490      Down   STKACS
    SILO_2     sp09.swa.ibm.com  /dev/rmt1        9490      Down   STKACS
```

Obtaining Volume Information Using the VFILE Option

The VFILE option on **cltalloc** and **ctpalloc** lets you save volume information to a file and then use that information later when you need to read your tape data set. The volume information is a subset of the information normally found in a full function tape catalog.

If you would like to process an MVS tape on a NetTAPE device, you can use the information from the MVS tape catalog to create a volume information file NetTAPE can use. Then, you can use the **VDIR** option to specify its location when you allocate the tape device.

The format of the volume information file is:

```
version_number         /* NetTAPE version number - currently VERS0001.*/
user_name              /* Name of file owner.*/
vault_ID               /* The physical location of the tape (device pool
                          name). Use the –P option on the
                          cltalloc command or the ctpalloc subroutine
                          to override this value. */
label_type             /* Label type: AL, SL, NSAL, or NL. */
number_of_volumes      /* Number of volumes the file spans.*/
file_sequence_num      /* The file's starting sequence number in the
                          first volume.*/
ext_vol_1, ext_vol_2, ....  /* The list of external volume IDs.*/
int_vol_1, int_vol_2, ....  /* The list of internal volume IDs. If
                               there are no internal volume IDs,
                               the string "NO_INT_VOL" appears here. */
```

Here is a sample volume information file:

```
VERS0001
ronglee
3494
NL
00000003
00000001
XYZ573,XYZ574,XYZ575
NO_INT_VOL
```

You can also obtain volume information using either the **cltvols** command, which returns volume information to STDOUT, or the **ctpvols** subroutine, which returns volume information to a structure. See “cltvols—Obtaining information about tape volumes used” on page 163 or “ctpvols or tpvols—Obtaining information about tape volumes used” on page 192 for more information.

Understanding MVS Tape Formats

NetTAPE lets you read a tape that was created on MVS or create a tape that can be read on MVS using the **cltalloc** command or the **ctpalloc** subroutine with tape allocation parameters equivalent to those found on MVS. This topic covers MVS tape format concepts and terminology related to these allocation parameters. For more information, see *MVS/DFP Using Magnetic Tape Labels and File Structure*.

Record formats

The *logical record* is the basic unit of information used by the processing program. It can be anything from a single character to a mass of information collected by a particular business transaction, or measurements recorded at a given point in an experiment. A *physical record* is a contiguous sequence of bytes written to or read from a tape as a unit. The maximum physical record size supported by NetTAPE is determined by the tape device driver being accessed. *Blocking* is the process of grouping logical records before they are written on a volume. A *block* is a physical record containing one or more logical records or parts of logical records.

The relationship between logical records, physical records on tape, and blocks is defined by the following parameters, which are provided by the client application when a tape file is opened:

RECFM The record format type

RECLN The maximum length of a logical record in bytes

BLKSZ The maximum length of a block in bytes

NetTAPE supports the following record formats:

U Unformatted. A block on tape is equated with a logical record. It is up to the application to interpret the contents of the block. Blocks can be of variable length. RECLN is the maximum record (and block) size. BLKSZ must be equal to RECLN.

F Fixed length. A block on tape contains exactly one logical record. All logical records are the same size, RECLN. BLKSZ must be equal to RECLN.

FB Fixed length blocked. A block on tape contains an integer multiple number of logical records. All logical records are the same size, RECLN. BLKSZ must be an integer (greater than 1) multiple of RECLN.

FBS Fixed length blocked standard. A block on tape contains an integer multiple number of logical records. All logical records are the same size, RECLN. BLKSZ must be an integer (greater than 1) multiple of RECLN. All blocks are the maximum block length except for the last block in a file.

V Variable length. A block on tape contains exactly one logical record. RECLN is the maximum length of a logical record. BLKSZ must exceed RECLN by at least 8 bytes.

VB Variable length blocked. A block may contain more than one logical record, but a logical record cannot span block boundaries. RECLN is the maximum length of a logical record. BLKSZ must exceed RECLN by at least 8 bytes.

VS Variable length spanned. A block on tape contains at most one logical record. A logical record may span block boundaries. The section of a logical record contained within a block is called a **segment**. RECLN is the maximum length of a logical record.

VBS Variable length blocked, spanned. A block may contain more than one logical record. Logical records may span block boundaries. The section of a logical record contained within a block is called a **segment**. RECLN is the maximum length of a logical record.

Volumes, Files and Data sets

Volume A dismountable physical unit of storage media, i.e., a reel of magnetic tape or a cartridge.

File or data set A series of physical record blocks, separated by inter-record gaps and terminated by a tape mark.

File organization A sequence of one or more tape volumes, each of which may contain one or more files. With a few restrictions, NetTAPE supports the following types of file organizations:

Single file, single volume.
Exactly one file on one tape volume.

Single file, multi volume
A single file that spans two or more volumes.

Multi file, single volume
Two or more files on a single volume.

Multi file, multi volume
Two or more files that span two or more volumes.

Markers

BOT, EOT Every tape volume contains physical (photoreflective) markers that delimit the writable area of a tape, the so-called Beginning-of-Tape (BOT) and End-of-Tape (EOT) markers. The ANSI tape standards prescribe that there is a minimum amount of writable magnetic tape following the EOT marker. A limited amount of data can therefore be written beyond the EOT marker.

TM Abbreviation for tape mark. A tape mark is a unique bit-pattern on tape that, at the lowest level, signals the end of a file. Two consecutive tape marks signify the logical end of a volume (LEOV).

Label Types

Magnetic tapes come in two basic types, called *non-labeled* and *labeled* tapes. Non-labeled tapes contain blocks of data, organized in files that are separated by tape marks. Labeled tapes also contain blocks of data and use tape marks to separate files, but in addition they contain labels that identify and control access to tape volumes and the files contained therein.

There is no standard mechanism for recording the volume serial number (volser) of a non-labeled tape on the magnetic tape itself. Non-labeled tapes are therefore identified only by an external volume identification (e.g., a sticky label). For labeled tapes the internal volume serial number (the volser, a 6 character string) is recorded in the VOL1 volume label. However, labeled tapes may also have an external volume identification (a 6-character string) that differs from the internally recorded volser.

NetTAPE supports the following label types:

NL Non-Labeled

AL ANSI X3.27-1987 (ISO 1001-1986) Labeled

SL IBM EBCDIC Standard Labeled

NSAL Non-Standard ANSI Labeled.

NetTAPE also supports Bypass Label Processing (BLP).

AL and SL tapes are very similar. They differ mostly in the way that character data is encoded in the labels (ASCII versus EBCDIC). AL and SL tapes contain volume, header, and trailer labels. The volume label (VOL1) is written at the start of a tape. It contains the volume serial number (volser) and defines the owner of the tape. Header labels (HDR1, HDR2) delimit the start of a file and define the data that are contained in the file. Similarly, trailer labels (EOF1, EOF2, EOV1, EOV2) delimit the end of a file. The EOF1, EOF2 trailer labels are used for single-file and multi-file single-volume data sets. The EOV1, EOV2 trailer labels are used for single-file and multi-file multi-volume data sets. Note that for AL and SL tapes, a sequence of labels itself constitutes a file and is always closed with a tape mark.

NSAL tapes follow nearly the same format as AL tapes. The difference is that for AL tapes, there is a sequence of labels and tape marks (EOF1, EOF2, TM, HDR1, HDR2, TM) between the files on the tape. NSAL tapes do not have labels between files. However, they do have labels at end of tape.

BLP is not a label type, but a tape access mode. In BLP mode the VOL1, HDR1, HDR2, EOF1, EOF2, EOV1, EOV2 records that are part of AL and SL tapes, are also made available to (and must be processed by) the client code as if they were ordinary data records. For all other modes, label processing is shielded from the client application. BLP mode requires special authority, defined in **nettape.adm.config**.

File and Volume Mark Sequences

While non-labeled and labeled tapes differ vastly in the detail of the record and tape mark sequences at the start and end of a file and volume, NetTAPE still allows the client application to treat these tapes in a virtually identical fashion by handling all the label processing behind the scenes. To simplify the functional descriptions in the remainder of the document, the following additional terms are defined.

BOV Mark Sequence

A Beginning-Of-Volume mark sequence (BOV) signifies the beginning of the first file on a volume, irrespective of whether it is part of a single- or multi-volume data set. It consists of the following sequence:

Label Type	BOV Mark Sequence
AL	BOT, VOL1, HDR1, HDR2, TM
SL	BOT, VOL1, HDR1, HDR2, TM
NSAL	BOT, VOL1, HDR1, HDR2, TM
NL	BOT

BOF Mark Sequence

A Beginning-Of-File mark sequence (BOF) signifies the beginning of a file other than the first file on a volume. It consists of the following sequence:

Label Type	BOF Mark Sequence
AL	HDR1, HDR2, TM
SL	HDR1, HDR2, TM
NSAL	HDR1, HDR2, TM (this sequence appears only before the first file)
NL	None (implied by BOT or EOF mark sequence of preceding file)

EOF mark sequence

An End-Of-File mark sequence (EOF) signifies the end of a file. It consists of the following sequence:

Label Type	EOF Mark Sequence
AL	TM, EOF1, EOF2, TM
SL	TM, EOF1, EOF2, TM
NSAL	TM after each file except the last file, TM, EOF1, EOF2, TM sequence after the last file
NL	TM

Note that when a volume is continued, an EOV mark sequence (see below) replaces the EOF mark sequence. The end of the file on the continuation volume is still delimited by an EOF mark sequence. An additional tape mark is always written after the EOF mark sequence for the last file on the last volume in a data set to signify the logical end of volume (LEOV).

EOV mark sequence

An End-Of-Volume mark sequence (EOV) signifies the end of a volume that is continued onto a subsequent volume. It consists of the following sequence:

Label Type	EOV Mark Sequence
AL	TM, EOV1, EOV2, TM, TM
SL	TM, EOV1, EOV2, TM, TM
NSAL	TM, EOV1, EOV2, TM, TM

Restrictions for AMPEX DST 310 or 410 Tape Devices

AMPEX DST 310 and 410 tape devices can only be used with non-labeled (NL) tapes, unformatted (U), fixed (F), or fixed block (FB) tapes.

NetTAPE cannot support labeled tapes on these devices because it relies on the device's variable block processing capability to detect header and trailer labels. And, because AMPEX DST 310 and 410 tape devices are fixed block devices, you can use only unformatted, fixed, or fixed block tapes.

The default record format is U, which is best suited for reading average amounts of data. To optimize performance when reading or writing large data files:

- When using the **cltalloc** command, specify: –**R F** or –**R FB** and use the –**B** and –**L** options to specify the block size and record length.
- When using the **ctpalloc** subroutine, specify: **RECFM=F** or **RECFM=FB** and use the **BLKSZ** and **RECLN** options to specify the block size and record length.

Use the largest block size and record length values your application can support. You can set the **MAX_DATA** option to any value up to one megabyte. The AMPEX DST 310 and 410 tape device perform best with very large block sizes.

Understanding NetTAPE Tape Positioning

Note

The return codes mentioned here are described in “NetTAPE Messages and API Return Values” on page 196.

NetTAPE follows MVS specifications for spacing on 3480 and 3490 tape drives.

Forward Space File and Backward Space File pass the tape mark with a return code of 0 (NetTAPE_OK).

When Forward Space Record or Backward Space Record encounters a tape mark, NetTAPE's behavior depends on the setting of the **client.cross.tm** keyword in the **nettape.config** file.

- If the **client.cross.tm** keyword is set to **yes** or is not specified, it crosses the tape mark and stops, returning a return code of -1 (NetTAPE_TEOF).
- If **client.cross.tm** keyword is set to **no**, it stops before the tape mark and returns a return code of -1 (NetTAPE_TEOF).

NetTAPE spacing behavior is the same for all supported devices, and is comparable to setting the Backward Space/Forward Space Record Mode to "SCSI Mode" on the SMIT mtdd and Atape device driver panels.

Unlabeled Tapes

When NetTAPE opens the tape, it positions the tape to the beginning (BOT).

ANSI or Standard Labeled Tapes

When NetTAPE opens the tape, it verifies the label information and positions the tape to the beginning of the first dataset or to the position specified by the file sequence number, if one is included.

Backward Space Record (BSR), Forward Space Record (FSR) do not pass tape marks. Tape Rewind (REW) rewinds the tape to the beginning of the dataset. Backward Space File (BSF), Forward Space File (FSF), and Write Tape Mark (WTM) are not allowed.

Bypass Label Processing

When NetTAPE opens a labeled tape for which bypass label processing (BLP) has been specified, it positions the tape to the beginning of the first dataset without verifying the label. To position the tape to the beginning of the tape (BOT), you must rewind it.

Suppressing End of Volume Processing

NetTAPE returns an End of Volume (NetTAPE_EOV) return code when it encounters two tape marks on a read operation. It returns an End of Tape (NetTAPE_EOT) return code when it encounters the end of tape on a write operation.

If you specify the SUP_EOV option on a NetTAPE command or subroutine, NetTAPE does not notify you of an EOV or EOT condition. Instead, NetTAPE has the next available volume mounted automatically. For input tapes, NetTAPE returns EOV only when it encounters EOV for the last volume in the volser list.

Suppressing End of File Processing

NetTAPE returns an End of File (NetTAPE_TEOF) return code when it encounters the tape mark on a read operation. If you specify the SUP_EOF option on a NetTAPE command or subroutine, NetTAPE does not notify you of the EOF condition. Instead, NetTAPE skips the tape mark and continues processing.

Tape Positioning After NetTAPE Operations

Table 6 on page 138 indicates NetTAPE's tape positioning behavior for each type of tape operation. You can use the **client.cross.tm** keyword in the **nettape.config** file to customize NetTAPE's tape positioning behavior. For more information, see “Step 4: Customizing the nettape.config File” on page 63.

Table 6 on page 138 refers to the rewind and no rewind options. These are controlled by the **ctpopen** mode parameter value.

Table 6 (Page 1 of 2). Tape positioning after different NetTAPE operations

Command or Subroutine	Operation	Tape Positioning Behavior
ctpopen	After open call	The tape is positioned at the beginning of the file. For a labeled tape, the tape is positioned after the header labels and tape mark.
ctpwrite ctpwrites	After write	The tape is positioned after the record that was written. If you haven't specified **SUP_EOV** (suppress EOV processing), NetTAPE returns NetTAPE_EOT (–1) when physical end-of-tape is reached.
ctpread ctpreads	After read	If the **client.cross.tm** keyword is set to **yes** or is not specified in the **nettape.config** file, the following occurs: • After the record read, the tape is positioned after (on the right side of) the tape mark, if one was encountered. If the **client.cross.tm** keyword is set to **no** in the **nettape.config** file, the following occurs: • After the record read, the tape is positioned before (on the left side of) the tape mark, if one was encountered. If you haven't specified **SUP_EOF** (suppress EOF file processing), NetTAPE returns NetTAPE_TEOF (–1) when it encounters a tape mark. If you haven't specified **SUP_EOV** (suppress EOV file processing), NetTAPE returns NetTAPE_EOV (–3) when it encounters a double tape mark.
ctprew	After rewind	For SL or AL tapes, NetTAPE rewinds to the beginning of the current file. For BLP tapes, NetTAPE rewinds to beginning of tape (BOT). For NL tapes, NetTAPE rewinds to beginning of tape (BOT). For NSAL tapes, NetTAPE positions the tape before the first record of the first file (after header labels).
ctpskpf	After skip file	For forward skip file, NetTAPE positions the tape after (on the right side of) the last tape mark skipped. For backward skip file, NetTAPE positions the tape after (on the left side of) the last tape mark encountered (going backwards). Skip file operations are not allowed for SL and AL tapes.

ctpskpr	After skip record	If the **client.cross.tm** keyword is set to **yes** or is not specified in the **nettape.config** file, the following occurs: • For forward skip record, NetTAPE positions the tape after (on the right side of) the last tape mark if one is encountered. • For backward skip record, NetTAPE positions the tape after (on the left side of) the last tape mark if one is encountered (going backward). • If you are skipping multiple records and NetTAPE encounters a tape mark before completing, the operation ceases and the tape is positioned after (on the left side of) the tape mark. NetTAPE also returns NetTAPE_EOF (–1). If the **client.cross.tm** keyword is set to **no** in the **nettape.config** file, the following occurs: • For forward skip record, NetTAPE positions the tape before (on the left side of) the last tape mark if one is encountered. • For backward skip record, NetTAPE positions the tape before (on the right side of) the last tape mark if one is encountered (going backward). • If you are skipping multiple records and NetTAPE encounters a tape mark before completing, the operation ceases and the tape is positioned before (on the right side of) the tape mark. NetTAPE also returns NetTAPE_EOF (–1).
ctpclose	After close	For unlabeled tapes opened for write, NetTAPE writes double tape marks. For labeled tapes opened for write, NetTAPE writes a tape mark followed by two trailer labels before issuing the device driver close, which writes the double tape marks. If the tape was opened with the no rewind option, NetTAPE positions the tape between the two tape marks. If the tape was opened with the rewind option, NetTAPE positions the tape at the beginning (BOT). For tapes opened for read with the no rewind option, NetTAPE positions the tape after the tape mark terminating the file. For labeled tapes, this is after the trailer labels. For tapes opened for read with the rewind option, NetTAPE rewinds the tape and positions it at the beginning (BOT).

Understanding NetTAPE End of Tape Handling

When NetTAPE reaches either logical end of tape (errno = ENOSPC) or physical end of tape (errno = ENXIO) on a write operation, it returns control so that you can mount the next volume. The write operation returns a value of NetTAPE_EOT when end of tape is reached.

However, if you specify the SUP_EOV option (Suppress End of Volume reporting) on **cltalloc**, **cltopen**, **ctpalloc**, or **ctpopen**, NetTAPE automatically mounts the next volume and continues processing. In this case, NetTAPE simulates a tape that is infinitely long.

Understanding and Controlling Write-Behind Buffers

By default, NetTAPE uses write-behind buffers to improve performance when writing to a remote tape device. When the data requires a volume switch, by default, NetTAPE automatically flushes the write-behind buffers to the new volume after the switch.

When NetTAPE reaches either logical end of tape (errno = ENOSPC) or physical end of tape (errno = ENXIO) on a write operation to a remote device, it returns to you without writing the last buffers to tape. After you close the current tape and open the next, NetTAPE flushes the write-behind buffers. The write operation returns a value of NetTAPE_EOT when end of tape is reached.

However, if you specify the SUP_EOV option (Suppress End of Volume reporting) on **cltalloc**, **cltopen**, **ctpalloc**, or **ctpopen**, NetTAPE automatically mounts the next volume and writes the write-behind buffer to the new volume.

The **nettape.config** keywords, **client.wbh** and **client.flush** let you specify whether write-behind buffers are used and whether the buffers are automatically flushed. Your options depend on whether you are using NetTAPE's command line interface or API, and whether you want to write an internal header at the beginning of each volume.

If you do not wish to write an internal header at the beginning of each volume, simply omit the two keywords and take the defaults.

If you are using the NetTAPE API and you wish to write an internal header at the beginning of each volume, you can flush the write-behind buffers manually, after writing your header, by using the **ctpflush** subroutine. Here are the options available with the NetTAPE API:

- Use write-behind buffering and have the buffers flushed by NetTAPE automatically (specify `client.wbh yes` and `client.flush yes`)
- Use write-behind buffering and flush the buffers manually yourself (specify `client.wbh yes` and `client.flush no`)

The NetTAPE command line interface does not provide a command for manually flushing the write-behind buffers. If you wish to write an internal header at the beginning of each volume, you must disable write-behind buffering. Here are the options available with the NetTAPE command line interface:

- Use write-behind buffering and have the buffers flushed by NetTAPE tape automatically (specify `client.wbh yes` and `client.flush yes`)
- Disable write-behind buffering (specify `client.wbh no`)

Note: IBM recommends that you specify non-default values for **client.wbh** and **client.flush** only in your own **$HOME/nettape.config** file.

For more information on specifying the **client.wbh** and **client.flush** keywords, see "Step 4: Customizing the nettape.config File" on page 63.

Chapter 15. Commands

Table 7 lists the NetTAPE commands and where they are described.

Table 7. NetTAPE Commands

Command	Description	Where Explained
cltalloc	Allocate a tape device and open the tape file	143
cltclose	Close the volume information file	153
cltopen	Access a tape file using different parameters.	155
cltunall	Unallocate a tape device	162
cltvols	Obtain information about tape volumes used	163

© Copyright IBM Corp. 1996, 1997

cltalloc—Allocating a tape device

Syntax

cltalloc [−**a**]
[−**B** *blocksize*]
[−**d** *dsname*]
[−**D** *device*[@*hostname*]]
[[−**e** *cyyddd*] | [−**r** *nnnn*]]
[−**f** *device*]
[−**F** *tape_format*]
[−**h** *hostname*]
[−**l** *label_type*]
[−**L** *record_length*]
[−**M** *tapemode*]
[−**n**]
[−**o** *"allocparms"*]
[−**P** *devpool*]
[−**R** *record_format*
[−**s** *fseq*]
[−**S** *source_category*]
[−**T** *target_category*]
[−**v** *volser*[**,***volser2*,...,*volsern*] | [−**v** **scratch**]
[−**V** *vol1*[**,***vol2*,...,*voln*]]]
[−**?**]

Parameters

−**a**

Specifies that you want to use the automatic cartridge loader (ACL) feature. ACL is supported on the 3480, 3490, and 3590 IBM tape devices. The ACL feature differs from ACF (automatic cartridge facility) in that ACL allows only sequential access to tapes in the cartridge loader while ACF can be used in a random access mode as a mini tape library.

You may specify −**a** only for a device defined in **nettape.adm.config** with the operation mode ibmacl or ibmacf.

You must also specify either the −**v** option or the −**V** option with the −**a** option.

−**B** *blocksize*

Specifies the size of the blocks or records. Use this option with the −**L** and −**R** options. This option does not apply to unformatted tapes (−**R U**); if you specify both −**R U** and −**B**, −**B** is ignored.

−**d** *dsname*

Specifies the name of a tape data set. The string *dsname* contains 1 to 44 characters. *dsname* is converted to upper case. If you omit −**d**, no data set name is used.

You must specify −**d** for standard label (**sl**) or ANSI label (**al**) tapes.

−**D** *device***[**@*hostname***]**

Specifies the full pathname of the preferred device, for example, /**dev**/**rmt0**. If you omit this parameter, NetTAPE selects a device from the specified (or default) device pool. If you want to request a device

on a specific host, you can use either the @*hostname* format of –**D** or –**h**. Using –**D** and –**h** lets you request a specific device. See Table 8 on page 149 for more information.

–**e** *cyyddd*

Specifies the expiration date for a **new** data set. *c* specifies the century (omitted=1900's, 0=2000's, 1=2100's) and *yyddd* is a Julian date. For example, `97100` is the 100th day of 1997 and `005206` is the 206th day of 2005. If you omit this option, the default is no expiration date.

Note: –**e** and –**r** are mutually exclusive. You can specify the longevity of the tape as either an expiration date (–**e** *cyyddd*) or as a number of days from now (–**r** *nnnn*).

–**f** *device*

Specifies the name of the special file for the virtual tape device that you want NetTAPE to create. You can specify the file name as either a fully-qualified path name or as a name relative to the current directory. NetTAPE performs dynamic device allocation to create a virtual tape device with this device name. If you don't specify –**f** *device*, NetTAPE creates **$HOME/mytape** and **$HOME/mytape.1**.

–**F** *tape_format*

tape_format is a string specifying the tape recording format. It can have one of these values:

basic	Basic (uncompacted) mode
compacted	Compacted mode
800	800 BPI, 9 track (NRZI format)
1600	1600 BPI, 9 track (PE format)
6250	6250 BPI, 9 track (GCR format)

The keywords **basic** and **compacted** may be supplied in upper, lower, or mixed case. They may be abbreviated down to a single letter (**b** and **c**).

If you omit –**F**, the default tape format is the format defined in SMIT when the device was configured.

–**h** *hostname*

Specifies the preferred hostname. *hostname* is a TCP/IP name.

See Table 8 on page 149 for more information. Using –**D** and –**h** lets you request a specific device.

–**l** *label_type*

Indicates the tape label type. *label_type* is one of:

AL ANSI X3.27-1987 (ISO 1001-1986) Labeled

NL Unlabeled

SL IBM EBCDIC Standard Labeled

BLP Bypass Label Processing

NSAL Non-standard ANSI Labeled

You may type **AL**, **NL**, **SL**, **BLP**, or **NSAL** in upper, lower, or mixed case. The default is **nl**. AMPEX DST 310 and 410 tapes support only NL.

Notes:

1. Bypassing label processing may circumvent data set access restrictions. Therefore you must have special authority (controlled by an entry in **nettape.adm.config**) to use **BLP**.

   For more information, see "Defining the User Authority Control List" on page 44.

2. When you specify **SL** on a write operation, NetTAPE writes a standard label record (VOL1,HDR1,HDR2) at the beginning of the tape volume.
3. For **AL** (ANSI standard label) tapes, NetTAPE supports ANSI version 3 standard labels.
4. NetTAPE supports **AL** or **SL** tapes on 8mm devices, but only for single volume data sets. Furthermore, you must provide sufficient room at the end of the tape for trailer labels.

To write to a tape (any label type) or to read from a **nl** (no label) tape, you must specify either all of –**L** *record_length*, –**B** *blocksize*, and –**R** *record_format*, or none of the three.

For standard label (**sl**) or ANSI label (**al**) tapes, you must also specify the –**d** option.

–**L** *record_length*

Specifies the length in bytes of logical records on the tape. Use this option with the –**B** and –**R** options.

–**M** *tapemode*

Specifies the tape mode. Possible values for *tapemode* are:

r Read
w Write

If you do not specify the tape mode, the default depends on whether you requested a scratch tape. If you request a specific tape volume using –**d** or –**v**, the default is **r** (read, rewind). If you do not specify –**d** or –**v**, the default is **w** (write, rewind).

–**n**

Specifies that you do not want to wait for a tape device if one is not immediately available. If a tape is not available immediately, you receive a non-zero return value. The system administrator can use the **mount.queue** entry in **nettape.adm.config** to establish whether NetTAPE queues mount requests when a device is busy.

–**o "***allocparms***"**

Specifies an optional parameter string, enclosed in double quotes. The string consists of one or more of the following keywords, separated by blanks:

GEN=*file_gen_num*

Specifies a 4-digit file generation number. If you omit this keyword, this field is set to blanks.

MAX_DATA=*max_block_size*
Specifies the maximum block size the tape server must support when it reads from the tape or writes to the tape. This value must be greater than or equal to the largest data block read or written by your application.

The default is 32768 (32K) bytes.

OWNER=*owner*
Specifies a 14-character string identifying the owner of the tape. If you omit this keyword, this field is set to blanks.

SUP_EOF
Specifies that NetTAPE ignore EOF tape marks and continue processing the tape.

If you omit this keyword, NetTAPE returns the NetTAPE_TEOF return code when it reaches EOF on a read operation.

SUP_EOV
Specifies that NetTAPE automatically mount the next volume (if necessary), when End of Volume (EOV) or End of Tape (EOT) is reached.

If you omit this keyword, NetTAPE returns the NetTAPE_EOV return code when it reaches EOV on a read operation, or the NetTAPE_EOT return code when it reaches EOT on a write operation. When reading a tape, NetTAPE returns NetTAPE_EOV, when it reaches EOV on the last volume in the volume list.

For more information about EOT and EOV, see “Understanding NetTAPE Tape Positioning” on page 136.

For more information about return codes, see “NetTAPE Messages and API Return Values” on page 196.

VDIR=*vol_id_dir*
Specifies the name of the directory where NetTAPE is to store (on a write operation) or retrieve (on a read operation) the file containing the volume information associated with data set specified by *dsname* on the –**d** option.

VDIR= is an optional keyword you can specify with the **VFILE** keyword.

VER=*version_num*
Specifies a 2-digit file version number. If you omit this keyword, this field is set to 0.

VFILE
On a write operation:

Specifies that NetTAPE is to save volume information for the data set specified by *dsname* on the –**d** option.

The volume information is saved in the file *dsname* in the **$HOME/.nettape**. To save the file in a different directory, specify that directory using the **VDIR**= option. For more information, see

"Obtaining Volume Information Using the VFILE Option" on page 131.

If you want this information sent to STDOUT, use the **cltvols** command instead. See "cltvols—Obtaining information about tape volumes used" on page 163 for more information.

On a read operation:

VFILE specifies that NetTAPE is to retrieve from **$HOME/.nettape** the volume information for the dataset specified by *dsname* on the –**d** option. If the volume information file is in a different directory, use the **VDIR**= option to specify its location.

The volume information file contains the name of the device pool where the data set was created. NetTAPE allocates the device from this pool unless you use the –**P** option to request that a different device pool be used. For more information, see "Obtaining Volume Information Using the VFILE Option" on page 131.

–**P** *devpool*

Specifies the device pool from which to allocate the device. If you do not specify the device pool, the default pool specified in **nettape.adm.config** is used. (See Table 8 on page 149.)

–**r** *nnnn*

Specifies the retention period for a **new** data set, in number of days.

Note: –**e** and –**r** are mutually exclusive. You can specify the longevity of the tape as either an expiration date (–**e** *cyyddd*) or as a number of days from now (–**r** *nnnn*).

The default value is infinity (no expiration date).

–**R** *record_format*

Specifies the format of records on the tape. Supported values of *record_format* are:

U Unformatted
F Fixed
FB Fixed blocked
FBS Fixed blocked standard
V Variable
VB Variable blocked
VS Variable spanned
VBS Variable blocked spanned

You can use –**B** and –**L** to change the blocksize and record length of formatted tapes. The default *record_format* is **U**, unformatted tapes.

–**s** *fseq*

Specifies the sequence number of the data set on the tape. The default is 1, the first data set of the tape.

–**S** *source_category*

Specifies the source category from which a scratch volume is mounted. In some tape libraries, source category can be viewed as a scratch pool name. Specify *source_category* as a character string to use the device in manual mode; specify it as a number when using a

library. If you don't specify –**S**, the category defaults to the definition in **nettape.adm.config**.

–**T** *target_category*
Specifies the target category to which a private volume is assigned. In some tape libraries, target categories can be viewed as private pool names. Specify *target_category* as a character string to use the device in manual mode; specify it as a number when using a library.

If you don't specify –**T**, the category defaults to the definition in **nettape.adm.config**.

–**v** *volser*[**,***volser2***,...,***volsern*]
–**v scratch**
Specifies the volser (external volume serial number) of one or more tapes. A *volser* is 1 to 6 characters. *volser* arguments are converted to upper case.

For a read operation, you must specify the –**v** option unless you use the VFILE option to specify volume information.

For a write operation, –**v** is optional. If you omit –**v** or specify –**v scratch**, a scratch tape is mounted.

For labeled tapes, NetTAPE uses the external volume serial number as the internal volume serial number unless you specify an internal volume serial number using the –**V** option.

–**V** *vol1***[,***vol2***,...,***voln***]**
Specifies the internal volume serial number each volume in the list –**v** *volser*,*volser2*,...,*volsern*. The internal volume number is 1 to 6 characters and is converted to upper case.

This option is for labeled tapes only. Use the –**V** option to specify an internal volume serial number that is different from the external volume serial number.

If you use the –**V** option, you must also specify the –**v** option.

–**?**
Displays the command syntax.

Description

This command:

1. Dynamically allocates a tape device from the device pool, esoteric device pool, or default device pool specified.
2. Opens the tape file for reading, writing, or updating (reading and writing).

Device pools, esoteric device pools, and the default device pool are defined in **nettape.adm.config**.

Table 8 on page 149 shows the interactions among the device, host name, and pool **cltalloc** parameters when you specify none, some, or all of them.

Table 8. Interactions among cltalloc parameters: pool, device and host name

Device	Host Name	Pool	Action
			NetTAPE looks in **nettape.adm.config** for a locally-attached device in the default pool. If one is not available, NetTAPE assigns another device in that pool.
X			Not supported
X	X		The specified device on the specified host must defined in **nettape.adm.config**.
X	X	X	The specified device on the specified host must be defined as a member of the specified pool in **nettape.adm.config**.
X		X	Not supported
	X	X	NetTAPE looks for any device on the specified host that is defined in the specified pool in **nettape.adm.config**.
	X		NetTAPE looks for any device on the specified host that is defined in the default pool in **nettape.adm.config**.
		X	NetTAPE looks in **nettape.adm.config** for a locally-attached device in the specified pool. If one is not available, NetTAPE assigns another device in the that pool.

Usage Notes

All input values are case sensitive except where noted. For instance, NetTAPE treats `-V vol0001` as different from `-V VOL0001`.

You must have the proper security files in place, depending on the security method you have chosen. For more information, see “Step 2: Defining NetTAPE's Security Method” on page 37.

Messages and Responses

The following messages are issued by **cltalloc**:

- `cltalloc: volser is now mounted on /mydir/mytape (/dev/pstn)`

  The **cltalloc** command was successful.

- `cltalloc: Allocation failed on volser for /mydir/mytape: A tape is already mounted`

- `cltalloc: Allocation failed on volser for /mydir/mytape: Dynamic allocation failed`

  Either the tape pseudo device driver could not be loaded or the tape device special file could not be created.

- `cltalloc: /mydir/mytape could not be created`

  The symbolic link, */mydir/mytape*, could not be created because NetTAPE does not have write access to */mydir*.

- `cltalloc: dsname cannot be more than 44 chars`

- `cltalloc: retention period should be nnnn`

  The retention period must be entered as a decimal number of days.

- `cltalloc: expiration date should be cyyddd`

  The expiration date must be entered as *cyyddd*, where *c* specifies the century (omitted=1900's, 0=2000's, 1=2100's) and *yyddd* is a Julian date. For example, `97100` is the 100th day of 1997 and `005206` is the 206th day of 2005.

- `cltalloc: -r and -e are mutually exclusive`

  You cannot specify both an expiration date and a retention period.

- `cltalloc: volser cannot be more than 6 chars`
- `cltalloc: Values for -S and -T cannot be equal`

  The source catalog and the target catalog must be different.

- `cltalloc: NL tapes on read require a blksz, recfm, and recln`

  NL tapes require a block size, a record format, and a record length.

- `cltalloc: AL and SL tapes require DSN`
- `cltalloc: Use of -a option must include either -v or -V`

  The automatic cartridge loader requires a list of volume serial numbers or volume IDs.

- `cltalloc: Invalid option: -p`

  The –**p** option is valid only with the CLIO/S product.

- `cltalloc: Invalid option: -c`

  The –**c** option is valid only with the CLIO/S product.

- `cltalloc: Invalid file sequence number`

  The file sequence number must be an integer.

- `cltalloc: Extra parameters ignored`

  Parameters were detected that could not be associated with a flag. These were ignored. For instance: **cltalloc** –**P** 3490A SL, where SL is not associated with a flag.

- `cltalloc: For Unformatted records Blocksize must equal record length`
- `cltalloc: For Fixed Block records Blocksize must be multiple of record length`
- `cltalloc: For Fixed Block records Blocksize must be multiple of record length`
- `cltalloc: For Variable records Blocksize must be record length + 8`
- `cltalloc: For Variable block records Blksize must be record length + 8`
- `cltalloc: For Variable block records Blksize must be record length + 8`

See “NetTAPE Messages and API Return Values” on page 196 for additional messages.

Examples

Here are some basic ways to use **cltalloc**:

1. To allocate a device from the default device pool and mount a scratch tape on that device, specify the following (the default device special file associated with the tape pseudo device driver is **$HOME/mytape**):

   ```
   cltalloc
   ```

2. To allocate any device in the 3490 device pool:

   ```
   cltalloc -P 3490
   ```

3. To allocate a specific device (510 on node k144n05), use either of the following:

   ```
   cltalloc -D /dev/510@k144n05
   cltalloc -D /dev/510 -h k144n05
   ```

4. To allocate any device in the 3490 device pool, tar $HOME/tape_stuff, and then unallocate the device:

   ```
   cltalloc -P 3490
   tar -cvf $HOME/mytape $HOME/tape_stuff
   cltunall
   ```

5. To allocate any device in the 3490 device pool with a volser and a new data set name:

   ```
   cltalloc -P 3490  -v extv12 -d new.data.set
   ```

6. To allocate any device in 3490 pool specifying the device special file, tar to tape, and then unallocate the device:

   ```
   cltalloc -P 3490 -f my_special_file
   tar -cvf my_special_file $HOME/tape_stuff
   cltunall -f my_special_file
   ```

Here are some more sophisticated ways to use **cltalloc**:

1. Request a tape device for reading the third file on volume **extv1**. The data set continues on a second volume, **extv2**. **cltalloc** ensures that the data set name encoded on the tape is **totals.8.12.84**. The device special file name you use to read the data is /**tmp**/**mybackup**.

   ```
   cltalloc -f /tmp/mybackup -v extv1,extv2 -s 3 -d totals.8.12.84
   ```

2. To read a tape data set that spans multiple volumes and using a device with the ACL (automatic cartridge loader) feature, issue a single mount request for both tapes by including the –**a** option:

   ```
   cltalloc -v extv1,extv2 -d mydata -a
   ```

   If you omit –**a**, the operator receives a separate mount request for each volume in the – list. The mount request for the second volume (**extv2**) is sent when end-of-tape is reported for the first volume.

3. The following sequence of commands demonstrates how to use **cltalloc** and **cltopen** to read two **tar** files that are written as the first and third data sets on a tape. The virtual device is accessed with the device special file /**viking**/**tape01**.

   ```
   cltalloc -v extvol -s 1 -f /viking/tape01
   tar -xvf /viking/tape01
   cltopen -s 3 -f /viking/tape01
   tar -xvf /viking/tape01
   cltunall -f /viking/tape01
   ```

Files

$HOME/nettape.config	File used to configure the NetTAPE status daemon and NetTAPE operational characteristics.
$HOME/.netrc	File for NetTAPE security (Remote Execution method).

Related Topics

Commands: **cltopen**, **cltunall**

cltclose—Closing the volume information file

Syntax

cltclose [–**f** *device_special_file*]
[–**?**]

Parameters

–**f**

Specifies the name of the device special file created by the preceding **cltalloc** command. If you omit this keyword, NetTAPE uses **$HOME/mytape** or **$HOME/mytape.1**.

–**?**

Displays the command syntax.

Description

The **cltclose** command closes the volume information file created using the VFILE option on the **cltalloc** and **cltopen** commands.

Messages and Responses

See “NetTAPE Messages and API Return Values” on page 196 for information about messages.

Examples

1. Backup two files to tape using the **VFILE** option, using **cltclose** to close the **VFILE** file:

```
cltalloc -P 3494 -f my3494 -d file_01_021196 -o "VFILE"
tar -vcf my3494 backup_file_01
cltclose -f my3494

cltopen -f my3494 -d file_02_021196 -o "VFILE"
tar -vcf my3494 backup_file_02
cltclose -f my3494

cltunall -f my3494
```

2. Restore two files from tape using the **VFILE** option:

```
cltalloc -f my3494 -d file_01_021196 -o "VFILE"
tar -vxf my3494
cltclose -f my3494

cltopen -f my3494 -d file_02_021196 -o "VFILE"
tar -vxf my3494
cltclose -f my3494

cltunall -f my3494
```

Files

$HOME/nettape.config	File used to configure the NetTAPE status daemon and NetTAPE operational characteristics.
$HOME/.netrc	File for NetTAPE security (Remote Execution method).

Related Topics

Commands: **cltalloc**, **cltopen**

For more information on the VFILE option, see “Obtaining Volume Information Using the VFILE Option” on page 131.

cltopen—Accessing a tape file using different parameters

Syntax

cltopen [−**a**]
[−**B** *blocksize*]
[−**d** *dsname*]
[[−**e** *cyyddd*] | [−**r** *nnnn*]]
[−**f** *device_special_file*]
[−**F** *tape_format*]
[−**l** *label_type*]
[−**L** *record_length*]
[−**o** *"allocparms"*]
[−**R** *recfm*]
[−**s** *fseq*]
[−**S** *source_category*]
[−**T** *target_category*]
[−**v** *volser*[**,***volser2*,...,*volsern*] | [−**v** **scratch**]
[−**V** *vol1*[**,***vol2*,...,*voln*]]]
[−**?**]

Parameters

−**a**

Specifies that you want to use the automatic cartridge loader (ACL) feature. ACL is supported on the 3480, 3490, and 3590 IBM tape devices. The ACL feature differs from ACF (automatic cartridge facility) in that ACL allows only sequential access to tapes in the cartridge loader while ACF can be used in a random access mode as a mini tape library.

You may specify −**a** only for a device defined in **nettape.adm.config** with the operation mode ibmacl or ibmacf.

You must also specify either the −**v** option or the −**V** option with the −**a** option.

−**B** *blocksize*

Specifies the size of the blocks or records. Use this option with the −**L** and −**R** options. This option does not apply to unformatted tapes (−**R U**); if you specify both −**R U** and −**B**, −**B** is ignored.

−**d** *dsname*

Specifies the name of a tape data set. The string *dsname* contains 1 to 44 characters. *dsname* is converted to upper case. If you omit −**d**, no data set name is used.

You must specify −**d** for standard label (**sl**) or ANSI label (**al**) tapes.

−**e** *cyyddd*

Specifies the expiration date for a **new** data set. *c* specifies the century (omitted=1900's, 0=2000's, 1=2100's) and *yyddd* is a Julian date. For example, `97100` is the 100th day of 1997 and `005206` is the 206th day of 2005. If you omit this option, the default is no expiration date.

Note: –**e** and –**r** are mutually exclusive. You can specify the longevity of the tape as either an expiration date (–**e** *cyyddd*) or as a number of days from now (–**r** *nnnn*).

–**f** *device_special_file*
Specifies the name of the device special file for the tape pseudo device driver you are using. This is a name previously defined with the –**f** option of **cltalloc**.

You can specify the file name as either a fully-qualified path name or as a name relative to the current directory. If you don't specify –**f** *device*, NetTAPE uses **$HOME/mytape** or **$HOME/mytape.1**.

–**F** *tape_format*
tape_format is a string specifying the tape recording format. It can have one of these values:

basic	Basic (uncompacted) mode
compacted	Compacted mode
800	800 BPI, 9 track (NRZI format)
1600	1600 BPI, 9 track (PE format)
6250	6250 BPI, 9 track (GCR format)

The keywords **basic** and **compacted** may be supplied in upper, lower, or mixed case. They may be abbreviated down to a single letter (**b** and **c**).

If you omit –**F**, the default tape format is the format defined in SMIT when the device was configured.

–**l** *label_type*
Indicates the tape label type. *label_type* is one of:

AL ANSI X3.27-1987 (ISO 1001-1986) Labeled

NL Unlabeled

SL IBM EBCDIC Standard Labeled

BLP Bypass Label Processing

NSAL Non-standard ANSI Labeled

You may type **AL**, **NL**, **SL**, **BLP**, or **NSAL** in upper, lower, or mixed case. The default is **nl**

Notes:

1. Bypassing label processing may circumvent data set access restrictions. Therefore you must have special authority (controlled by an entry in **nettape.adm.config**) to use **BLP**.

   For more information, see “Defining the User Authority Control List” on page 44.

2. When you specify **SL** on a write operation, NetTAPE writes a standard label record (VOL1,HDR1,HDR2) at the beginning of the tape volume.

3. For **AL** (ANSI standard label) tapes, NetTAPE supports ANSI version 3 standard labels.

4. NetTAPE supports **AL** or **SL** tapes on 8mm devices, but only for single volume data sets. Furthermore, you must provide sufficient room at the end of the tape for trailer labels.

To write to a tape (any label type) or to read from a **nl** (no label) tape, you must specify either all of –**L** *record_length*, –**B** *blocksize*, and –**R** *record_format*, or none of the three.

For standard label (**sl**) or ANSI label (**al**) tapes, you must also specify the –**d** option.

–**L** *record_length*
Specifies the length in bytes of logical records on the tape. Use this option with the –**B** and –**R** options.

–**o "***allocparms***"**
Specifies an optional parameter string, enclosed in double quotes. If you do not wish to override the allocation parameters you specified when you allocated the device using **cltalloc**, you should omit this option. The string consists of one or more of the following keywords, separated by blanks:

GEN=*file_gen_num*
Specifies a 4-digit file generation number. If you omit this keyword, this field is set to blanks.

OWNER=*owner*
Specifies a 14-character string identifying the owner of the tape. If you omit this keyword, this field is set to blanks.

SUP_EOF
Specifies that NetTAPE ignore EOF tape marks and continue processing the tape.

If you omit this keyword, NetTAPE returns the NetTAPE_TEOF return code when it reaches EOF on a read operation.

SUP_EOV
Specifies that NetTAPE automatically mount the next volume (if necessary), when End of Volume (EOV) or End of Tape (EOT) is reached.

If you omit this keyword, NetTAPE returns the NetTAPE_EOV return code when it reaches EOV on a read operation, or the NetTAPE_EOT return code when it reaches EOT on a write operation. When reading a tape, NetTAPE returns NetTAPE_EOV, when it reaches EOV on the last volume in the volume list.

For more information about EOT and EOV, see “Understanding NetTAPE Tape Positioning” on page 136.

For more information about return codes, see “NetTAPE Messages and API Return Values” on page 196.

VDIR=*vol_id_dir*
Specifies the name of the directory where NetTAPE is to store (on a write operation) or retrieve (on a read operation) the file containing the volume information associated with data set specified by *dsname* on the –**d** option.

VDIR= is an optional keyword you can specify with the **VFILE** keyword.

VER=*version_num*
Specifies a 2-digit file version number. If you omit this keyword, this field is set to 0.

VFILE
On a write operation:

Specifies that NetTAPE is to save volume information for the data set specified by *dsname* on the –**d** option.

The volume information is saved in the file *dsname* in the **$HOME/.nettape**. To save the file in a different directory, specify that directory using the **VDIR** option. For more information, see "Obtaining Volume Information Using the VFILE Option" on page 131.

If you want this information sent to STDOUT, use the **cltvols** command instead. See "cltvols—Obtaining information about tape volumes used" on page 163 for more information.

On a read operation:

VFILE specifies that NetTAPE is to retrieve from **$HOME/.nettape** the volume information for the dataset specified by *dsname* on the –**d** option. If the volume information file is in a different directory, use the **VDIR** option to specify its location. For more information, see "Obtaining Volume Information Using the VFILE Option" on page 131.

–**r** *nnnn*
Specifies the retention period for a **new** data set, in number of days.

Note: –**e** and –**r** are mutually exclusive. You can specify the longevity of the tape as either an expiration date (–**e** *cyyddd*) or as a number of days from now (–**r** *nnnn*).

The default value is infinity (no expiration date).

–**R** *record_format*
Specifies the format of records on the tape. Supported values of *record_format* are:

U Unformatted
F Fixed
FB Fixed blocked
FBS Fixed blocked standard
V Variable
VB Variable spanned
VS Variable blocked
VBS Variable blocked spanned

AMPEX DST 310 and 410 devices support only U, F,and FB.

You can use –**B** and –**L** to change the blocksize and record length of formatted tapes. The default *record_format* is **U**, unformatted tapes.

–**s** *fseq*

Specifies the sequence number of the data set on the tape. The default is 1, the first data set of the tape.

–**S** *source_category*

Specifies the source category from which a scratch volume is mounted. In some tape libraries, source category can be viewed as a scratch pool name. Specify *source_category* as a character string to use the device in manual mode; specify it as a number when using a library. If you don't specify –**S**, the category defaults to the definition in **nettape.adm.config**.

–**T** *target_category*

Specifies the target category to which a private volume is assigned. In some tape libraries, target categories can be viewed as private pool names. Specify *target_category* as a character string to use the device in manual mode; specify it as a number when using a library.

If you don't specify –**T**, the category defaults to the definition in **nettape.adm.config**.

–**v** *volser*[**,***volser2***,...,***volsern*]
–**v scratch**

Specifies the volser (external volume serial number) of one or more tapes. A *volser* is 1 to 6 characters. *volser* arguments are converted to upper case.

For a read operation, you must specify the –**v** option unless you use the VFILE option to specify volume information.

For a write operation, –**v** is optional. If you omit –**v** or specify –**v scratch**, a scratch tape is mounted.

For labeled tapes, NetTAPE uses the external volume serial number as the internal volume serial number unless you specify an internal volume serial number using the –**V** option.

–**V** *vol1*[**,***vol2***,...,***voln*]

Specifies the internal volume serial number for each volume in the list –**v** *volser*,*volser2*,...,*volsern*. The internal volume identifier is 1 to 6 characters and is converted to upper case.

This option is for labeled tapes only. Use the –**V** option to specify an internal volume serial number that is different from the external volume serial number.

If you use the –**V** option, you must also specify the –**v** option.

–**?**

Displays the command syntax.

Description

Use the **cltopen** command when you want to access a tape file using different parameters than those currently specified. For example, you can use **cltopen** to:

- Specify a different data set name
- Reposition the tape
- Change allocation parameters.

cltopen accepts a subset of the options provided by the **cltalloc** command, letting you override those values as well as the defaults.

Note: **cltopen** defers any necessary volume switch until the application issues the **open()** system call.

Usage Notes

All input values are case sensitive except where noted. For instance, NetTAPE treats `-V vol0001` as different from `-V VOL0001`.

Messages and Responses

See "NetTAPE Messages and API Return Values" on page 196 for information about messages.

Examples

1. To change the data set name for the next operation to a tape mounted on the device previously allocated as **$HOME/mytape**, use:

   ```
   cltopen -d really.neat.data
   ```

2. To reposition the tape to read the fourth data set on the device specified by **/lab/tapes/tape1**, use:

   ```
   cltopen -f /lab/tapes/tape1 -s 4
   ```

3. To request that a different tape volume to be mounted on the previous assigned tape drive **$HOME/mytape**, allocated as add some extra options:

   ```
   cltopen -f $HOME/mytape -V myvol2 -v extlb2
   ```

4. The following sequence of commands demonstrates how to use **cltalloc** and **cltopen** to read two **tar** files that are written as the first and third data sets on a tape. The virtual device is accessed with the device special file **/viking/tape01**.

   ```
   cltalloc -v extvol -s 1 -f /viking/tape01
   tar -xvf /viking/tape01
   cltopen -s 3 -f /viking/tape01
   tar -xvf /viking/tape01
   cltunall -f /viking/tape01
   ```

5. The following sequence of commands demonstrates how to use **cltalloc** and **cltopen** to read two **tar** files that are written as the first and third data sets on a tape. The virtual device is accessed with the device special file **/viking/tape01**.

   ```
   cltalloc -v extvol -s 1 -f /viking/tape01
   tar -xvf /viking/tape01
   cltopen -s 3 -f /viking/tape01
   tar -xvf /viking/tape01
   cltunall -f /viking/tape01
   ```

Files

$HOME/nettape.config	File used to configure the NetTAPE status daemon and NetTAPE operational characteristics.
$HOME/.netrc	File for NetTAPE security (Remote Execution method).

Related Topics

Commands: **cltalloc**, **cltunall**

cltunall—Unallocating a tape device

Syntax

cltunall [–**f** *device_special_file*]

Parameters

–**f** *device_special_file*

Specifies the name of the device special file created by the preceding **cltalloc** command. If you omit this keyword, NetTAPE unallocates **$HOME/mytape** and **$HOME/mytape.1**.

Description

This command unallocates the tape device.

Messages and Responses

This command displays one of the following messages upon completion:

- `cltunall: Error - no tape is allocated on /dev/pst`*n*

  A tape is already mounted.

- `cltunall: Tape on /dev/pst`*n*` is now being unallocated`

- `cltunall: Nettaped apparently down. Removing $HOME/`*mytape*`.`
  `cltunall: cltclntd killed. /dev/pst`*n*` remains.`
  `cltunall: Have system administrator use rmdev to remove it.`

  Your I/O operation has completed successfully but the device could not be unallocated because the NetTAPE status daemon is down. Follow the instructions provided to have your tape pseudo device driver deleted.

- `cltunall: Usage: cltunall -f device`

See “NetTAPE Messages and API Return Values” on page 196 for information about messages.

Examples

To unallocate the tape device **$HOME/mytape**, issue:

```
cltunall -f $HOME/mytape
```

Files

$HOME/nettape.config	File used to configure the NetTAPE status daemon and NetTAPE operational characteristics.
$HOME/.netrc	File for NetTAPE security (Remote Execution method).

Related Topics

Commands: **cltalloc**

cltvols—Obtaining information about tape volumes used

The **cltvols** command returns information about the tape volumes used by the data set that is currently in use.

Syntax

cltvols [–**f** *device_special_file*]
[–**s**]
[–**v**]
[–**V**]
[–**?**]

Parameters

–**f** *device_special_file*

Specifies the name of the device special file created by the preceding **cltalloc** command. If you omit this keyword, NetTAPE uses **$HOME/mytape**.

–**s**

Specifies that only file sequence information is to be returned.

–**v**

Specifies that only information about external tape volume IDs is to be returned.

–**V**

Specifies that only information about internal tape volume IDs is to be returned.

–**?**

Displays the command syntax.

Description

The **cltvols** command writes to STDOUT information about the tape volumes used.

To have this information written to a file instead, specify the VFILE option on the **cltalloc** command. See “cltalloc—Allocating a tape device” on page 143 for more information. Here's when to use **cltvols**:

When	Because
Reading and writing tapes	To confirm the volume ID
Writing to a scratch tape	To learn the volume ID
Writing a multi-volume tape	To confirm the volume ID (in case the write operation spanned a volume)

This command performs the same function as **ctpvols()** subroutine.

Messages and Responses

See “NetTAPE Messages and API Return Values” on page 196 for information about messages.

Examples

Backup a file to tape, obtain information about the volumes used, then unallocate the device.

```
cltalloc -P 3494 -l sl -f my3494
tar -vcf my3494 backup_file

cltvols -f my3494

Total Number of volumes: 3
File Sequence Number: 1
External Volume IDs: XYZ300,XYZ301,XYZ302
Internal Volume IDs: XYZ300,XYZ301,XYZ302

cltvols -f my3494 -s
1

cltvols -f my3494 -v
XYZ300,XYZ301,XYZ302

cltvols -f my3494 -V
XYZ300,XYZ301,XYZ302

cltunall -f my3494
```

Files

$HOME/nettape.config	File used to configure the NetTAPE status daemon and NetTAPE operational characteristics.
$HOME/.netrc	File for NetTAPE security (Remote Execution method).

Chapter 16. Application Programming Interfaces

The NetTAPE tape subroutines, which are available in both C and FORTRAN, are described in this section. The following table lists the NetTAPE tape subroutines, their functions, and where they are explained.

Subroutine			
C	**FORTRAN**	**Description**	**Page**
ctpalloc	tpalloc	Allocate a tape device	166
ctpclose	tpclose	Close the tape file	173
ctperr	tperr	Translate an error code to a message	174
ctpflush	tpflush	Flush remaining write-behind buffer data to tape	175
ctpioctl	(none)	Issue an IOCTL command	177
ctpopen	tpopen	Open the tape file	178
ctpqwbh	tpqwbh	Query the number of blocks of data remaining in write-behind buffers	185
ctpread	tpread	Read the tape	186
ctpreads	tpreads	Read the tape (second version)	187
ctprew	tprew	Rewind the tape	188
ctpskpf	tpskpf	Skip tape files	189
ctpskpr	tpskpr	Skip tape records	190
ctpunall	tpunall	Unallocate a tape device	191
ctpvols	tpvols	Obtain information about the tape volumes used.	192
ctpweof	tpweof	Write tape marks	193
ctpwrite	tpwrite	Write to tape	194
ctpwrites	tpwrites	Write to tape (second version)	195

Compiling, Linking, and Running with the NetTAPE API

To use NetTAPE subroutines, you'll need the following information:

- The NetTAPE header file is in **/usr/lpp/clnettape/inc/fcftpint.h**.
- The NetTAPE subroutine library is located in **/usr/lib/libclios.a** and **/usr/lib/libclsec.a**.
- A sample **makefile** is in **/usr/lpp/nettape/samples/api/api**. Copy it to your own directory and customize it for your use.

Finding the NetTAPE API Examples File

The **/usr/lpp/nettape/samples/api** directory contains sample programs that use the NetTAPE application programming interfaces. You can make a copy of these files and modify them for your use.

© Copyright IBM Corp. 1996, 1997

ctpalloc or tpalloc—Allocating a tape device

Description

Use this function to request a tape device.

Syntax

Language	Programming Syntax
C	**int ctpalloc (int** ******tlu***, char** ******node***, int** *maxdata***, char** ******allocparms***, char** ******utility* **)**
FORTRAN	**tpalloc (** *tlu*, *node*, *maxdata*, *allocparms*, *utility*, *ret* **)**

tlu Is a pointer to an integer (INTEGER*4) representing the tape logical unit number. This value is returned from the **ctpalloc** routine; subsequent tape calls refer to this device. Note that the other calls use the value of *tlu* rather than its address (&*tlu*). An application or group of applications can allocate up to 10 tape units with successive calls to this routine.

node Is a pointer (CHARACTER*(*)). Code this parameter as a null pointer, NetTAPE does not use it. It is maintained for compatibility with the CLIO/S product.

maxdata Is an input integer (INTEGER*4) representing the maximum block size the tape server must support when it reads from the tape or writes to the tape. This value should be greater than or equal to the largest data block read or written by your application.

The default is 65536 (64K) bytes.

allocparms

Is a pointer (CHARACTER*(*)) to the allocation parameters. The *allocparms* string is limited to 256 bytes in length. *allocparms* specifies information needed to request a tape device. A sample *allocparms* string is:

```
POOL=3490_1 VOL=myvol1 sl
```

The following allocation parameters are supported:

ACL Specifies that you want to use the automatic cartridge loader (ACL) feature. ACL is supported on the 3480, 3490, and 3590 IBM tape devices. The ACL feature differs from ACF (automatic cartridge facility) in that ACL allows only sequential access to tapes in the cartridge loader while ACF can be used in a random access mode as a mini tape library.

You may specify **ACL** only for a device defined in **nettape.adm.config** with the operation mode ibmacl or ibmacf.

You must also specify either the **VOL**= option or the **VID**= option with the **ACL** option.

BLKSZ=*blocksize*

Specifies the size of the blocks or records. Use this option with the **RECLN**= and **RECFM**= options. This option does

not apply to unformatted tapes (**RECFM**=**U**); if you specify both **RECFM**=**U** and **BLKSZ**=, **BLKSZ**= is ignored.

BLOCKING
Specifies that **ctpread**, **ctpwrite**, and **ctpskpr** are to work with logical records rather than blocks. Use this option with the **BLKSZ**=, **RECLN**=, and **RECFM**= options. This option is required when using blocked format tapes (**RECFM**= set to **FB**, **FBS**, **VB**, or **VBS**)

ctpwrite places the logical records into blocks based on the **BLKSZ**=, **RECLN**=, and **RECFM**= options.

ctpread extracts the logical records from the blocks of the file based on the **BLKSZ**=, **RECLN**=, and **RECFM**= options.

ctpskpr skips logical records based on the **BLKSZ**=, **RECLN**=, and **RECFM**= options.

DEV=*device*[@*hostname*]
Specifies the full pathname of the preferred device, for example, /**dev**/**rmt0**. If you omit this parameter, NetTAPE selects a device from the specified (or default) device pool. If you want to request a device on a specific host, you can use either the @*hostname* format of **DEV**= or **HOST**=. Using **DEV**= and **HOST**= lets you request a specific device. See Table 8 on page 149 for more information.

DSN=*dsname*
Specifies the name of a tape data set. The string *dsname* contains 1 to 44 characters. *dsname* is converted to upper case. If you omit **DSN**=, no data set name is used.

You must specify **DSN**= for standard label (**sl**) or ANSI label (**al**) tapes.

EX=*cyyddd*
Specifies the expiration date. *c* specifies the century (omitted=1900's, 0=2000's, 1=2100's) and *yyddd* is a Julian date. For example, `97100` is the 100th day of 1997 and `005206` is the 206th day of 2005.

FSEQ=*fseq*
Specifies the sequence number of the data set on the tape. The default is 1, the first data set of the tape.

GEN=*file_gen_num*
Specifies a 4-digit file generation number. If you omit this keyword, this field is set to blanks.

HOST=*hostname*
Specifies the preferred hostname. *hostname* is a TCP/IP name.

See Table 8 on page 149 for more information.

AL, NL, SL, NSAL, BLP
Specifies tape label attributes.

AL ANSI X3.27-1987 (ISO 1001-1986) Labeled

NL Unlabeled

SL IBM EBCDIC Standard Labeled

NSAL Non-Standard ANSI Labeled.

BLP Bypass Label Processing

You may type **AL**, **NL**, **SL**, **NSAL**, and **BLP** in upper, lower, or mixed case. The default is **nl**

Notes:

1. Bypassing label processing may circumvent data set access restrictions. Therefore you must have special authority (controlled by an entry in **nettape.adm.config**) to use **BLP**.

   For more information, see "Defining the User Authority Control List" on page 44.

2. When you specify **SL** on a write operation, NetTAPE writes a standard label record (VOL1,HDR1,HDR2) at the beginning of the tape volume.
3. For **AL** (ANSI standard label) tapes, NetTAPE supports ANSI version 3 standard labels.
4. NetTAPE supports **AL** or **SL** tapes on 8mm devices, but only for single volume data sets. Furthermore, you must provide sufficient room at the end of the tape for trailer labels.
5. For **NSAL** tapes, NetTAPE never crosses tape marks when it skips records. If you have set the **client.cross.tm** keyword in the **nettape.config** file to **yes**, NetTAPE ignores the setting.

To write to a tape (any label type) or to read from a **nl** (no label) tape, you must specify either all of **RECLN**=, **BLKSZ**=, and **RECFM**=, or none of the three.

For standard label (**sl**) or ANSI label (**al**) tapes, you must also specify the **DSN**= option.

NOWAIT Specifies that you do not want to wait for a tape device if one is not immediately available. If a tape is not available immediately, you receive a non-zero return value. The system administrator can use the **mount.queue** entry in **nettape.adm.config** to establish whether NetTAPE queues mount requests when a device is busy.

OWNER=*owner*
Specifies a 14-character string identifying the owner of the tape. If you omit this keyword, this field is set to blanks.

POOL=*devpool*
Specifies the device pool from which to allocate the device. If you do not specify the device pool, the default pool specified in **nettape.adm.config** is used. (See Table 8 on page 149.)

RECFM=*record_format*
Specifies the format of records on the tape. Supported values of *record_format* are:

U	Unformatted
F	Fixed
FB	Fixed blocked
FBS	Fixed blocked standard
V	Variable
VB	Variable blocked
VS	Variable spanned
VBS	Variable blocked spanned

AMPEX DST 310 and 410 devices support only U, F, and FB tapes. The default *record_format* is **U**, unformatted tapes.

You can use **BLKSZ**= and **RECFM**= to change the blocksize and record length of formatted tapes.

RECLN=*record_length*
Specifies the length in bytes of logical records on the tape. Use this option with the **BLKSZ**= and **RECFM**= options.

RET=*num* Specifies the retention period.

REWIND_REJECT
Specifies that you want a rewind request, made through the **ctprew** or **tprew** subroutine, to be rejected for an ANSI Labeled (AL) or Standard Labeled (SL) tape.

If you do not specify **REWIND_REJECT**, a rewind request for an AL or SL tape rewinds the tape to the beginning of the file.

SRC=*source_category*
Specifies the source category from which a scratch volume is mounted. In some tape libraries, source category can be viewed as a scratch pool name. Specify *source_category* as a character string to use the device in manual mode; specify it as a number when using a library. If you don't specify **SRC**=, the category defaults to the definition in **nettape.adm.config**.

SUP_EOF
Specifies that NetTAPE ignore EOF tape marks and continue processing the tape.

If you omit this keyword, NetTAPE returns the NetTAPE_TEOF return code when it reaches EOF on a read operation.

SUP_EOV
Specifies that NetTAPE automatically mount the next volume (if necessary), when End of Volume (EOV) or End of Tape (EOT) is reached.

If you omit this keyword, NetTAPE returns the NetTAPE_EOV return code when it reaches EOV on a read operation, or the NetTAPE_EOT return code when it reaches

EOT on a write operation. When reading a tape, NetTAPE returns NetTAPE_EOV, when it reaches EOV on the last volume in the volume list.

For more information about EOT and EOV, see "Understanding NetTAPE Tape Positioning" on page 136.

For more information about return codes, see "NetTAPE Messages and API Return Values" on page 196.

TAR=*target_category*
Specifies the target category to which a private volume is assigned. In some tape libraries, target categories can be viewed as private pool names. Specify *target_category* as a character string to use the device in manual mode; specify it as a number when using a library.

If you don't specify **TAR**=, the category defaults to the definition in **nettape.adm.config**.

TFMT=*tape_format*
Specifies the tape density. *tape_format* is a string specifying the tape recording format. It can have one of these values:

basic	Basic (uncompacted) mode
compacted	Compacted mode
800	800 BPI, 9 track (NRZI format)
1600	1600 BPI, 9 track (PE format)
6250	6250 BPI, 9 track (GCR format)

The keywords **basic** and **compacted** may be supplied in upper, lower, or mixed case. They may be abbreviated down to a single letter (**b** and **c**).

If you omit **TFMT**=, the default tape format is the format defined in SMIT when the device was configured.

TMODE=*tapemode*
Specifies the tape mode. Possible values for *tapemode* are:

r	Read
w	Write

If you do not specify the tape mode, the default depends on whether you requested a scratch tape. If you request a specific tape volume using **DSN**= or **VOL**=, the default is **r** (read, rewind). If you do not specify **DSN**= or **VOL**=, the default is **w** (write, rewind).

VDIR=*vol_id_dir*
Specifies the name of the directory where NetTAPE is to store (on a write operation) or retrieve (on a read operation) the file containing the volume information associated with data set specified by **DSN**=*dsname*.

VDIR= is an optional keyword you can specify with the **VFILE** keyword.

VER=*version_num*
Specifies a 2-digit file version number. If you omit this keyword, this field is set to 0.

VFILE On a write operation:

Specifies that NetTAPE is to save volume information for the data set specified by *dsname* on the –**d** option.

The volume information is saved in the file *dsname* in the **$HOME/.nettape**. To save the file in a different directory, specify that directory using the **VDIR**= option. For more information, see "Obtaining Volume Information Using the VFILE Option" on page 131.

If you want this information saved to a buffer, use the **ctpvols** subroutine instead. See "ctpvols or tpvols—Obtaining information about tape volumes used" on page 192 for more information.

On a read operation:

VFILE specifies that NetTAPE is to retrieve from **$HOME/.nettape** the volume information for the data set specified by *dsname* on the –**d** option. If the volume information file is in a different directory, use the **VDIR**= option to specify its location.

The volume information file contains the name of the device pool where the data set was created. NetTAPE allocates the device from this pool unless you use the **POOL**= option to request that a different device pool be used. For more information, see "Obtaining Volume Information Using the VFILE Option" on page 131.

VID=*int_volid*[**,***int_volid2***,...,***int_volid*]
Specifies the internal volume serial number for each volume in the list –**v** *volser*,*volser2*,...,*volsern*. The internal volume identifier is 1 to 6 characters and is converted to upper case.

This option is for labeled tapes only. Use the **VID**= option to specify an internal volume serial number that is different from the external volume serial number.

If you use the **VID**= option, you must also specify the **VOL**= option.

VOL=**scratch**
VOL=*volser*[**,***volser2***,...,***volsern*]
Specifies the volser (external volume serial number) of one or more tapes. A *volser* is 1 to 6 characters. *volser* arguments are converted to upper case.

For a read operation, you must specify the **VOL**= option unless you use the VFILE option to specify volume information.

For a write operation, **VOL**= is optional. If you omit **VOL**= or specify **VOL**=**scratch**, a scratch tape is mounted.

For labeled tapes, NetTAPE uses the external volume serial number as the internal volume serial number unless you specify an internal volume serial number using the **VID**= option.

WRITE_TM_ACCEPT
Specifies that you want a write-tape-mark request, made through the **ctpweof** or **tpweof** subroutine, to be accepted and ignored with a successful return code for an ANSI Labeled (AL) tape.

If you do not specify **WRITE_TM_ACCEPT**, a write tape mark request for an SL or AL tape is rejected.

utility Is a pointer (CHARACTER*(*)). Code this parameter as a null pointer, NetTAPE does not use it. It is maintained for compatibility with the CLIO/S product.

ret Is an integer (INTEGER*4) representing the return value.

Return Values

This function returns one of the following return values:

0	NetTAPE_OK
−6	NetTAPE_COMM_ERR
−10	NetTAPE_ALLINUSE
−11	NetTAPE_UNKNOWN_NODE
−12	NetTAPE_COPNPAR_ERR
−13	NetTAPE_COPNSRV_ERR
−17	NetTAPE_NOTPSRV
−182	NetTAPE_CONFIG_ERROR

See “NetTAPE Messages and API Return Values” on page 196 for additional return values and for more information about those listed here.

Files

For C language programs, include the NetTAPE header file, **/usr/lpp/clnettape/inc/fcftpint.h**.

In addition, you can use the following files:

$HOME/nettape.config File used to configure the NetTAPE status daemon and NetTAPE operational characteristics.

$HOME/.netrc File for NetTAPE security (Remote Execution method).

ctpclose or tpclose—Closing the tape file

Description

This call closes the tape file.

Syntax

Language	Programming Syntax
C	**int ctpclose (int** *tlu*, **int** *option* **)**
FORTRAN	**tpclose (** *tlu*, 0, *ret* **)**

Where:

tlu Is an integer (INTEGER*4) representing the tape logical unit number returned from the **ctpalloc** call.

option Is an integer (INTEGER*4) The following are valid values for the *option* parameter:

0 Reserved for future use by NetTAPE.

ret Is an integer (INTEGER*4) representing the return value.

Return Values

This function returns one of the following return values. If the return value is a negative number, errno indicates the error condition of the failing close command.

0 NetTAPE_OK
–6 NetTAPE_COMM_ERR

See “NetTAPE Messages and API Return Values” on page 196 for additional return values and for more information about those listed here.

Files

For C language programs, include the NetTAPE header file, **/usr/lpp/clnettape/inc/fcftpint.h**.

ctperr or tperr—Translating an error code to a message

Description

This call translates an error code into a descriptive message.

Syntax

Language	Programming Syntax
C	**char *ctperr (int** *cterrno* **)**
FORTRAN	**tperr (** *cterrno*, *errtext*, *ret* **)**

Where:

cterrno Is an integer (INTEGER*4) representing the last NetTAPE error code that the program encountered.

errtext Is a character string (CHARACTER*(*)) that holds the text of the error message.

ret Is a pointer (CHARACTER*(*)) representing a pointer to the return value.

Return Values

This function returns a pointer to the error message string associated with the specified error code.

Examples

The following C code example illustrates the use of **ctperr**. If the **ctpopen** subroutine returns with an error code, the message corresponding to that error code is printed to **stderr**. For instance, if ctpopen() returns -17 (NetTAPE_NOTPSRV), the message "No connection to a tape server is available." would be printed.

```
if ((ret = ctpopen(tlu, "allocparms", mode)) < 0 ) {
         fprintf(stderr,"NetTape Error: %s\n", ctperr(ret));
            .
            .      /* perhaps some cleanup routine  */
         exit(3);
      }
```

Files

For C language programs, include the NetTAPE header file, **/usr/lpp/clnettape/inc/fcftpint.h**.

ctpflush or tpflush—Flushing remaining write-behind buffer data

Description

Caution

Use this function only after the volume switch has occurred, otherwise unpredictable results can occur when the tape encounters the physical end-of-volume.

This call flushes to tape the data remaining in the write-behind buffers. Before using this function, you can optionally use the **ctpqwbh** function to determine the number of unwritten blocks of data remaining in the write-behind buffers. This information might be useful if you maintain a database or directory with pointers to different sections of a tape and you need to know the number of blocks that have actually been written on a particular tape volume. See “ctpqwbh or tpqwbh—Querying the number of data blocks in write-behind buffers” on page 185 for more information.

To use **ctpflush**, you must have the write-behind buffer feature enabled without automatic buffer flushing. This is done by specifying the following keywords in your local version of the **nettape.config** file:

```
client.wbh     yes
client.flush   no
```

Handling your own write-behind buffer flushing is useful if you want to write your own internal header at the beginning of a tape. To do this:

1. Write the internal header
2. Invoke **ctpflush** to empty the write-behind buffers that still contain data,
3. Proceed to write data to the tape.

See “Understanding and Controlling Write-Behind Buffers” on page 140 for additional information.

Syntax

Language	Programming Syntax
C	**int ctpflush (int** *tlu* **)**
FORTRAN	**tpflush (** *tlu*, *ret* **)**

Where:

tlu Is an integer (INTEGER*4) representing the tape logical unit number returned by the **ctpalloc** call.

ret Is an integer (INTEGER*4) representing the return value.

Return Values

This function returns one of the following return values:

0	NetTAPE_OK
–5	NetTAPE_IOERR
–6	NetTAPE_COMM_ERR
–7	NetTAPE_INVALPARM
–17	NetTAPE_NOTPSRV
–18	NetTAPE_INVALCALL
–180	NetTAPE_WBH_EMPTY
–181	NetTAPE_WBH_NOTENABLED

See “NetTAPE Messages and API Return Values” on page 196 for additional return values and for more information about those listed here.

Files

For C language programs, include the NetTAPE header file, **/usr/lpp/clnettape/inc/fcftpint.h**.

ctpioctl—Issuing an IOCTL Command

Description

This call lets you issue **ioctl** commands for functions that are not supported by other NetTAPE tape API subroutines. It is similar to the **ioctl** system call. Support for **ioctl** commands is based on a user–configurable table. See Appendix A, “Customizing the IOCTL Table” on page 203.

Use this call only for functions that are not supported by other NetTAPE API subroutines. Do not use this call to replace any of the following NetTAPE API subroutines:

- **ctprew**, for rewinding a tape
- **ctpskpf**, for skipping tape files
- **ctpskpr**, for skipping tape records
- **ctpweof**, for writing tape marks.

Syntax

Language	Programming Syntax
C	**int ctpioctl (int** *tlu*, **int** *ioctl_cmd*, **char ***_cmd_arg**)**
FORTRAN	Not supported

Where:

tlu Is an integer representing the tape logical unit number returned by the **ctpalloc** call.

ioctl_cmd Is an integer representing the command to be issued with the **ioctl** system call.

cmd_arg

Is the address of the **ioctl** command parameter block.

Return Values

This function returns one of the following return values. If the return value is a negative number, errno indicates the error condition of the failing ioctl command.

0	NetTAPE_OK
–5	NetTAPE_IOERR
–6	NetTAPE_COMM_ERR
–7	NetTAPE_INVALPARM
–17	NetTAPE_NOTPSRV

See “NetTAPE Messages and API Return Values” on page 196 for additional return values and for more information about those listed here.

Files

For C language programs, include the NetTAPE header file, **/usr/lpp/clnettape/inc/fcftpint.h**.

ctpopen or tpopen—Opening the tape file

Description

This call opens a tape file for reading, writing, or updating (reading and writing).

Syntax

Language	Programming Syntax
C	**int ctpopen (int** *tlu*, **char ***_allocparms_, **int** *mode* **)**
FORTRAN	**tpopen (** *tlu*, *allocparms*, *mode*, *ret* **)**

Where:

tlu Is an integer (INTEGER*4) representing the tape logical unit number returned by the **ctpalloc** call.

allocparms

Use *allocparms* to specify additional allocation parameters only if you wish to change parameters that were specified at allocation. A sample *allocparms* string is:

```
VOL=myvol1 AL DSN=another_dataset
```

allocparms can contain one or more of the following keywords:

ACL Specifies that you want to use the automatic cartridge loader (ACL) feature. ACL is supported on the 3480, 3490, and 3590 IBM tape devices. The ACL feature differs from ACF (automatic cartridge facility) in that ACL allows only sequential access to tapes in the cartridge loader while ACF can be used in a random access mode as a mini tape library.

You may specify **ACL** only for a device defined in **nettape.adm.config** with the operation mode ibmacl or ibmacf.

You must also specify either the **VOL**= option or the **VID**= option with the **ACL** option.

BLKSZ=*blocksize*
Specifies the size of the blocks or records. Use this option with the **RECLN**= and **RECFM**= options. This option does not apply to unformatted tapes (**RECFM**=**U**); if you specify both **RECFM**=**U** and **BLKSZ**=, **BLKSZ**= is ignored.

BLOCKING
Specifies that **ctpread**, **ctpwrite**, and **ctpskpr** are to work with logical records rather than blocks. Use this option with the **BLKSZ**=, **RECLN**=, and **RECFM**= options.

ctpwrite places the logical records into blocks based on the **BLKSZ**=, **RECLN**=, and **RECFM**= options.

ctpread extracts the logical records from the blocks of the file based on the **BLKSZ**=, **RECLN**=, and **RECFM**= options.

ctpskpr skips logical records based on the **BLKSZ**=, **RECLN**=, and **RECFM**= options.

DSN=*dsname*

Specifies the name of a tape data set. The string *dsname* contains 1 to 44 characters. *dsname* is converted to upper case. If you omit **DSN**=, no data set name is used.

You must specify **DSN**= for standard label (**sl**) or ANSI label (**al**) tapes.

EX=*cyyddd*

Specifies the expiration date for a **new** data set. *c* specifies the century (omitted=1900's, 0=2000's, 1=2100's) and *yyddd* is a Julian date. For example, `97100` is the 100th day of 1997 and `005206` is the 206th day of 2005. If you omit this option, the default is no expiration date.

Note: **EX**= and **RET**= are mutually exclusive. You can specify the longevity of the tape as either an expiration date (**EX**=.*cyyddd*) or as a number of days from now (**RET**= *nnnn*).

FSEQ=*fseq*

Specifies the sequence number of the data set on the tape. The default is 1, the first data set of the tape.

GEN=*file_gen_num*

Specifies a 4-digit file generation number. If you omit this keyword, this field is set to blanks.

AL, NL, SL, NSAL, BLP

Specifies the tape label type.

AL	ANSI X3.27-1987 (ISO 1001-1986) Labeled
NL	Unlabeled
SL	IBM EBCDIC Standard Labeled
NSAL	Non-Standard ANSI Labeled
BLP	Bypass Label Processing

You may type **NL**, **AL**, **BLP**, and **SL** in upper, lower, or mixed case. The default is **nl**.

Notes:

1. AMPEX DST 310 and 410 devices support only NL tapes.
2. Bypassing label processing may circumvent data set access restrictions. Therefore you must have special authority (controlled by an entry in **nettape.adm.config**) to use **BLP**.

For more information, see “Defining the User Authority Control List” on page 44.

3. When you specify **SL** on a write operation, NetTAPE writes a standard label record (VOL1,HDR1,HDR2) at the beginning of the tape volume.
4. For **AL** (ANSI standard label) tapes, NetTAPE supports ANSI version 3 standard labels.
5. NetTAPE supports **AL** or **SL** tapes on 8mm devices, but only for single volume data sets. Furthermore, you must provide sufficient room at the end of the tape for trailer labels.
6. For **NSAL** tapes, if you have set the **client.cross.tm** keyword in the **nettape.config** file to **yes**, NetTAPE ignores the setting.

To write to a tape (any label type) or to read from a **nl** (no label) tape, you must specify either all of **RECLN**=, **BLKSZ**=, and **RECFM**=, or none of the three.

To read from a labeled tape, you must specify **RECFM**=. Other information is read from the tape label. If you specify **RECLN**= or **BLKSZ**= and the values in the tape label do not match your recorded values, **ctpopen** returns an error return code.

For standard label (**sl**) or ANSI label (**al**) tapes, you must also specify the **DSN**= option.

OWNER=*owner*
Specifies a 14-character string identifying the owner of the tape. If you omit this keyword, this field is set to blanks.

RECFM=*record_format*
Specifies the format of records on the tape. Supported values of *record_format* are:

U	Unformatted
F	Fixed
FB	Fixed blocked
FBS	Fixed blocked standard
V	Variable
VB	Variable blocked
VS	Variable spanned
VBS	Variable blocked spanned

You can use **BLKSZ**= and **RECFM**= to change the blocksize and record length of formatted tapes. The default *record_format* is **U**, unformatted tapes.

RECLN=*record_length*
Specifies the length in bytes of logical records on the tape. Use this option with the **BLKSZ**= and **RECFM**= options.

RET=*nnnn*
Specifies the retention period for a **new** data set, in number of days.

Note: **EX**= and **RET**= are mutually exclusive. You can specify the longevity of the tape as either an expiration date (**EX**= *cyyddd*) or as a number of days from now (**RET**= *nnnn*).

The default value is infinity (no expiration date).

REWIND_REJECT
Specifies that you want a rewind request, made through the **ctprew** or **tprew** subroutine, to be rejected for an ANSI Labeled (AL) or Standard Labeled (SL) tape.

If you do not specify **REWIND_REJECT**, a rewind request for an AL or SL tape rewinds the tape to the beginning of the file.

SRC=*source_category*
Specifies the source category from which a scratch volume is mounted. In some tape libraries, source category can be viewed as a scratch pool name. Specify *source_category* as a character string to use the device in manual mode; specify it as a number when using a library. If you don't specify **SRC**=, the category defaults to the definition in **nettape.adm.config**.

SUP_EOF
Specifies that NetTAPE ignore EOF tape marks and continue processing the tape.

If you omit this keyword, NetTAPE returns the NetTAPE_TEOF return code when it reaches EOF on a read operation.

SUP_EOV
Specifies that NetTAPE automatically mount the next volume (if necessary), when End of Volume (EOV) or End of Tape (EOT) is reached.

If you omit this keyword, NetTAPE returns the NetTAPE_EOV return code when it reaches EOV on a read operation, or the NetTAPE_EOT return code when it reaches EOT on a write operation. When reading a tape, NetTAPE returns NetTAPE_EOV, when it reaches EOV on the last volume in the volume list.

For more information about EOT and EOV, see “Understanding NetTAPE Tape Positioning” on page 136.

For more information about return codes, see “NetTAPE Messages and API Return Values” on page 196.

TAR=*target_category*
Specifies the target category to which a private volume is assigned. In some tape libraries, target categories can be viewed as private pool names. Specify *target_category*

as a character string to use the device in manual mode; specify it as a number when using a library.

If you don't specify **TAR**=, the category defaults to the definition in **nettape.adm.config**.

TFMT=*tape_format*
Specifies the tape density. *tape_format* is a string specifying the tape recording format. It can have one of these values:

basic	Basic (uncompacted) mode
compacted	Compacted mode
800	800 BPI, 9 track (NRZI format)
1600	1600 BPI, 9 track (PE format)
6250	6250 BPI, 9 track (GCR format)

The keywords **basic** and **compacted** may be supplied in upper, lower, or mixed case. They may be abbreviated down to a single letter (**b** and **c**).

If you omit **TFMT**=, the default tape format is the format defined in SMIT when the device was configured.

VDIR=*vol_id_dir*
Specifies the name of the directory where NetTAPE is to store (on a write operation) or retrieve (on a read operation) the file containing the volume information associated with data set specified by **DSN**=*dsname*.

VDIR= is an optional keyword you can specify with the **VFILE** keyword.

VER=*version_num*
Specifies a 2-digit file version number. If you omit this keyword, this field is set to 0.

VFILE On a write operation:

Specifies that NetTAPE is to save volume information for the data set specified by *dsname* on the –**d** option. Each volume information file is permanently associated with the device pool where it is created. If you don't specify an esoteric device pool, you must use the particular device pool you first specified, when you read the data set later on.

The volume information is saved in the file *dsname* in the **$HOME/.nettape**. To save the file in a different directory, specify that directory using the **VDIR** option.

If you want this information sent to STDOUT, use the **cltvols** command instead. See “cltvols—Obtaining information about tape volumes used” on page 163 for more information. For more information, see “Obtaining Volume Information Using the VFILE Option” on page 131.

On a read operation:

VFILE specifies that NetTAPE is to retrieve from **$HOME/.nettape** the volume information for the dataset specified by *dsname* on the –**d** option. If the volume information file is in a different directory, use the **VDIR** option to specify its location. For more information, see "Obtaining Volume Information Using the VFILE Option" on page 131.

VID=*int_volid*[**,***int_volid2***,...,***int_volid*]
Specifies the internal volume serial number for each volume in the list –**v** *volser*,*volser2*,...,*volsern*. The internal volume identifier is 1 to 6 characters and is converted to upper case.

This option is for labeled tapes only. Use the **VID**= option to specify an internal volume serial number that is different from the external volume serial number.

If you use the **VID**= option, you must also specify the **VOL**= option.

VOL=**scratch**
VOL=*volser*[**,***volser2***,...,***volsern*]
Specifies the volser (external volume serial number) of one or more tapes. A *volser* is 1 to 6 characters. *volser* arguments are converted to upper case.

For a read operation, you must specify the **VOL**= option unless you use the VFILE option to specify volume information.

For a write operation, **VOL**= is optional. If you omit **VOL**= or specify **VOL**=**scratch**, a scratch tape is mounted.

For labeled tapes, NetTAPE uses the external volume serial number as the internal volume serial number unless you specify an internal volume serial number using the **VID**= option.

WRITE_TM_ACCEPT
Specifies that you want a write-tape-mark request, made through the **ctpweof** or **tpweof** subroutine, to be accepted and ignored with a successful return code for an ANSI Labeled (AL) tape.

If you do not specify **WRITE_TM_ACCEPT**, a write tape mark request for an AL tape is rejected.

mode Is an integer (INTEGER*4) specifying the tape mode:

1 Read
2 Output: open for output and allow rewinding
3 Update: open for update (read/write) and allow rewinding
4 Input with no rewind: open for input and avoid rewinding
5 Output with no rewind: open for output and avoid rewinding
6 Update with no rewind: open for update (read/write) and avoid rewinding

ret Is an integer (INTEGER*4) representing the return value.

Return Values

This function returns one of the following return values. If the return value is a negative number, errno indicates the error condition of the failing open command.

0	NetTAPE_OK
–6	NetTAPE_COMM_ERR
–17	NetTAPE_NOTPSRV

See “NetTAPE Messages and API Return Values” on page 196 for additional return values and for more information about those listed here.

Files

For C language programs, include the NetTAPE header file, **/usr/lpp/clnettape/inc/fcftpint.h**.

In addition, you can use the following files:

$HOME/nettape.config	File used to configure the NetTAPE status daemon and NetTAPE operational characteristics.
$HOME/.netrc	File for NetTAPE security (Remote Execution method).

ctpqwbh or tpqwbh—Querying the number of data blocks in write-behind buffers

Description

This call returns the number of blocks of data remaining in the write-behind buffers of a particular device.

Syntax

Language	Programming Syntax
C	**int ctpqwbh (int** *tlu* **)**
FORTRAN	**tpqwbh (** *tlu*, *ret* **)**

Where:

tlu Is an integer (INTEGER*4) representing the tape logical unit number returned by the **ctpalloc** call.

ret Is an integer (INTEGER*4) representing the return value.

Return Values

If the function is successful, it returns the number of blocks of data in the write-behind buffers of the device. Otherwise, it returns one of the following return values:

−7	NetTAPE_INVALPARM
−181	NetTAPE_WBH_NOTENABLED

See “NetTAPE Messages and API Return Values” on page 196 for additional return values and for more information about those listed here.

Files

For C language programs, include the NetTAPE header file, **/usr/lpp/clnettape/inc/fcftpint.h**.

ctpread or tpread—Reading the tape

Description

This call reads data from an open tape device.

Syntax

Language	Programming Syntax
C	**int ctpread (int** *tlu*, **void ***buffer*, **int** *length* **)**
FORTRAN	**tpread (** *tlu*, *buffer*, *length*, *ret* **)**

Where:

tlu Is an integer (INTEGER*4) representing the tape logical unit number returned from the **ctpalloc** call.

buffer Is a pointer (CHARACTER*(*)) to the buffer.

length Is an integer (INTEGER*4) representing the number of bytes being read from the tape.

ret Is an integer (INTEGER*4) representing the return value. If the return value is greater than or equal to zero, it is the number of bytes read.

Return Values

If successful, this function returns the number of bytes read. If unsuccessful, it returns one of these return values:

−1 NetTAPE_TEOF
−2 NetTAPE_LOADPOINT
−3 NetTAPE_EOV
−5 NetTAPE_IOERR
−6 NetTAPE_COMM_ERR
−7 NetTAPE_INVALPARM - The record length was greater than the maximum record length specified on **ctpalloc** or **tpalloc**, or an invalid record length was specified.
−17 NetTAPE_NOTPSRV
−19 NetTAPE_MALLOCERR
−20 NetTAPE_RECFORM - The format of the records on a tape is not what NetTAPE expected. For example, a file that was allocated to contain VBS records does not contain valid VBS records.

See “NetTAPE Messages and API Return Values” on page 196 for additional return values and for more information about those listed here.

Files

For C language programs, include the NetTAPE header file, **/usr/lpp/clnettape/inc/fcftpint.h**.

ctpreads or tpreads—Reading the tape

Description

This call reads data from an open tape device.

Syntax

Language	Programming Syntax
C	**int ctpreads (int** *tlu*, **void ***buffer*, **int** *length* **int *** *bytes_read*)
FORTRAN	**tpreads (** *tlu*, *buffer*, *length*, *bytes_read* , *ret* **)**

Where:

tlu Is an integer (INTEGER*4) representing the tape logical unit number returned from the **ctpalloc** call.

buffer Is a pointer (CHARACTER*(*)) to the buffer.

length Is an integer (INTEGER*4) representing the number of bytes being read from the tape.

bytes_read Is an integer (INTEGER*4) representing the number of bytes read from the tape. This value is valid only when the subroutine completes with a return value of NetTAPE_OK.

ret Is an integer (INTEGER*4) representing the return value. If the return value is greater than or equal to zero, it is the number of bytes read.

Return Values

This function one of the following return values:

0	NetTAPE_OK
–1	NetTAPE_TEOF
–2	NetTAPE_LOADPOINT
–3	NetTAPE_EOV
–5	NetTAPE_IOERR
–6	NetTAPE_COMM_ERR
–7	NetTAPE_INVALPARM - The record length was greater than the maximum record length specified on **ctpalloc** or **tpalloc**, or an invalid record length was specified.
–17	NetTAPE_NOTPSRV
–19	NetTAPE_MALLOCERR
–20	NetTAPE_RECFORM - The format of the records on a tape is not what NetTAPE expected. For example, a file that was allocated to contain VBS records does not contain valid VBS records.

See “NetTAPE Messages and API Return Values” on page 196 for additional return values and for more information about those listed here.

Files

For C language programs, include the NetTAPE header file, **/usr/lpp/clnettape/inc/fcftpint.h**.

ctprew or tprew—Rewinding the tape

Description

This call rewinds the tape.

Syntax

Language	Programming Syntax
C	**int ctprew (int** *tlu* **)**
FORTRAN	**tprew (** *tlu*, *ret* **)**

Where:

tlu Is an integer (INTEGER*4) representing the tape logical unit number returned from the **ctpalloc** call.

ret Is an integer (INTEGER*4) representing the return value.

Return Values

This function returns one of the following return values. If the return value is a negative number, errno indicates the error condition of the failing ioctl command.

0	NetTAPE_OK
–6	NetTAPE_COMM_ERR
–17	NetTAPE_NOTPSRV

See “NetTAPE Messages and API Return Values” on page 196 for additional return values and for more information about those listed here.

Files

For C language programs, include the NetTAPE header file, **/usr/lpp/clnettape/inc/fcftpint.h**.

ctpskpf or tpskpf—Skipping tape files

Description

This function skips forward or backward the specified number of tape marks on the tape.

Syntax

Language	Programming Syntax
C	**int ctpskpf (int** *tlu*, **int** *count* **)**
FORTRAN	**tpskpf (** *tlu*, *count*, *ret* **)**

Where:

tlu Is an integer (INTEGER*4) representing the tape logical unit number, returned from the **ctpalloc** call.

count Is an integer (INTEGER*4) representing the number of tape marks to be skipped. This can be a positive or negative number.

ret Is an integer (INTEGER*4) representing the return value.

Return Values

This function returns one of the following return values. If the return value is a negative number, errno indicates the error condition of the failing ioctl command.

0	NetTAPE_OK
–1	NetTAPE_TEOF
–2	NetTAPE_LOADPOINT
–4	NetTAPE_EOT
–5	NetTAPE_IOERR
–6	NetTAPE_COMM_ERR
–17	NetTAPE_NOTPSRV
–18	NetTAPE_INVALCALL - The file must be opened using **ctpopen** before you can skip tape files.

See “NetTAPE Messages and API Return Values” on page 196 for additional return values or for more information about those listed here.

Files

For C language programs, include the NetTAPE header file, **/usr/lpp/clnettape/inc/fcftpint.h**.

ctpskpr or tpskpr—Skipping tape records

Description

This function skips forward or backward the specified number of tape records on the tape.

Syntax

Language	Programming Syntax
C	**int ctpskpr (int** *tlu*, **int** *count* **)**
FORTRAN	**tpskpr (** *tlu*, *count*, *ret* **)**

Where:

tlu Is an integer (INTEGER*4) representing the tape logical unit number, returned from the **ctpalloc** call.

count Is an integer (INTEGER*4) representing the number of records to skip. The value can be positive or negative.

ret Is an integer (INTEGER*4) representing the return value.

Return Values

This function returns one of the following return values. If the return value is a negative number, errno indicates the error condition of the failing ioctl command.

0	NetTAPE_OK
–1	NetTAPE_TEOF
–2	NetTAPE_LOADPOINT
–3	NetTAPE_EOV
–4	NetTAPE_EOT
–5	NetTAPE_IOERR
–6	NetTAPE_COMM_ERR
–17	NetTAPE_NOTPSRV
–18	NetTAPE_INVALCALL - The file must be opened using **ctpopen** before you can skip tape records.
–19	NetTAPE_MALLOCERR
–20	NetTAPE_RECFORM - The format of the records on a tape is not what NetTAPE expected. For example, a file that was allocated to contain VBS records does not contain valid VBS records.
–21	NetTAPE_SKIP_ERROR - NetTAPE could not guarantee tape position because a hardware or device driver error occurred. This errno applies only to Ampex tape devices.

See “NetTAPE Messages and API Return Values” on page 196 for additional return values and more information about those listed here.

Files

For C language programs, include the NetTAPE header file, **/usr/lpp/clnettape/inc/fcftpint.h**.

ctpunall or tpunall—Unallocating a tape device

Description

This call uses the tape unallocation call to stop the remote tape server and free internal control blocks. This is required by NetTAPE.

Syntax

Language	Programming Syntax
C	**int ctpunall (int** *tlu* **)**
FORTRAN	**tpunall (** *tlu*, *ret* **)**

Where:

tlu Is an integer (INTEGER*4) representing the tape logical unit number returned from the **ctpalloc** call.

ret Is an integer (INTEGER*4) representing the return value.

Return Values

This function returns one of the following return values:

0 NetTAPE_OK
–6 NetTAPE_COMM_ERR

See “NetTAPE Messages and API Return Values” on page 196 for additional return values and for more information about those listed here.

Files

For C language programs, include the NetTAPE header file, **/usr/lpp/clnettape/inc/fcftpint.h**.

ctpvols or tpvols—Obtaining information about tape volumes used

Description

The **ctpvols** call returns information about the tape volumes used by the data set that is currently in use. When multiple volumes have been written, you can call **ctpvols** after **ctpclose** and before **ctpunall** to get the list of volumes.

To have this information written to a file instead, specify the VFILE option on the **ctpalloc** subroutine. See “ctpalloc or tpalloc—Allocating a tape device” on page 166.

Syntax

Language	Programming Syntax
C	**int ctpvols (int** *tlu*, **int ***nvols*, **char ***bf* **)**
FORTRAN	**tpvols (** *tlu*, *nvols*, *bf* , *ret* **)**

Where:

tlu Is an integer (INTEGER*4) representing the tape logical unit number, returned from the **ctpalloc** call.

nvols Is an integer (INTEGER*4) representing the number of tape volumes, returned by **ctpvols**.

bf Is a pointer (CHARACTER*(*)) to a buffer allocated and returned by **ctpvols**. Once you have saved the contents of the buffer, free the buffer's memory space.

ret Is an integer (INTEGER*4) representing the return value.

Return Values

This function returns one of the following return values:

0	NetTAPE_OK
–1	NetTAPE_TEOF
–6	NetTAPE_COMM_ERR
–17	NetTAPE_NOTPSRV

See “NetTAPE Messages and API Return Values” on page 196 for additional return values and for more information about those listed here.

Files

For C language programs, include the NetTAPE header file, **/usr/lpp/clnettape/inc/fcftpint.h**.

ctpweof or tpweof—Writing tape marks

Description

This call writes tape marks as specified.

Syntax

Language	Programming Syntax
C	**int ctpweof (int** *tlu*, **int** *count* **)**
FORTRAN	**tpweof (** *tlu*, *count*, *ret* **)**

Where:

tlu Is an integer (INTEGER*4) representing the tape logical unit number returned from the **ctpalloc** call.

count Is an integer (INTEGER*4) representing the number of tape marks to be written to the tape.

ret Is an integer (INTEGER*4) representing the return value.

Return Values

This function returns one of the following return values. If the return value is a negative number, errno indicates the error condition of the failing ioctl command.

0	NetTAPE_OK
–6	NetTAPE_COMM_ERR
–17	NetTAPE_NOTPSRV

See “NetTAPE Messages and API Return Values” on page 196 for additional return values and for more information about those listed here.

Files

For C language programs, include the NetTAPE header file, **/usr/lpp/clnettape/inc/fcftpint.h**.

ctpwrite or tpwrite—Writing to tape

Description

This call writes data to an open tape device.

Syntax

Language	Programming Syntax
C	**int ctpwrite (int** *tlu*, **void ***buffer*, **int** *length* **)**
FORTRAN	**tpwrite (** *tlu*, *buffer*, *length*, *ret* **)**

Where:

tlu Is an integer (INTEGER*4) representing the tape logical unit number returned by the **ctpalloc** call.

buffer Is a pointer (CHARACTER*(*)) to the buffer.

length Is an integer (INTEGER*4) representing the number of bytes being written to the tape.

ret Is an integer (INTEGER*4) representing the return value.

Return Values

This function returns one of the following return values:

nnn	The number of bytes written.
–1	NetTAPE_TEOF — Write failed because of device error; see associated message for details about the error.
–2	NetTAPE_LOADPOINT
–5	NetTAPE_IOERR
–6	NetTAPE_COMM_ERR
–7	NetTAPE_INVALPARM
–17	NetTAPE_NOTPSRV

See “NetTAPE Messages and API Return Values” on page 196 for additional return values and for more information about those listed here.

Files

For C language programs, include the NetTAPE header file, **/usr/lpp/clnettape/inc/fcftpint.h**.

ctpwrites or tpwrites—Writing to tape

Description

This call writes data to an open tape device.

Syntax

Language	Programming Syntax
C	**int ctpwrites (int** *tlu*, **void** **buffer*, **int** *length* **int** *bytes_written* **)**
FORTRAN	**tpwrites (** *tlu*, *buffer*, *length*, *bytes_written*, *ret* **)**

Where:

tlu Is an integer (INTEGER*4) representing the tape logical unit number returned by the **ctpalloc** call.

buffer Is a pointer (CHARACTER*(*)) to the buffer.

length Is an integer (INTEGER*4) representing the number of bytes being written to the tape.

bytes_written Is an integer (INTEGER*4) representing the number of bytes written to the tape. This value is valid only when the subroutine completes with a return value of NetTAPE_OK.

ret Is an integer (INTEGER*4) representing the return value.

Return Values

This function returns one of the following return values:

0. NetTAPE_OK.
–1 NetTAPE_TEOF — Write failed because of device error; see associated message for details about the error.
–2 NetTAPE_LOADPOINT
–5 NetTAPE_IOERR
–6 NetTAPE_COMM_ERR
–7 NetTAPE_INVALPARM
–17 NetTAPE_NOTPSRV

See “NetTAPE Messages and API Return Values” on page 196 for additional return values and for more information about those listed here.

Files

For C language programs, include the NetTAPE header file, **/usr/lpp/clnettape/inc/fcftpint.h**.

NetTAPE Messages and API Return Values

Name	Value	Message
NetTAPE_OK	0	The operation completed successfully.
NetTAPE_TEOF	–1	A tape mark was hit on a read. Write failed because of device error; see associated message for details about the error.
NetTAPE_LOADPOINT	–2	The loadpoint was hit as it attempted to backspace past the beginning of the tape.
NetTAPE_EOV	–3	A tape mark was hit twice on a read.
NetTAPE_EOT	–4	End of the tape was hit on a write.
NetTAPE_IOERR	–5	A tape I/O error occurred.
NetTAPE_COMM_ERR	–6	A communication error in the NetTAPE network occurred.
NetTAPE_INVALPARM	–7	An invalid parameter was entered in a NetTAPE call or function.
NetTAPE_BOT	–8	NetTAPE has reached the first file after the NSAL label and tape mark.
NetTAPE_ALLINUSE	–10	All tape drives are in use. A maximum of 10 tape drives can be accessed at the same time.
NetTAPE_UNKNOWN_NODE	–11	The node was not found in the **parconf** file.
NetTAPE_COPNPAR_ERR	–12	The NetTAPE **OPNPAR** call failed.
NetTAPE_COPNSRV_ERR	–13	The NetTAPE **OPNSRV** call failed.
NetTAPE_MSGTOOLONG	–14	**ctpwrto** error. The message length exceeds the maximum 100 bytes.
NetTAPE_NOTPSRV	–17	No connection to a tape server is available. **ctpalloc** is not called.
NetTAPE_INVALCALL	–18	The requested function could not be performed because it is inappropriate. For instance, a **ctpopen** request for a tape that has not been allocated.
NetTAPE_MALLOCERR	–19	Memory allocation failed.
NetTAPE_RECFORM	–20	NetTAPE detected an invalid record format.
NetTAPE_SKIP_ERROR	–21	NetTAPE could not guarantee tape position because a hardware or device driver error occurred. This errno applies only to Ampex tape devices.
NetTAPE_SPEC_ALLOC_FAILURE	–30	The allocation request failed.
NetTAPE_NODEVS_AVAILABLE	–31	No devices were available and either NOWAIT specified by user or **nettape.adm.config** specifies that mount requests are not to be queued.
NetTAPE_WAIT_TIME_EXP	–32	The maximum wait time for a queued request was exceeded.
NetTAPE_BLP_NOT_AUTHORIZED	–33	The user is not authorized for bypass label processing (BLP).
NetTAPE_OPER_NOT_AUTHORIZED	–34	The user lacks operator authorization, which is required for the attempted action. Operator authorization is set in **nettape.adm.config**.

Name	Value	Message
NetTAPE_NO_DEFAULT_POOL	−35	No device pool was specified and no default device pool is defined in **nettape.adm.config**.
NetTAPE_NO_DEVS_AVAILABLE	−36	No devices are up (available) in the specified pool.
NetTAPE_NO_ACL_ACF_DEVICES	−37	No ACL or ACF devices are in the specified pool.
NetTAPE_CLTOPR_INVALID_VOLSER	−38	The volser was omitted on a request to mount a scratch tape.
NetTAPE_INVALID_DEV_POOL	−39	An invalid device pool name was specified.
NetTAPE_INVALID_CATEGORY	−40	An invalid category name was specified.
NetTAPE_INVALID_ARGUMENT	−41	An invalid argument was specified.
NetTAPE_INVALID_HOST	−42	An invalid host name was specified.
NetTAPE_UNEXPECTED_CLTUNALL	−43	An invalid host name or user ID was specified on a **cltunall** command.
NetTAPE_CLIENT_REQ_CANCEL	−44	The tape request was cancelled by the user.
NetTAPE_OPER_CANCEL1	−45	The tape request was cancelled by the operator.
NetTAPE_OPER_CANCEL2	−46	The queued mount request was cancelled by the operator.
NetTAPE_OPER_CANCEL3	−47	The tape request was cancelled, operator intervention required.
NetTAPE_ACCESS_NOINFO	−48	The specified user name is not recognized by NetTAPE.
NetTAPE_ACCESS_NONE	−49	The user does not have access to the requested device.
NetTAPE_VOL_ERROR	−50	The volume information that was specified in the allocation parameters is incorrect or missing.
NetTAPE_UNKNOWN_ALLOC_PARMS	−51	Unknown or unsupported keywords were specified in the allocation parameters.
NetTAPE_LIBRARY_CANCEL	−80	The tape request was cancelled by the tape library manager.
NetTAPE_LIBRARY_VOLCHECK_IGNORE	−81	The requested tape label is different from the label found, but the tape to be used anyway.
NetTAPE_LIBRARY_ERROR	−82	A tape library hardware problem was encountered.
NetTAPE_LIBRARY_DMN_DOWN	−83	The tape library daemon is not running.
NetTAPE_LIBRARY_VOLCHECK_NO	−84	The requested tape label is different from the label found. The request is cancelled because operator intervention is required.
NetTAPE_LIBRARY_VOLSER_UNKNOWN	−85	The specified library volume is unrecognized.
NetTAPE_LIBRARY_DOWN	−86	The tape library manager is not running.
NetTAPE_LIBRARY_NOT_DEFINE	−87	The tape library name is not defined in **nettape.adm.config**.
NetTAPE_INTERNAL_ERROR	−100	NetTAPE internal error.
NetTAPE_START_CLUTIL_FAILURE	−101	The clutil daemon could not be started.
NetTAPE_MKDEV_FAILURE	−102	The tape pseudo device driver could not be created.
NetTAPE_CHOWN_FAILURE	−103	**chown** failed for a device special file.
NetTAPE_CLUTIL_FAILURE	−104	The clutil daemon failed.

Name	Value	Message
NetTAPE_CLUTIL_STICKY_BIT	−105	Installation error. NetTAPE not installed using root.
NetTAPE_CHOWN_INVALID_USERID	−106	The user is does not have a user ID on the node containing the tape device.
NetTAPE_GETDEVNO_ERR	−107	The clutil daemon could not obtain the device number for an IBM 3494 tape library.
NetTAPE_MKDEV_TMP_FULL	−108	NetTAPE could not create a tape pseudo device driver using **mkdev** because the /**tmp** directory is full.
NetTAPE_NO_NTA_CONFIG	−120	NetTAPE could not find **nettape.config**.
NetTAPE_INVALID_NTA_CONFIG	−121	An error was found in **nettape.config**.
NetTAPE_SECURITY_CHECK_FAILURE	−122	NetTAPE's security check failed.
NetTAPE_CONN_STSDMN_FAILURE	−123	The tape client failed to connect to the status daemon.
NetTAPE_SL_VOLCHECK	−140	A standard label tape with an incorrect volser was mounted.
NetTAPE_AL_VOLCHECK	−141	An ANSI label tape with an incorrect volser was mounted.
NetTAPE_SL_AL_VOLCHECK	−142	A standard label tape was requested, but an ANSI label tape was mounted.
NetTAPE_AL_SL_VOLCHECK	−143	An ANSI label tape was requested, but a standard label tape was mounted.
NetTAPE_SL_NL_VOLCHECK	−144	A standard label tape was requested, but an unlabeled tape was mounted.
NetTAPE_AL_NL_VOLCHECK	−145	An ANSI label tape was requested, but an unlabeled tape was mounted.
NetTAPE_NL_AL_VOLCHECK	−146	An unlabeled tape was requested, but an ANSI label tape was mounted.
NetTAPE_NL_SL_VOLCHECK	−147	An unlabeled tape was requested, but a standard label tape was mounted.
NetTAPE_INVALID_HDR1_DSN	−148	An incorrect HDR1 header label was found.
NetTAPE_INVALID_BLK_CNT	−149	An incorrect block count was found in the EOF1 trailer label.
NetTAPE_VOLCHECK_EXIT_CANCEL	−150	The allocation request was cancelled by the Volume Check exit.
NetTAPE_VFILE_DSN_INUSE	−160	The VFILE file is in use by another user.
NetTAPE_VFILE_POOL_CONFLICT	−161	The device pool specified when the VFILE file was created differs from the one on a call to read the VFILE file.
NetTAPE_VFILE_UPDT_LOCK_ERR	−162	An error occurred while updating the VFILE file's lock file.
NetTAPE_VFILE_UNLOCK_ERR	−163	An error occurred while unlocking the VFILE file.
NetTAPE_VFILE_CREATE_ERR	−164	The VFILE file could not be created.
NetTAPE_VFILE_RWFLAG_ERR	−165	For a command that involves reading from the VFILE file: the file does not permit read access. For a command that involves writing to the VFILE file: the file does not permit write access.
NetTAPE_VFILE_RETRIEVE_ERR	−166	The VFILE file could not be read.

Name	Value	Message
NetTAPE_VFILE_NO_HOME_DIR	−167	The HOME environment variable is not defined.
NetTAPE_VFILE_LABEL_CONFLICT	−168	The specified label does not match the one in the VFILE file.
NetTAPE_VFILE_OWNER_CONFLICT	−169	The specified user name does not match the one in the VFILE file.
NetTAPE_VFILE_VOL_LIST_CONFLICT	−170	The VOL= keyword cannot be specified with VFILE.
NetTAPE_VFILE_VID_LIST_CONFLICT	−171	The VID= keyword cannot be specified with VFILE.
NetTAPE_VFILE_FSEQ_CONFLICT	−172	−s *fseq* cannot be specified with VFILE.
NetTAPE_WBH_EMPTY	−180	The write-behind buffers are empty.
NetTAPE_WBH_NOTENABLED	−181	The write-behind buffer feature is disabled.
NetTAPE_CONFIG_ERROR	−182	A syntax error was found in the **nettape.config** file
NetTAPE_VERSION_MISMATCH	−999	The status daemon and the clutil daemon are from different versions of NetTAPE.

Chapter 17. Troubleshooting Tips for Users

Here are some tips for usage-related errors:

- Return code NetTAPE_COPNSRV_ERR (–13) from **ctpalloc**

  Verify that you have access to the node containing the device.

- Message "The NetTAPE OPNSRV call failed" from **cltalloc**

  Verify that you have access to the node containing the device.

- Allocation fails

  Verify that your user ID is authorized to access NetTAPE on the node to which the device is attached and that the permissions allow reading and writing. For information about NetTAPE authorization, see “Step 2: Defining NetTAPE's Security Method” on page 37.

- NetTAPE terminates while you are writing data to a multi-volume data set.

  If NetTAPE terminates while a multi-volume data set is being written, the operation mode of the tape device determines whether the write operation can complete successfully. For instance, suppose you are writing a three-volume data set and NetTAPE fails while you are writing to the second volume:

  – With ACL mode, the write operation completes successfully, resulting in the expected three-volume data set.

  – With IBMACS or STKACS mode, write operations to the second volume completes successfully, but the third volume is not mounted. The write operation must be reinitiated, starting with the first volume.

  – With manual mode, write operations to the second volume complete successfully but the write operations to the third volume will fail.

- Return code NetTAPE_INVALPARM (–7), when reading a standard label tape.

  Verify that the allocation parameters you have specified match those with which the tape was originally allocated. For instance, the data set name and label type must be the same.

  Verify that the volume check exit routine, if there is one, did not encounter an error.

  Look in the client daemon log, /**tmp**/**cltclntd.pst***n*, for error messages. See Chapter 13, “Troubleshooting Tips for the Administrator” on page 123 for more information.

© Copyright IBM Corp. 1996, 1997

Appendix A. Customizing the IOCTL Table

Device drivers use the AIX **ioctl** system call to perform control functions on remote tape devices, such as setting the tape density. NetTAPE includes support for most **ioctl** commands associated with the tape devices that can be used with NetTAPE. The **ioctl** commands supported by NetTAPE are maintained in a table, which you can modify by adding new **ioctl** commands. You might find it necessary or desirable to modify the ioctl table, for instance, when you install either:

- A new kind of tape device in your NetTAPE configuration, which includes a new device driver
- A new tape device driver for an existing device in your NetTAPE configuration. In this case, you might want to add support for any new **ioctl** commands the device driver uses.

At a high level, the process for updating the NetTAPE ioctl table consists of the following steps:

1. Select a host (client host) from which you will update and recompile the ioctl table. The host must be one of the server systems from which the remote tape device will be used. The host must also be defined to the NetTAPE configuration, in **nettape.adm.config**.
2. Update the ioctl table on the server host.
3. Stop NetTAPE.
4. Recompile, and relink the ioctl table on the server host.
5. Update the **nettape.adm.config** file to include the new device, if applicable.
6. Restart NetTAPE.
7. Copy the updated executable to the other NetTAPE client systems for the device, if desired.

The next several topics provide detailed instructions for performing these steps.

Adding IOCTL Commands to the IOCTL Table

If applicable, install the new device driver on the desired host and test its basic functions. To add additional commands to the ioctl table, perform the following steps:

Step 1: Identify header files and ioctls

Look for the header file (or files) you'll need to recompile the ioctl table in the/**usr**/**include**/**sys** directory of the host where the device driver is installed. To see which header file you need from this directory, check the device driver documentation.

© Copyright IBM Corp. 1996, 1997

Step 2: Add the New Header File to the IOCTL Table

Next, add the new header file to the ioctl table file, as follows:

1. Change to the ioctl samples directory. Enter:

   ```
   cd /usr/lpp/nettape/samples/ioctl
   ```

2. Edit the file **netTapeIoctl.h**. About 35 lines from the top of the file, you'll find a comment that looks like this:

   ```
   /*  Include the new header file here  */
   ```

3. Add the new header file (or files) below the comment line using the **#include** statement.

Step 3: Add New IOCTL Commands to the IOCTL Table

Add the new ioctl commands to the ioctl table. An ioctl table entry, for an Ampex DST device driver for instance, looks like this:

```
"DSTIOCTOP", DSTIOCTOP, TRUE, TRUE, 5, DST_SETPOS,
sizeof(dstioctop_st), sizeof(dst_position_st),0,0
```

Although the example shows the entry on two lines, the entire entry must be on a single line in the ioctl table.

Note: All entries except the last must end in a comma.

Going from left to right, the format of an ioctl table entry consists of:

ioctl command name string
: The name of the ioctl command in string form, for example, `"DSTIOCTOP"`. If an error occurs, NetTAPE uses the command name string to identify the command in the **/tmp/cltclntd.pst***n* error log on the client node.

ioctl command name
: The name of the ioctl command, for example, `DSTIOCTOP`. The ioctl command name must be the same as the ioctl command string, without the quotation marks.

Data structure is used for input
: If the data structure associated with the ioctl command is used for input, specify TRUE. Otherwise, specify FALSE. For instance, to set the block size of the device, you would place the value in the structure and pass the structure as input to the ioctl command. If you are uncertain whether the command uses the structure as an input, specify TRUE.

Data structure is used for output
: If the data structure associated with the ioctl command is used for output, specify TRUE. Otherwise, specify FALSE. For instance, an ioctl command sometimes returns information about the tape device to the caller. In this case, the structure is used for output. If you are uncertain whether the command uses the structure for output, specify TRUE.

Data structure type
: A field that indicates information about the data structures that are used by the ioctl command. Specify one of the following:

0 The Type 0 ioctl command uses only a single structure or no structure. Most ioctl commands use a single structure that is specified as the third parameter in the command's parameter list. For instance, a typical ioctl command invocation would look like this:

```
ioctl (fd, IOCINFO, &devinfo)
```

To indicate that an ioctl command uses no structure, specify both "data structure is used for input" and "data structure is used for output" as FALSE, and specify "number of additional data structures used" as 0. On the invocation, specify a 0 or null in the third parameter list field. For instance:

```
ioctl (fd, STIOCMD, 0)
```

1 The Type 1 ioctl command uses one additional structure. It is pointed to by the last member of the first structure.

2 The Type 2 ioctl command uses two additional structures. They are pointed to by the last two members of the first structure.

3 The Type 3 ioctl command uses three additional structures. They are pointed to by the last three members of the first structure.

4 The Type 4 ioctl command uses four additional structures.

5 The Type 5 ioctl command uses one additional structure, which is pointed to by the last member of the first structure. However, the Type 5 ioctl command also accepts a sub-opcode parameter that precisely identifies the nature of the additional structure. The sub-opcode parameter is described below.

6 The Type 6 ioctl command is an MTIO Type B ioctl command (MTIOFMQ, MTIOFMS, MTIOCRST, or MTIOCMNT). Each of these ioctl commands requires 2 structures. Unlike the Type 5 ioctl command data structures, the second structure is pointed to by the second member of the first structure.

Sub-opcode parameter

Use this parameter only if you have specified a Type 5 ioctl command. This parameter specifies the second op code associated with certain ioctl commands. If the ioctl commands use a second op code, these are listed in the header file along with the main op codes. The second op code must be placed in the first member of the first structure.

If there is no second op code, specify a 0 for this parameter.

Size of first structure

The size of the first structure, which is the one specified in the parameter list. Always use the **sizeof** macro. For instance,

`sizeof (first_structure)`

Size of second structure
The size of the second structure, if there is one. For instance, `sizeof (second_structure)`. If there is no second structure, specify a 0.

Size of third structure
The size of the third structure, if there is one. For instance, `sizeof (third_structure)`. If there is no third structure, specify a 0.

Step 4: Recompile with the Updated IOCTL Table

Before you recompile the ioctl table, you must stop NetTAPE. Once NetTAPE is stopped, use the **make.ioctl** makefile, located in the **/usr/lpp/nettape/samples/ioctl** directory, to recompile and relink the ioctl table.

You can either:

- Recompile the ioctl table and make it available to both NetTAPE command users and NetTAPE API programs.
- Recompile the ioctl table and make it available only to NetTAPE API programs.

  This second option may be useful if you have no need to make the new ioctls available to command users.

Making the New IOCTL Table Available for Commands and Programs

To recompile the ioctl table and make it available for both commands and programs, enter:

```
make -f make.ioctl
```

The makefile saves the current versions of the executables, **pstdd** and **cltclntd**, with the suffix, `.old`. If you want to maintain two or more previous versions of the old NetTAPE executables, you'll need to rename one set to avoid overwriting versions you have already saved.

The object that contains the new ioctl table is inserted into the **libclios.a** archive. To make use of the new ioctl table, NetTAPE API users must now relink their programs.

NetTAPE places the newly-recompiled executables, **pstdd**, **cltclntd**, and **tapesrv**, in the **/usr/lpp/clnettape/bin** directory on the server node.

Making the New IOCTL Table Available Only to Programs

To recompile the ioctl table and make it available only to programs that use the NetTAPE API, enter:

```
make -f make.ioctl api
```

With the **api** option, the makefile recompiles the ioctl table and inserts the object that contains the new table into the **libclios.a** archive. To make use of the new ioctl table, NetTAPE API users must now relink their programs.

Step 5: Update the NetTAPE Configuration

Before restarting NetTAPE, add the new device to your **nettape.adm.config** file, if necessary. Then, restart NetTAPE.

Step 6: Copy Executables to Other Client Systems

Once you have verified that the new **ioctl** commands are working, copy the new versions of the **pstdd** and **cltclntd** executables to the other client systems that will use the device, replacing the existing versions.

If a client program tries to use an **ioctl** command that is not found in the ioctl table, the /**tmp**/**cltclntd.pst***n* error log on the client node will contain an error message similar to this:

```
pstdd error log: ioctl XXXXXXXXX is not in the ioctl table
```

Note: Some SP systems can have a combination of AIX 4.1 and AIX 4.2 operating systems running on different nodes. Do **not** place executables that were compiled on an AIX 4.2 system on an AIX 4.1 system; they are not binary compatible and results are unpredictable. You may put AIX 4.1 executables on an AIX 4.2 system.

Appendix B. How to Use NetTAPE Commands

This appendix provides examples of using NetTAPE commands with the basic AIX backup commands, **tar**, **cpio**, **dd**, **backup**, and **restore**.

Using tar with Labeled Tapes

The following commands write to multiple tape files, on a single labeled tape, using **tar** commands. The **cltopen** command is issued between each **tar** to specify a different data set name and file sequence number.

```
#  allocate a 3494 tape device with dataset name d1 and file sequence 1
#  standard label tape
#  tar file1 to the tape
cltalloc -P 3494 -f mytape -d d1 -s 1 -l sl
tar -cvf mytape.1 file1

#  now open the tape with dataset name d2 and file sequence 2
#  tar file2 to the tape
cltopen -f mytape -d d2 -s 2
tar -cvf mytape file2

#  now let's get the 2 files off the tape
#  open the tape to dataset name d1 and file sequence 1
#  restore file1 from tape
cltopen -f mytape -d d1 s 1
tar -xvf mytape

#  open the tape to dataset name d2 and file sequence 2
#  restore file2 from tape
cltopen -f mytape -d d2 s 2
tar -xvf mytape

#  unallocate the tape device
cltunall -f mytape
```

Using tar, cpio, dd, and backup/restore with Multi-volume Data Sets

Certain allocation options are required when you use the tar, dd, and cpio commands with multi-volume data sets. These options also vary depending on whether a labeled tape is used.

For unlabeled tapes (NL):
To write to the tape, you must specify the allocation option SUP_EOV. To read from the tape, you must specify the entire volume list, as well as the SUP_EOV and SUP_EOF options.

Here's an example using the **tar** command:

© Copyright IBM Corp. 1996, 1997

```
#  allocate a 3490 device using the suppress end of volume option
#  using a scratch tape
cltalloc -P 3490B -f mytape -o "SUP_EOV"

#  tar a large directory to tape which I know will span volumes
tar cvf mytape /large_directory

#  find out the volume serial numbers since I didn't request
#  any specific volumes and used scratch tapes
cltvols -f mytape

#  open the device with the volume list and the suppress end
#  of volume and suppress end of file options
cltopen -f mytape -v VOL1,VOL2,VOL3 -o "SUP_EOV SUP_EOF"

#  restore the large directory
tar -xvf mytape

#  unallocate the device
cltunall -f mytape
```

For labeled tapes (AL or SL):
To write to the tape, you must specify the SUP_EOV allocation option. To read from the tape, you must specify the entire volume list, as well as the SUP_EOV option.

Here's an example using the **tar** command:

```
#  allocate a 3490 device using the suppress end of volume option
#  and a standard label scratch tape
cltalloc -P 3490B -f mytape -o "SUP_EOV" -l sl

tar cvf mytape /large_directory
cltvols -f mytape
cltopen -f mytape -v VOL1,VOL2,VOL3 -o "SUP_EOV"
tar -xvf mytape
cltunall -f mytape
```

Although the above examples are for **tar**, you must use the same options for **cpio**, **dd**, and **backup**/**restore**.

Using the backup/restore Commands

When backing up large amounts of data, specify the blocksize on the restore. If you think you'll need multiple volumes, you must also specify the option SUP_EOV on the allocations. See “Using tar, cpio, dd, and backup/restore with Multi-volume Data Sets” on page 209 for more information.

Here's an example:

```
#  allocate a 3490 device using scratch tape
cltalloc -P 3490B -f mytape

#  backup everything in the current directory to tape
find . -print | backup -vif mytape

#  get the volume serial
cltvols -f mytape

#  unallocate the device
cltunall -f mytape

#  allocate the device for restore using the volume from the
#  backup
cltalloc -P 3490C -f mytape -v VOL1

#  restore the data specifying blocksize of 32768
#  dd is required when using restore with tape, see the
#  restore manpage
dd if=mytape bs=32768 | restore -xvgf -

#  unallocate the device
cltunall -f mytape
```

Using the cpio Command

When using **cpio** to backup large files, specify the blocksize. If you think you'll need multiple volumes, you must also specify the option SUP_EOV on the allocations. See “Using tar, cpio, dd, and backup/restore with Multi-volume Data Sets” on page 209 for more information.

Here's an example:

```
#  allocate a 3490 device using scratch tape
cltalloc -P 3490B -f mytape

#  cpio the current directory
#  the blocksize is specified with C32.  This will result
#  in a blocksize of 16k  (32 x 512).
find . -print | cpio -ovdC32 > mytape

#  get the volume serial
cltvols -f mytape

#  open the device specifying the volume serial
cltopen -f mytape -v VOL1

#  restore the tape, again using the blocksize 32
cpio -idmvC32 < mytape

#  unallocate the device
cltunall -f mytape
```

Using DB2 PE Database's backup/restore Commands

To **backup**/**restore** a DB2 database to **mytape**, you need to specify the following on the DB2 commands:

- The full path name of the NetTAPE device (e.g., /u/curly/mytape),
- The BUFFER parameter, which specifies the buffer size in 4K byte blocks. The resulting block size (BUFFER n * 4096) must be less than or equal to the value you specified on the MAX_DATA option when you issued the **cltalloc** command to allocate **mytape**.

For example:

```
db2 backup database sample to /u/curly/mytape buffer 8
db2 restore database sample from /u/curly/mytape buffer 8
```

When running DB2 backup spanning multiple volumes, you must specify SUP_EOV option on the **cltalloc** command. When running DB2 restore spanning multiple volumes, you must specify all of the following on the **cltalloc** command:

- The SUP_EOV option
- The SUP_EOF option
- The complete list of volumes for the restore operation.

Appendix C. NetTAPE API Usage Examples

This appendix contains two simple examples that show how to perform tape operations using the NetTAPE API. You can find the files for these two programs, as well as a number of other more complex examples, online in the NetTAPE product API samples directory, **/usr/lpp/nettape/samples/api**.

Example 1

The example below shows the following sequence of tasks:

1. Allocating an IBM 3480 tape device
2. Opening the tape file
3. Reading a block of data
4. Rewinding the tape file
5. Writing a block of data
6. Closing the tape file
7. Unallocating the tape device.

```
#include <stdio.h>
#include <fcftpint.h>    /* include file for NetTAPE API */


main(int argc, char **argv)
{

     int  istat;
     int  iunit = 0;
     int  blksz;
     char tpargs[4096];
     char buf1[] = "ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890";
     char buf2[256];


     blksz = strlen(buf1);
     sprintf(tpargs,"POOL=3480 VOL=XYZ300 ");

     /*
      * Request a tape device from the 3480 device pool
      *  and mount the tape volume
      */

     printf("Requesting a tape device...\n");
     istat=ctpalloc(&iunit,NULL,8192,tpargs,NULL);

     if(istat != 0) {
       fprintf(stderr,"Error %d connecting to server \n",istat);
       exit(1);
     }

     printf("Opening a tape file...\n");
     istat=ctpopen(iunit,"",3);

     if(istat != 0) {
```

© Copyright IBM Corp. 1996, 1997

```
   fprintf(stderr,"Error %d opening tape\n",istat);
   exit(1);
 }

 /*
  *   Write one block
  */

 printf("Writing data... (buf1 = %s)\n", buf1);
 istat=ctpwrite(iunit,buf1,blksz);
 if(istat < 0) {
    fprintf(stderr,"Error %d writing tape\n",istat);
    exit(1);
 }

 /*
  *   Rewind the tape
  */

printf("Rewinding the tape...\n");
istat=ctprew(iunit);
if(istat != 0) {
   fprintf(stderr,"Error %d rewinding tape \n",istat);
   exit(1);
}

 /*
  *   Read one block
  */

printf("Reading data... (buf2 = %s)\n", buf2);
istat=ctpread(iunit,buf2,blksz);
if(istat < 0) {
   fprintf(stderr,"Error %d reading tape\n",istat);
   exit(1);
}
printf("After data read (buf2 = %s)\n", buf2);

/*
 * Close the tape file
 */

printf("Closing the tape...\n");
istat=ctpclose(iunit,0);
if(istat != 0) {
   fprintf(stderr,"Error %d closing tape\n",istat);
   exit(1);
}

/*
 * Unallocate the tape device
 */

printf("Unallocating the tape...\n");
istat=ctpunall(iunit);
if(istat != 0) {
   fprintf(stderr,"Error %d disconnect from server\n",istat);
   exit(1);
```

```
    }

    exit(0);
}
```

Example 2

The example below shows the following sequence of tasks:

1. Allocating an STK Silo tape device
2. Opening the tape file
3. Writing 600 blocks of data
4. Closing the tape file
5. Retrieving the list of volume IDs for the previous write operation
6. Reading from the tape file
7. Closing the tape file
8. Unallocating the tape device.

```
#define L_VID 8

#include <stdio.h>
#include <fcftpint.h>    /* include file for NetTAPE API */


main(int argc, char **argv)
{

char *volbuff1,*volbuff2,*s;
int   nvols,i;

     int  istat;
     int  iunit = 0;
     int  blksz;
     char tpargs[4096];
     char buf[] = "ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890";


     blksz = strlen(buf);
     strcpy(tpargs,"POOL=SILO_1 VOL=200058 ");  /* use scratch mount */

     /*
      *  Request a tape device from the SILO_1 device pool
      *  and use the scratch tapes
      */

     printf("Requesting a tape device...\n");
     istat=ctpalloc(&iunit,NULL,8192,tpargs,NULL);

     if(istat != 0) {
       fprintf(stderr,"Error %d connecting to server \n",istat);
       exit(1);
     }

     /*
      *  Open the tape for write operation
      */
```

```
printf("Opening a tape device...\n");
istat=ctpopen(iunit,"",2);

if(istat != 0) {
  fprintf(stderr,"Error %d opening tape for write\n",istat);
  istat=ctpunall(iunit);
  exit(1);
}

/*
 *   Write 600 blocks
 */

 printf("Writing data...\n");
 for(i=0;i<600;i++) {
    istat=ctpwrite(iunit,buf,blksz);
    if(istat < 0) {
      fprintf(stderr,"Error %d writing tape\n",istat);
      istat=ctpclose(iunit,0);
      istat=ctpunall(iunit);
      exit(1);
    }
 }

/*
 *  Close the tape file
 */

 printf("Closing the tape...\n");
 istat=ctpclose(iunit,0);
 nvols = 10;
 volbuff1 = (char *) malloc(nvols*L_VID);

 /*
  *  Retrieve a list of volume IDs for the previous write operation
  */

 istat=ctpvols(iunit,&nvols,volbuff1);
 printf("istat:%i nvols:%i \n",istat,nvols);
 if(istat < 0) {
   fprintf(stderr,"Error %d calling ctpvols\n",istat);
   istat=ctpclose(iunit,0);
   istat=ctpunall(iunit);
   exit(1);
 }
 printf("ctpvols returned (nvols = %i; volbuff1 = %s)\n", nvols,
         volbuff1);

 volbuff2 = (char *) malloc(nvols*L_VID + 10);
 strcpy(volbuff2,"VOL=");
 for(s=volbuff1,i=0;i<nvols;i++,s += L_VID) {
    printf("volume #%i %s \n",i+1,s);
    if (i != 0) strcat(volbuff2,",");
    strcat(volbuff2,s);
 }

 /*
```

```
       *  Open the tape for read operation
       */

      printf("open parms:%s \n",volbuff2);
      printf("Opening a tape device...\n");
      istat=ctpopen(iunit,volbuff2,1);

      if(istat != 0) {
        fprintf(stderr,"Error %d opening tape for read\n",istat);
        istat=ctpunall(iunit);
        exit(1);
      }


     /*
      *   Read tape
      */

    printf("Reading data...\n");
    for(;;) {
      istat=ctpread(iunit,buf,blksz);
      if(istat == -1) {
         fprintf(stderr,"Tape Mark (EOT) hit        \n",istat);
      } else if(istat == -3 ) {
         fprintf(stderr,"End of Volume (EOV) hit        \n",istat);
         break;
      } else if(istat < 0   ) {
         fprintf(stderr,"Error %d reading tape\n",istat);
         break;
      }
    }

    /*
     * Close the tape file
     */

    printf("Closing the tape...\n");
    istat=ctpclose(iunit,0);
    if(istat != 0) {
       fprintf(stderr,"Error %d closing tape\n",istat);
       istat=ctpunall(iunit);
       exit(1);
    }

    /*
     * Unallocate the tape device
     */

    printf("Unallocating the tape...\n");
    istat=ctpunall(iunit);
    if(istat != 0) {
       fprintf(stderr,"Error %d unallocating the tape device\n",istat);
       exit(1);
    }

    exit(0);
}
```

Appendix D. SCSI Tape Library Messages

This appendix contains information about the messages that are issued by the NetTAPE TLC SCSI tape library daemon (also known as the SCSI PVR). You may see these messages if you are using the NetTAPE operator GUI. They may also appear in the log for the SCSI tape library daemon along with other trace information.

BRM6200E Error issuing ioctl *ioctl issued* **on library** *library name***, File not open. F=***internal code***, L=***internal code***.**

Explanation: An ioctl was issued against a library that is not open.

System Action: The operation fails.

User Response: Contact IBM service. This should not occur. Report the values in the message.

BRM6201E Audit operation is required for library *library name***.Audit starting.**

Explanation: The server encountered a problem managing the given library, and determined that an audit operation should be performed. It then starts an audit.

System Action: The server initiates an audit.

User Response: Examine subsequent messages to ensure that the audit was successful.

BRM6202E Insufficient memory to continue operations.

Explanation: There is not enough memory to continue operations.

System Action: The request fails.

User Response: Provide more memory for the program to use.

BRM6203E No cartridges in library *library name***.**

Explanation: An inventory operation was run on the indicated PVR, but no cartridges were found in the library.

System Action: The request fails.

User Response: Insert cartridges in the library for the PVR to manage.

BRM6204E Error opening NetTAPE SCSI Catalog *filespec***, errno** *errno***.**

Explanation: At library initialization or when the file is rewritten, the SCSI PVR is unable to open the catalog.

System Action: Processing halts.

User Response: Ensure that the catalog exists and is readable by the SCSI PVR. There must be one per library and must be /etc/nettape.libname.config.

BRM6205E Version statement required before *stmttype* **statement.**

Explanation: At library initialization,a statement was found before the version statement in the NetTAPE SCSI Catalog.

System Action: Processing halts.

User Response: Ensure that the version statement is first, the library statement is second and the others follow.

© Copyright IBM Corp. 1996, 1997

BRM6206E A duplicate entry exists in the NetTAPE SCSI Catalog at line *line_no***.**

Explanation: At PVR initialization, the server found a duplicate entry in the NetTAPE SCSI Catalog at the identified line number.

System Action: Initialization halts.

User Response: Ensure that there is no duplicate version, library, element, drive or volume record in the file at the given line number.

BRM6207E An unknown tag exists in the SCSI configuration at line *line_no***.**

Explanation: At server initialization, the server found a tag in the NetTAPE SCSI Catalog that it did not recognize.

System Action: Initialization halts.

User Response: Ensure that the tag at the given line number is one of vers., lib., dr., ele. or v. Fix the error and restart the PVR.

BRM6208E Not enough parameters in library definition at line *line_no***.**

Explanation: At server initialization, the server found the number of parameters on the library line is less than the number required.

System Action: Initialization halts.

User Response: Ensure that the required parameters exist on the library definition line.

BRM6209E No match found for *parameter* **in library definition at line** *line_no***.**

Explanation: A not found condition for the parameter occurred when processing the line at line_no. If the line number is 0, the error occurred after initialization.

System Action: Processing halts except in three instances in which the server corrects the error. These are when the number of slots, drives or ports is different in the configuration file than passed from the library control.

User Response: Specify a valid value for the parameter in the configuration file at line line_no if the error occurred at initialization. If the error occurred after initialization, an audit of the library is likely required.

BRM6210E Not enough parameters in element definition at line *line_no***.**

Explanation: At server initialization, the server found the number of parameters on the element line is less than the number required.

System Action: Initialization halts.

User Response: Ensure that the required parameters exist on the element definition line. They are element number and type. If a volume is at the element address, it must also be included in the element line, and a volume line must be included to describe the volume.

BRM6211E Too many lines of type *defn_type* **were found at line** *line_no***.**

Explanation: At server initialization, the server found the number of lines of type defn_type exceeds the number contained in the library.

System Action: Initialization halts.

User Response: Check the number of element or drive lines with the library being described by the configuration file. Remove any extra lines.

BRM6212E Not enough parameters in drive definition at line *line_no***.**

Explanation: At server initialization, the server found the number of parameters on the drive line is less than the number required.

System Action: Initialization halts.

User Response: Ensure that the required parameters exist on the drive definition line. They are special file name, element number, model, mounts between cleans and time between cleans, If the library supports auto cleaning, both mounts and time should be set to 0.

BRM6213E Not enough parameters in volume definition at line *line_no***.**

Explanation: At server initialization, the server found the number of parameters on the volume line is less than the number required.

System Action: Initialization halts.

User Response: Ensure that the required parameters exist on the volume definition line. They are volume ID, element number, type, and status.

BRM6214E *recordID* **has an unrecognized status at line** *line_no***.**

Explanation: During processing, the server found the record contains a status it does not recognize.

System Action: The request fails.

User Response: Ensure that the status of the volume is one of scratch, private, ejected or clean, and the status of an element is slot, drive or port.

BRM6215E An I/O error occurred writing file *config* **at line** *line_no***. Errno =** *errno*

Explanation: During the write back of the NetTAPE SCSI Catalog, an I/O error occurred.

System Action: Writing halts.

User Response: Determine if the error occurred at a place in the file that is crucial. Stop the PVR, repair the file and restart the PVR.

BRM6216E Volume *volname* **not found in NetTAPE SCSI catalog.**

Explanation: During a move from element to element, the volume information was missing from the catalog tables. During a change of a volume from one category to another, the volume information was not found. During the rewrite of the NetTAPE SCSI catalog, a volume statement was found for a non-existent volume.

System Action: The action fails but the PVR continues. The write continues.

User Response: Determine if the volume is indeed in the library and, if not, enter it and rerun the job.

BRM6217W SCSI file *config_name* **contains an unrecognized line at line number** *line_no***.**

Explanation: During the write back of the file specified, a line is not recognized as a valid line. Valid line types start with #, lib., dr., ele., and v.

System Action: Processing continues.

User Response: Determine if there was a similar error during the reading of the configuration file. If not, there is a software error. Call your IBM service.

BRM6218E Element *element_number* **contents** *element_content* **does not have associated volume record.**

Explanation: During processing, an element contains a volume specification but no corresponding volume data exists in the file.

System Action: Processing halts

User Response: Check the library and correct the error in the configuration file. Elements must match volume records if contents are specified.

BRM6219E Element numbers in element and volume tables for volume *volume* **mismatched.**

Explanation: During processing, a volume contains a different element number than in the element table.

System Action: Processing halts

User Response: Check the library and correct the error in the configuration file. Elements must match volume records if contents are specified.

BRM6220E Two elements exist in the NetTAPE SCSI Catalog with element number *element_number***.**

Explanation: At PVR initialization, the server found a duplicate entry in the NetTAPE SCSI Catalog for the specified element number. When the PVR is adding elements, it tried to add an element that is a duplicate of an existing element.

System Action: Initialization halts.

User Response: Ensure that the elements are correctly specified.

BRM6221E No elements exist in the NetTAPE SCSI Catalog.

Explanation: At PVR initialization, the server found no element definitions in the NetTAPE SCSI Catalog.

System Action: Initialization halts.

User Response: Ensure that at least the drive elements are specified.

BRM6222E Two drives exist in the NetTAPE SCSI Catalog with special file *special_file_name***.**

Explanation: At PVR initialization, the server found a duplicate entry in the NetTAPE SCSI Catalog for the specified drive special file.

System Action: Initialization halts.

User Response: Ensure that the drives are correctly specified.

BRM6223E Drive *drive_ele_number* **contents** *drive_content* **does not have associated volume record.**

Explanation: During the reading of the configuration file, a drive contains a volume specification but no corresponding volume data exists in the file.

System Action: Processing halts

User Response: Check the library and correct the error in the NetTAPE SCSI catalog. Drives must match volume records if contents are specified.

BRM6224E Element numbers in drive and volume tables for volume *volume* **mismatched.**

Explanation: During the reading of the NetTAPE SCSI Catalog, a volume contains a different element number than in the element table.

System Action: Processing halts

User Response: Check the library and correct the error in the catalog. Elements must match volume records if contents are specified.

BRM6225E Two drives exist in the SCSI configuration with same element number *element_number***.**

Explanation: At PVR initialization, the server found a duplicate entry in the NetTAPE SCSI Catalog for the specified drive element number.

System Action: Initialization halts.

User Response: Ensure that the drives are correctly specified.

BRM6226E Move request for volume *volname* **to** *element_number* **is invalid.**

Explanation: When performing a move for the SCSI PVR, the from-element does not contain the volume, the to-element is not empty, or the volume record was not found.

System Action: The Move fails but the PVR continues.

User Response: Perform an audit of the SCSI Library.

BRM6227E Duplicate volume *volume* **found during** *function***.**

Explanation: During processing of the function, a volume was not in the expected category of SCRATCH, PRIVATE, CLEAN, or EJECTED. Note if the error was encountered during an enter, there could be a duplicate volume in the library.

System Action: Processing halts.

User Response: Run an audit to determine correct configuration.

BRM6228E Element *element_number* **out of range for the library.**

Explanation: During processing , an element was requested that is out of range for the specified library, or all space for elements has been taken.

System Action: Processing halts.

User Response: Check the NetTAPE SCSI Catalog for elements that should not be defined. If all elements look to be in range, then there may be an error in the information passed from the library to the device driver. Call your hardware representative.

BRM6229E Element *element_number* **is not a drive, slot or external port.**

Explanation: While adding an element, an element was requested to be added that was other than a drive, slot or external port.

System Action: Processing halts.

User Response: Run an audit to determine correct configuration.

BRM6230E SCSI special file *device name* **could not be found.**

Explanation: During a dismount of a volume, the drive specified by the Status Daemon was not found.

System Action: The dismount fails, but the SCSI PVR continues.

User Response: This may be caused by a drive being defined in the NetTAPE configuration file, but not in the NetTAPE SCSI Catalog for the specific PVR. Ensure that all drives being used by NetTAPE are defined in both configuration files.

BRM6231E Cartridge in drive *device name* **could not be dismounted.**

Explanation: During PVR initialization, the device driver detected a cartridge in the indicated drive; however, the drive record in the catalog shows no cartridge being mounted there. The cartridge cannot be dismounted.

System Action: The dismount fails, but the SCSI PVR continues.

User Response: Determine whether or not there is a cartridge in the drive. If there is a cartridge, stop the SCSI PVR, update the NetTAPE SCSI Catalog to reflect the presence of the cartridge in the drive, and start the SCSI PVR again.

If there is no cartridge in the drive, perform an AUDIT on the SCSI PVR. This will cause the device driver table to be updated.

BRM6232E No drives exist in the NetTAPE SCSI Catalog.

Explanation: At PVR initialization, the server found no drive definitions in the NetTAPE SCSI Catalog.

System Action: Initialization halts.

User Response: Ensure that at least the drive and drive elements are specified.

BRM6233E Element number *element_number* **or volid** *volume_id* **in element mismatched.**

Explanation: At PVR initialization, the server found a volume that did not correspond with the element definition in the NetTAPE SCSI Catalog.

System Action: Initialization halts.

User Response: Ensure that all volumes have an element record containing the same volume ID.

BRM6234E Ejected volume *volume_id* **does not have an element -1.**

Explanation: At PVR initialization, the server found a volume in the ejected state with an element number other than -1.

System Action: Initialization halts.

User Response: Ensure that all ejected volumes have an element number of -1.

BRM6235E Invalid category *status* **specified on enter of volume** *volume***.**

Explanation: During processing of the inject function, a volume was entered without the target status of SCRATCH, PRIVATE, or CLEAN.

System Action: Processing of the inject halts but the SCSI PVR remains operational.

User Response: Possible software error. Call your software representative.

BRM6236E Last slot *last_slot* **for occupied drive** /**dev**/*special_file* **is invalid.**

Explanation: During processing of the initialization of the SCSI library a drive containing a volume did not have a last slot that was neither a valid slot number, an element that was a slot, or an element that was empty.

System Action: Processing of initialization halts.

User Response: Check the NetTAPE SCSI catalog and fix any errors you discover.

BRM6240I Cartridge *cartridge name* **in drive** *device name* **dismounted to slot =** *slot address***.**

Explanation: The indicated volume was successfully dismounted from the indicated drive to the indicated slot.

System Action: The SCSI PVR continues.

User Response: None

BRM6241E Cartridge *cartridge name* **in drive** *device name* **failed dismount to slot =** *slot address***, rc =** *return code***.**

Explanation: The indicated volume was not successfully dismounted from the indicated drive to the indicated slot.

System Action: The SCSI PVR continues.

User Response: See the user responses for accompanying error messages

---

BRM6242E Catalog error after successful dismount, rc = *return code***.**

Explanation: After a successful dismount, an error occurred updating the NetTAPE SCSI Catalog.

System Action: The SCSI PVR continues.

User Response: See the user responses for accompanying error messages from the catalog. If necessary, stop the SCSI PVR server and manually update the catalog to reflect the correct location of the dismounted cartridge.

BRM6243E No empty slots in the library.

Explanation: There are no empty slots in the library.

System Action: The SCSI PVR continues.

User Response: Remove one or more cartridges from the library and update the catalog appropriately; then, try the request again.

BRM6244I Cartridge *cartridge name* **ejected to EEPort with address=** *port address***.**

Explanation: The indicated volume was successfully ejected to the exit port with the indicated address.

System Action: The SCSI PVR continues.

User Response: Consult the operator message portion of the NetTAPE GUI to know where the cartridge is to be placed.

BRM6245E Cartridge *cartridge name* **ejection to EEPort with address =** *port address* **failed, rc =** *return code***.**

Explanation: The indicated volume was not successfully ejected from the library to the indicated exit port slot.

System Action: The SCSI PVR continues.

User Response: See the user responses for accompanying error messages

---

BRM6246E Catalog error after successful eject, rc = *return code***.**

Explanation: After a successful eject, an error occurred updating the NetTAPE SCSI Catalog.

System Action: The SCSI PVR continues.

User Response: See the user responses for accompanying error messages from the catalog. If necessary, stop the SCSI PVR server and manually update the catalog to reflect the correct location of the ejected cartridge.

BRM6247I Cartridge *cartridge name* **injected to slot with address= @2%d.**

Explanation: The indicated volume was successfully injected from the exit port to the storage element with the indicated address.

System Action: The SCSI PVR continues.

User Response: None.

BRM6248E Inject of cartridge *cartridge name* **into slot** *slot address* **failed, rc =** *return code***.**

Explanation: The indicated volume was not successfully injected to the indicated slot.

System Action: The SCSI PVR continues.

User Response: See the user responses for accompanying error messages. If necessary, stop the SCSI PVR server and manually fix the problem. Be sure the catalog matches the hardware status.

BRM6249E Catalog error after successful inject, rc = *return code***.**

Explanation: After a successful inject, an error occurred updating the catalog.

System Action: The SCSI PVR continues.

User Response: See the user responses for accompanying error messages from the catalog. If necessary, stop the SCSI PVR server and manually update the catalog to reflect the correct location of the injected cartridge.

BRM6250I Cartridge *cartridge name* **from slot** *device name* **mounted in drive @3%s.**

Explanation: The indicated cartridge from the indicated storage slot was successfully mounted in the indicated drive.

System Action: The SCSI PVR continues.

User Response: None

BRM6251E Cartridge *cartridge name* **from slot** *slot address* **not mounted in drive** *device name*, **rc =** *return code*.

Explanation: The indicated volume in the indicated slot was not successfully mounted in the indicated drive.

System Action: The SCSI PVR continues.

User Response: See the user responses for accompanying error messages

BRM6252E No cleaning cartridges available in library.

Explanation: The NetTAPE SCSI PVR attempted to find a cleaning cartridge to clean a drive, but there were none in the library.

System Action: The cleaning operation fails, but the SCSI PVR continues.

User Response: Insert a cleaning cartridge into the library. If there are cleaning cartridges in the library, ensure that they are correctly defined in the NetTAPE SCSI Catalog.

BRM6253E Catalog error after successful mount, rc = *return code*.

Explanation: After a successful mount, an error occurred updating the NetTAPE SCSI Catalog to indicate that the cartridge was mounted.

System Action: The PVR will attempt to dismount the volume and return it to its storage slot. The SCSI PVR continues.

User Response: See the user responses for accompanying error messages from the catalog. If necessary, stop the SCSI PVR server and manually update the catalog to reflect the correct location of the mounted cartridge. Note, that if the cartridge is still mounted when the PVR is restarted, the cartridge will be dismounted and placed into a storage slot.

BRM6254E Catalog error after successful mount, rc = *return code*.

Explanation: After a successful mount, an error occurred updating the NetTAPE SCSI Catalog to indicate that the cartridge has been moved from the scratch category to the private category.

System Action: The PVR will attempt to dismount the volume and return it to its storage slot. It will also attempt to update the catalog to indicate that the cartridge is in the storage location. The SCSI PVR continues.

User Response: See the user responses for accompanying error messages from the catalog. If necessary, stop the SCSI PVR server and manually update the catalog to reflect the correct location of the mounted cartridge. Note, that if the cartridge is still mounted when the PVR is restarted, the cartridge will be dismounted and placed into a storage slot; however, it will not transition to another category during dismount processing.

BRM6255E Scratch mount on *device name* **failed, no scratch volumes available**

Explanation: An attempts was made to mount a scratch volume on the named device, but there were no scratch volumes available for mounting.

System Action: The mount fails, but the SCSI PVR server continues.

User Response: Make scratch volumes available in the library. This may be done by injecting scratch cartridges into the library. Or, if all slots in the library are occupied, private volumes may be ejected, then scratch volumes may be injected into the library. After there is a scratch volume available, retry the operation which caused the mount of a scratch volume to occur. If there is no EE port available, the PVR will need to be stopped, scratch volumes placed into the library, the NetTAPE SCSI Catalog updated appropriately, and the PVR started again.

BRM6256I SCSI PVR terminating for library '*library name***'**

Explanation: The SCSI PVR server for the named library is shutting down.

System Action: The SCSI PVR server terminates.

User Response: Perform necessary maintenance and restart the PVR in order to make the library available to customers again.

BRM6257I SCSI PVR starting for library '*library name***'**

Explanation: The SCSI PVR server is starting for the named library.

System Action: None.

User Response: None.

BRM6258E Catalog and device driver mismatch for element address = *drive address***, contents =** *volser***.**

Explanation: The NetTAPE SCSI catalog indicates that the drive element at the indicated address has the indicated volume in it; however, the device driver detects no cartridge in the drive.

System Action: SCSI PVR initialization continues, but the PVR will stop after the rest of the elements are checked.

User Response: If there is, indeed, a cartridge in the drive, the device drive needs to be refreshed. Edit the NetTAPE SCSI Catalog, setting auto_init to true, and restart the PVR. This will cause the device driver tables to be refreshed and should resolve the problem. If there is not a cartridge in the drive, edit the NetTAPE SCSI Catalog to reflect the true contents of the library and restart the PVR.

BRM6259I NetTAPE SCSI Catalog specified to use bar code reader.

Explanation: The customer has indicated that the library has a bar code reader and it will be used.

System Action: Processing continues.

User Response: None.

BRM6260I NetTAPE SCSI Catalog specified no bar code reader.

Explanation: The customer has indicated that the library (whether it has a bar code reader or not) will not use bar codes for identifying volumes.

System Action: Processing continues.

User Response: None.

BRM6261W The drive *device name* **will be cleaned.**

Explanation: The NetTAPE SCSI PVR has determined that the indicated drive needs to be cleaned. If there are cleaning cartridges in the library, cleaning will be initiated on the drive.

System Action: The PVR will attempt to mount a cleaning cartridge and clean the drive. The SCSI PVR continues.

User Response: None.

BRM6262E EE port at address *address* **is occupied.**

Explanation: The NetTAPE SCSI PVR was scanning the NetTAPE SCSI catalog and the device driver tables and discovered that an EE port defined in the device driver table was not defined in the catalog. It attempted to dynamically define an element for it, but found that the port was occupied.

System Action: SCSI PVR initialization continues, but the PVR will stop after the rest of the elements are checked.

User Response: If there is, in fact, a cartridge in the EE port, the customer can physically place the cartridge into another place, updating the catalog, if necessary. Or, the customer may manually define the Element Definition Record for the EE port in the NetTAPE SCSI Catalog.

If there is no cartridge in the EE port, the customer should edit the NetTAPE SCSI Catalog to cause an audit of the library to occur at initialization time, which should resolve the problem.

BRM6263E Cartridge *cartridge name* **not mounted, catalog error, rc =** *return code***.**

Explanation: A catalog query was issued for the indicated volume but failed with the indicated return code.

System Action: The SCSI PVR continues.

User Response: See the user responses for accompanying error messages. Verify that the NetTAPE SCSI Catalog is valid.

BRM6264E Cartridge *cartridge name* **not mounted, not in catalog.**

Explanation: A catalog query was issued for the indicated volume but the volume was not found in the catalog.

System Action: The SCSI PVR continues.

User Response: See the user responses for accompanying error messages. Verify that the NetTAPE SCSI Catalog is valid.

BRM6265E Cartridge *cartridge name* **not mounted, not in library.**

Explanation: A catalog query was issued for the indicated volume but the volume is ejected.

System Action: The SCSI PVR continues.

User Response: Inject the volume into the library, the try the request again.

BRM6266E Cartridge *cartridge name* **not mounted, is already mounted.**

Explanation: A catalog query was issued for the indicated volume but the volume is already mounted in a drive.

System Action: The SCSI PVR continues.

User Response: Dismount the volume, then attempt the request again. If the volume is not mounted, stop the PVR, edit the NetTAPE SCSI catalog to reflect the true configuration of the PVR, and restart the SCSI PVR.

BRM6267E Cartridge *cartridge name* **not mounted, is in a port.**

Explanation: A catalog query was issued for the indicated volume but the volume is in a port.

System Action: The SCSI PVR continues.

User Response: If the cartridge has been ejected, remove the cartridge from the port, inject the cartridge back into the library, then attempt the mount again. If the volume is not in a port, stop the PVR, edit the NetTAPE SCSI catalog to reflect the true configuration of the PVR, and restart the SCSI PVR.

BRM6272W Invalid barcode found on volume defined in catalog with label *label* **and slot address** *address*

Explanation: The customer has specified that the bar code reader should be used for this library; however, when the library attempted to read the bar code for the indicated volume in the indicated slot location, it could not read it.

System Action: Processing continues, but only the name in the catalog will be used.

User Response: Verify that there is a bar code reader on this library and that it is working. Verify that the bar code on the volume is intact, readable, and matches the name in the catalog.

BRM6273W Zero-lengthed barcode found on volume defined in configuration with label *label* **and slot address** *address*

Explanation: The customer has specified that the bar code reader should be used for this library; however, when the library attempted to read the bar code for the indicated volume in the indicated slot location, it found a bar code, but it was of length zero.

System Action: Processing continues, but only the name in the catalog will be used.

User Response: Verify that there is a bar code reader on this library and that it is working. Verify that the bar code on the volume is intact, readable, and matches the name in the catalog.

BRM6274W Barcode *barcode* **on volume in slot** *address* **truncated to six characters.**

Explanation: NetTAPE can only handle volumes with bar codes of up to six characters. The SCSI PVR recognizes only the first six characters of such volumes.

System Action: Processing continues.

User Response: This message can be ignored if the first six characters of all volumes in the library are unique. This message can be eliminated by relabeling volumes that have bar codes that are too long.

BRM6275E Volume *volume* **in NetTAPE SCSI Catalog has barcode** *barcode***.**

Explanation: The volume id of the volume in the NetTAPE SCSI Catalog must match the bar code. It does not.

System Action: Processing continues for the inventory operation, but the inventory will fail.

User Response: Synchronize the catalog and the bar codes by either changing one or the other and start the PVR again.

BRM6276E Volume *volume* in catalog with address *address* is not in hardware.

Explanation: The catalog has the named volume defined in its element table at the named address; however, the device driver has no volume in that location.

System Action: Processing continues for the inventory operation, but the inventory will fail.

User Response: If there is, in fact, a volume at that location in the library, audit the library to refresh the device driver tables. Otherwise, edit the configuration file to reflect the true contents of the hardware.

BRM6277E Drive defined in catalog at address *address* is not in hardware.

Explanation: The NetTAPE SCSI Catalog has the drive defined in its element table at the indicated address; however, the device driver has no drive in that location.

System Action: Processing continues for the inventory operation, but the inventory will fail.

User Response: Edit the NetTAPE SCSI Catalog to reflect the true contents of the hardware.

BRM6278E EE port defined in catalog at address *address* is not in hardware.

Explanation: The catalog has an EE port defined in its element table at the indicated address; however, the device driver has no EE port in that location.

System Action: Processing continues for the inventory operation, but the inventory will fail.

User Response: Edit the NetTAPE SCSI Catalog to reflect the true contents of the hardware.

BRM6279W Volume serial *volser* truncated to 6 characters.

Explanation: During initialization of the NetTAPE SCSI Catalog, a volume serial was found that is longer than 6 characters.

System Action: Initialization truncates the volume serial and continues.

User Response: NetTAPE requires 6 or less character volume serials. The file has been updated and no action is required.

BRM6280E Drive statement for *drive_id* contains invalid interval numbers.

Explanation: During initialization of the NetTAPE SCSI Catalog, a drive statement contained an invalid interval for either hours or mounts.

System Action: Initialization stops.

User Response: Set the interval between 0 and 65534.

BRM6281E Element number *ele_no* in element points to drive that is mismatched.

Explanation: During processing, an element points to a drive but either the drive element number or contents doesn't agree with the element.

System Action: Initialization halts

User Response: Check the NetTAPE SCSI Catalog and match the element and drive.

BRM6282E Volume serial *volser* already exists in the NetTAPE SCSI Catalog.

Explanation: During processing, a volume is being inserted into the catalog but the volume serial already exists with the same status.

System Action: Processing halts

User Response: Check the NetTAPE SCSI Catalog for duplicate volumes.

BRM8300E I/O error on library *library name* **(OP=***internal code***, CC=***internal code***, KEY=***internal code***, ASC=***internal code***, ASCQ=***internal code***).**

Explanation: An I/O error has occurred while operating on the designated library device. CC stands for completion code and may have the following values:

Following are the completion code values:

Following are completion code values for all device classes:

Code Value	Description
-1	DD_UNKNOWN_ERROR
0	DD_NO_ERROR
200	DD_NO_SENSE
201	DD_DEVICE_DRIVER_FAILURE
202	DD_EEPROM_FAILURE
203	DD_MANUAL_INTERVENTION
204	DD_RECOVERED_ERROR
205	DD_SCSI_ADAPTER_ERROR
206	DD_SCSI_ERROR
207	DD_ILLEGAL_REQUEST
208	DD_COMMAND_ABORTED
209	DD_HARDWARE_MICROCODE
210	DD_UNIT_ATTENTION

Following are completion code values for the media changer

Code Value	Description
300	DD_CARTRIDGE_ENTRY_EXIT
301	DD_CARTRIDGE_LOAD_FAILURE
302	DD_CARTRIDGE_IN_FAILED_DRIVE
303	DD_CAROUSEL_NOT_LOADED
304	DD_CHANGER_FAILURE
305	DD_DRIVE_FAILURE
306	DD_DRIVE_OR_MEDIA_FAILURE
307	DD_ENTRY_EXIT_FAILURE
308	DD_ENTRY_EXIT_NOT_PRESENT
309	DD_LIBRARY_AUDIT
310	DD_LIBRARY_FULL
311	DD_MEDIA_EXPORT
312	DD_SLOT_FAILURE
313	DD_SLOT_OR_MEDIA_FAILURE
314	DD_SOURCE_EMPTY
315	DD_DESTINATION_FULL

Following are completion code values for tape and optical drives

Code Value	Description
400	DD_END_PHYSICAL_MEDIA
401	DD_MEDIA_BLANK
402	DD_MEDIA_CORRUPTED
403	DD_MEDIA_FAILURE
404	DD_MEDIA_INCOMPATIBILITY
405	DD_SECTOR_RELOCATION
406	DD_SECTOR_OUT_OF_RANGE
407	DD_WRITE_PROTECT
408	DD_CLEAN_MEDIA
409	DD_MEDIA_FAULT
410	DD_CLEANING_COMPLETE
411	DD_LOGICAL_END_OF_MEDIA
412	DD_MEDIA_NOT_PRESENT
413	DD_BEGINNING_OF_MEDIA
414	DD_ERASE_FAILURE
415	DD_WRITE_TO_WRITTEN_WORM
416	DD_WRONG_LENGTH_BLOCK
417	DD_OPEN_READ_ONLY
418	DD_OPEN_WRITE_ONLY

System Action: The operation fails.

User Response: Ensure that the drive associated with the library was identified correctly in the CfgAddDrive command, and that the library device is currently powered on and ready. If the library has an access door, make sure it is closed. The drive or library reference manual provided with the device usually contain tables that explain the values of the KEY, ASC, and ASCQ fields. If the problem persists, contact your service representative and provide the internal code values from this message.

BRM8302E I/O error on drive *drive name* **(OP=***internal code***, CC=***internal code***, KEY=***internal code***, ASC=***internal code***, ASCQ=***internal code***, Description=***error description***). Refer to Appendix B in the 'Messages' manual for recommended action.**

Explanation: An I/O error has occurred while operating on the designated drive.

System Action: The operation fails.

User Response: Ensure that the drive is correct defined in the NetTAPE Configuration file and in the NetTAPE SCSI Catalog. Also ensure that the device is currently powered on and ready. The drive or library reference manual provided with the device usually contain tables that explain the values of the KEY, ASC, and ASCQ fields. If the problem persists, contact your service representative and provide the internal code values from this message.

BRM8310E An I/O error occurred while accessing library *library name***.**

Explanation: An I/O error occurs while accessing the designated library.

System Action: The operation fails.

User Response: Ensure that the device associated with the library was identified correctly to NetTAPE TLC, and that the library device is currently powered on and ready. If the library has an access door, make sure it is closed. If the problem persists, contact your service representative and provide the internal code values from this message.

BRM8311E An I/O error occurred while accessing drive *drive name***.**

Explanation: An I/O error occurs while accessing the specified drive.

System Action: The operation fails.

User Response: Ensure that the device associated with the library was identified correctly to NetTAPE TLC, and that the library device is currently powered on and ready. If the library has an access door, make sure it is closed. If the problem persists, contact your service representative and provide the internal code values from this message. After checking and correcting these potential problems, retry the operation.

BRM8358E Audit operation is required for library *library name***.**

Explanation: The server encounters a problem managing the given library, and determines that an audit operation should be performed.

System Action: The server may continue to access the library, but some volumes may not be accessible until an audit is issued against the library.

User Response: Issue a CfgInventoryPVR command against the library.

BRM8446I Manual intervention required for library *library name***.**

Explanation: The specified library requires manual intervention.

System Action: Current library activity will be delayed until the required intervention occurs.

User Response: If the library has an access door, make sure it is in the closed position. If it has a cartridge carousel, make sure the carousel is installed. The server automatically detects when the appropriate action has been taken; it will then continue its operations.

BRM8457I Audit for library *library name* **started.**

Explanation: A library audit has been started for the given library.

System Action: The server starts an audit command to synchronize the device driver tables with the NetTAPE SCSI Catalog.

User Response: None.

BRM8460E Audit for library *library name* **failed.**

Explanation: The PVR attempted to perform an audit on the named library, but it failed.

System Action: The PVR continues operation

User Response: Make sure the library and drive devices associated with this command are powered on and ready, then start the PVR again.

BRM8461I Audit for library *library name* **completed successfully.**

Explanation: The library audit has completed successfully.

System Action: The NetTAPE SCSI Catalog is updated to match the contents of the library as found during the audit operation.

User Response: None.

Appendix E. Frequently Asked Questions

Based on feedback from NetTAPE users, here are some answers to the most frequently asked questions about using NetTAPE.

General Questions about NetTAPE

1. **Where can I get the NetTAPE product documentation?**

   NetTAPE product documentation is available on the product tape and on the World Wide Web at URL
   http://www.rs6000.ibm.com/resource/aix_resource/sp_books/nettape/index.html

Questions about Administering NetTAPE

1. **How can I tell whether the NetTAPE status daemon (nettaped) is running?**

   Do either of the following:

   - Enter the **cltopr** command:

     ```
     cltopr -q
     ```

     If NetTAPE is running, the **cltopr** command returns device information in this format:

     ```
     Current status for all known devices...
     Shr Pool_name  Host_name   Device_name   Dev_type  State  Op_mode
     ================================================================
         A_3490     chevysn17   /dev/382      3480      Up     MANUAL
         A_3494     chevysn17   /dev/rmt3     3490      Up     IBMACS
         STKLIB_1   sp10        /dev/stk901   4490      Down   STKACS
         STKLIB_1   sp10        /dev/stk902   4490      Down   STKACS
     ```

   - Enter the following command on the node where the NetTAPE status daemon runs:

     ```
     ps -ef | grep nettaped
     ```

     If NetTAPE is running, the above command returns a message such as:

     ```
     user1 24294     1   0 15:23:18  pts/2  0:00 nettaped
     ```

2. **What should I do if I cannot start the NetTAPE status daemon?**

   Look in the NetTAPE status daemon log file (**/tmp/nettaped.log** by default) on the node where you tried to start the NetTAPE status daemon. The bottom of the status daemon log file will contain error messages about the failure. Here are some examples of messages you might see:

   ```
   Sample /tmp/nettaped.log:
   sp03/S 09:41:00 (pid=20528):-StartUp-Unknown node:sp10-(ref. parconf)

   sp03/S 09:41:00 (pid=20528):-StartUp-Unknown node:sp10-(ref. parconf)
   sp03/S 09:41:00 (pid=20528):-StartUp-canceled due to unknown node
   ```

   Common reasons for not being able to start the NetTAPE status daemon include:

© Copyright IBM Corp. 1996, 1997

- You have selected Remote Execution Using .netrc as your NetTAPE security method and an incorrect host name has been defined in or a host name is missing from the **.netrc** file.

  The Remote Execution Using .netrc method is the only method available for NetTAPE 1.1. For NetTAPE 1.2, you select this method by specifying `SECURITY_MODE=netrc` in the **/etc/clnettape.security** file.

  Use the **ping** and **rexec** commands to test whether you can reach the failing host name from the node where you are trying to run the status daemon. For instance, to test whether you have connectivity to host name **sp10**, enter:

  ```
  ping sp10
  ```

  If the **ping** command is successful, enter:

  ```
  rexec sp10 who
  ```

- An incorrect host name has been defined in or a host name is missing from the **/etc/parconf** file.

  Use the **ping** and **rexec** commands to test whether you can reach the failing host name from the node where you are trying to run the status daemon. For instance, to test whether you have connectivity to host name **sp10**, enter:

  ```
  ping sp10
  ```

  If the **ping** command is successful, enter:

  ```
  rexec sp10 who
  ```

  Note: The *hostname* component of the *hostname.device* entry in the **/etc/nettape.adm.config** file must be one of the nicknames you have specified in the **/etc/parconf** file.

- An empty device pool

  You must define at least one tape device for each device pool that is defined in **/etc/nettape.adm.config**.

- The **/etc/nettape.adm.config** file entry, **stsdmn.util.portno**, is the same as the **nettape.config** file entry, **stsdmn.portno**.

  These two entries must be different (for instance, stsdmn.util.portno 7742 and stsdmn.portno 7741).

- You have defined a tape library (3494, etc...) in **/etc/nettape.adm.config** but you have not defined tape devices in the tape library.

- There are duplicate device definitions in **/etc/nettape.adm.config**.

- Your installation does not have the rexec policy enabled. NetTAPE Version 1 Release 1 uses **rexec** to start the remote process. A future release of NetTAPE will remove this restriction.

If the error messages in the status daemon log file do not indicate the nature of the problem, turn on the following NetTAPE debug environment variables and restart the NetTAPE status daemon:

```
C Shell:
  setenv DBG -1
  setenv CLIODEB 1792

Korn Shell:
  export DBG=-1
  export CLIODEB=1792
```

The status daemon log file will contain the debug trace log information. Look for any reported errors and correct them. If you still cannot determine why the NetTAPE status daemon won't run, save the status daemon log file and contact IBM service personnel for additional help. IBM service personnel will request the trace log file information.

To turn off the NetTAPE debug environment variables, enter:

```
C Shell:
  setenv DBG 0
  setenv CLIODEB 0

Korn Shell:
  export DBG=0
  export CLIODEB=0
```

3. **How can I tell whether the NetTAPE tape library daemon is running?**

   On the node that you start the library daemon, use the following commands to verify that the NetTAPE tape library daemon is running:

   - For the 3494 tape library daemon, enter:

     ```
     ps -ef | grep cl3494d
     ```

     If the NetTAPE 3494 tape library daemon is running, the command returns a message such as:

     ```
     user1 24294     1   0 15:23:18  pts/2  0:00 cl3494d
     ```

   - For the STK Silo tape library daemon, enter:

     ```
     ps -ef | grep clsilod
     ```

     If the NetTAPE STK Silo tape library daemon is running, the command returns a message such as:

     ```
     user1 24294     1   0 15:23:18  pts/2  0:00 clsilod
     ```

   - For the SCSI tape library daemon, enter:

     ```
     ps -ef | grep clscsid
     ```

     If the SCSI tape library daemon is running, the command returns a message such as:

     ```
     user1 24294     1   0 15:23:18  pts/2  0:00 clscsid
     ```

   You can also enter the **cltopr** command to see whether the tape library devices are in the UP state:

   ```
   cltopr -q
   ```

   If the NetTAPE tape library daemons are running, the command returns device information in this format:

```
Current status for all known devices...
Pool_name         Host_name         Device_name       Dev_type  State  Op_mode
================================================================================
A_3494            chevysn17         /dev/rmt2         3590      Up     IBMACS
A_3494            chevysn17         /dev/rmt3         3590      Up     IBMACS
STKLIB_1          sp10              /dev/stk901       4490      Up     STKACS
STKLIB_1          sp10              /dev/stk902       4490      Up     STKACS
exb_2             k80n06            /dev/mt0          8mm       Up     SCSIACS
exb_2             k80n06            /dev/mt1          8mm       Up     SCSIACS

--------------------------------------------------------------------------------
```

4. **Why can't I place the 3494 tape library device into the UP state?**

   Look in the **/tmp/cl3494d.log** file on the node where you tried to run the 3494 tape library daemon. The bottom of the file will contain error messages about the failure. Here are some examples of messages you might see:

```
Sample /tmp/nettaped.log:
   fordn05/cl3494d 23:09:19 (pid=31502): - pvr_init(): Unable to open Library
                                                        /dev/lmcp0
   fordn05/cl3494d 23:09:19 (pid=31502): - V_PVR_INIT - pvr_init failed
                                                      - status:-1
```

   Verify that the library manager control point daemon (**/etc/lmcpd**) is running. From the node on which you running the 3494 tape library daemon, enter:

```
ps -ef | grep lmcpd
```

   If the **lmcpd** daemon is not running, make sure that the library control device driver is installed correctly, according to the directions in the **/usr/lpp/nettape_tlc/doc/library_config.README** file. To verify that the library control device driver is installed correctly, enter:

```
mtlib -l /dev/lmcp0 -f /dev/rmt2 -qD
```

   If everything appears to be correct, check the status daemon log file to see if it contains any relevant error messages. If the status daemon log file does not indicate the nature of the problem, turn on the following NetTAPE debug environment variables and restart the NetTAPE status daemon and the 3494 tape library daemon:

```
C Shell:
  setenv DBG -1
  setenv CLIODEB 1792

Korn Shell:
  export DBG=-1
  export CLIODEB=1792
```

   The status daemon log file will contain the debug trace log information. Look for any messages that indicate errors and try to correct them. If you still cannot diagnose and correct the problem, save both the status daemon log and **/tmp/cl3494d.log** files and contact IBM service personnel for additional help. IBM service personnel will request the trace log file information.

   To turn off the NetTAPE debug environment variables, enter:

```
C Shell:
  setenv DBG 0
  setenv CLIODEB 0

Korn Shell:
  export DBG=0
  export CLIODEB=0
```

5. **Why can't I place the STK Silo tape library device into the UP state?**

   Look in the **/tmp/clsilod.log** file on the node where you tried to run the NetTAPE silo tape library daemon. The bottom of the **/tmp/clsilod.log** file will contain error messages about the failure. Here are some examples of messages you might see:

   ```
   fordn05/clsilod 23:22:51 (pid=29410): - init_daemons(): acs_query_server()
                                           failed - STATUS_IPC_FAILURE
   fordn05/clsilod 23:22:51 (pid=39370): - pvr_init() failed!
   ```

   A common reason for not being able to place the STK Silo tape library device into the UP state is that the STK SSI (Storage Server Interface) daemon, **/usr/lpp/nettape_tlc/csc/bin/ssi**, is not running.

   To check whether the STK SSI daemon is running, on the node where you start the STK SSI daemon, enter:

   ```
   ps -ef | grep ssi
   ```

   If the daemon is not running, ensure that the STK SSI daemon driver is installed correctly according to the directions in the **/usr/lpp/nettape_tlc/doc/library_config.README** file.

   If everything appears to be correct, check the status daemon log file to see if contains any relevant error messages. If the status daemon log file does not indicate the nature of the problem, turn on the following NetTAPE debug environment variables and restart the NetTAPE status daemon and the STK tape library daemon:

   ```
   C Shell:
     setenv DBG -1
     setenv CLIODEB 1792

   Korn Shell:
     export DBG=-1
     export CLIODEB=1792
   ```

   The status daemon log file will contain the debug trace log information. Look for any messages that indicate errors and try to correct them. If you still cannot diagnose and correct the problem, save both the status daemon log and the **/tmp/cl3494d.log** files and contact IBM service personnel for additional help. IBM service personnel will request the trace log file information.

   To turn off the NetTAPE debug environment variables, enter:

   ```
   C Shell:
     setenv DBG 0
     setenv CLIODEB 0

   Korn Shell:
     export DBG=0
     export CLIODEB=0
   ```

6. **How does NetTAPE work with ADSM?**

NetTAPE enhances the value of ADSM by:

- Allowing libraries and drives to be shared among applications.
- Providing STK silo library support for ADSM when the Atape, mtdd, or OMI (Open Microsystems Inc.) tape device drivers are used. No modification to ADSM is required.

NetTAPE Version 1 Release 2 does not require that ADSM tape devices be local to the ADSM server.

Note that NetTAPE Version 1 Release 1 does require that ADSM tape devices be local to the ADSM server. To work with NetTAPE, an ADSM Storage pool must be set up with an External Library Manager (ELM) pointing to a NetTAPE device pool. For example:

```
define library 3590a libtype=external
       externalmanager=/usr/lpp/nettape/bin/cladsmd
define devclass t3590 devt=3590 libr=3590a mountr=5 mountl=3
define stg extstg t3590 maxscr=1000
```

where:

- 3590A is the arbitrary name of a NetTAPE generic device pool, in this case with all 3590 devices inside a 3494.
- **/usr/lpp/nettape/bin/cladsmd** is the name of the interface module that provides the interface between ADSM and NetTAPE. The **cladsmd** module translates simple requests from ADSM into requests to the NetTAPE status daemon for services such as mount and dismount.

Devices are not defined to ADSM, just the device class. ADSM keeps track of the volumes that it owns. When a scratch tape is mounted, it is changed to the private category by NetTAPE. The mount retention (**mountr**) setting can be reduced for the device class (**devclass**) to get better sharing. The maximum scratch (**maxscr**) setting on the storage pool can be set to the number of volumes that ADSM requires.

If an error occurs (for example, if a volume is mounted without a label), the volume is returned to scratch by ADSM so that it can be used by another command or application.

7. **How do I get NetTAPE PTFs?**

   Call IBM's Direct Customer Support network line at:
   1-800-225-5249 or 1-800-742-9235

8. **What should I do if the "cltopr -S pvl" or "cltopr -H pvl" command hangs?**

   This problem often occurs when one or more of the tape server hosts go down. The NetTAPE status daemon (**pvl**) will eventually start (for –**S**) or stop (for –**H**) after TCP/IP times out.

9. **What should I do if the operator GUI displays the following message about the clutil daemon?**

   ```
   <Fri Apr 18 16:12:12 1997>  From user1 on fordn18  :chown-Unable to start
              clutil daemon-node:sp14
   ```

   This problem often occurs when the **.netrc** file does not contain the correct information for the specified node (**sp14** in the example).

10. **What should I do if the operator GUI displays the following message about the status daemon?**

```
Fordn03/cltoprg 10:57:28 < pid=15174>: - Status daemon denies connection.
                                       check your network security arrangements.
```

Ask your system administrator to check the files that are related to the NetTAPE security method you are using.

For NetTAPE 1.1, the only security method available is the Remote Execution Using .netrc method (netrc).

For NetTAPE 1.2, the security method you are using is determined by the option that is specified on the `SECURITY_MODE=` keyword in the **/etc/clnettape.security** file.

Once you have determined the security method, take the appropriate action, as follows:

Security Method	Administrator Action
netrc	Make sure that a **$HOME/.netrc** file exists in the user's home directory on that node. Make sure that the user's **$HOME/.netrc** file is owned by the user and not by root.
trusted	Make sure that the **/etc/hosts.equiv** file exists on that node.
restrict	Make sure that the **/etc/clhosts.equiv** file exists on that node.
encrypt	Make sure that the **/etc/clnetrc** file exists on that node.

Questions about Using NetTAPE

1. **What should I do if the cltalloc command fails with the following messages?**

   ```
   cltalloc: openx - errno=46  Device not ready
   cltalloc: open failed with errno= 46  Device not ready
   ```

   Ask the system administrator to verify that:

   - The *hostname* component of the *hostname.device* entry in the **/etc/nettape.adm.config** file is set to one of the nicknames specified in the **/etc/parconf** file.
   - The tape drive's control panel shows that the device is in the READY mode.

2. **What should I do if the cltalloc command fails fails with "permission denied"?**

   Verify that the **$HOME/.netrc** file is correctly defined. Ask the system administrator to verify that the **/.netrc** file is correctly defined.

3. **What should I do if the cltalloc. command fails with "cannot create pseudo message"?**

   Verify that the **/tmp** directory is not full.

4. **What should I do if the cltalloc command fails and the error messages are insufficient to resolve the problem?**

   Look for additional information in the following files:

   - The status daemon log file (**/tmp/nettaped.log** by default)

- **/tmp/cltclntd.pst***n* where *n* is the number of the associated device special file.

  To locate the proper **/tmp/cltclntd.pst***n* file, enter:

  ```
  ls -trl /tmp/cltclntd.pst*
  ```

  Generally, the file at the end of the list is the one that you need to look at.

- The AIX system error log

  To display the contents of the AIX system error log, enter:

  ```
  errpt -a | more
  ```

If you still cannot resolve the problem, create a **/tmp/cliodeb.pst***n.* file, where *n* is the suffix of the device special file (same as **/tmp/cltclntd.pst***x*). Place the following line in the file:

```
C Shell:
  setenv CLIODEB 1792

Korn Shell:
         CLIODEB=1792
```

If you can, restart the NetTAPE status daemon with the following NetTAPE debug environment variables defined:

```
C Shell:
  setenv DBG -1
  setenv CLIODEB 1792

Korn Shell:
  export DBG=-1
  export CLIODEB=1792
```

Then reissue the **cltalloc** command.

The status daemon log file and the **/tmp/cltclntd.pst***n* file will contain the debug trace log information. Look for any messages that indicate errors and try to correct them. If you still cannot diagnose and correct the problem, save both the status daemon log and the **/tmp/cltclntd.pst***n* files and contact IBM service personnel for additional help. IBM service personnel will request the trace log file information.

To turn off the NetTAPE debug environment variables, enter:

```
C Shell:
  setenv DBG 0
  setenv CLIODEB 0

Korn Shell:
  export DBG=0
  export CLIODEB=0
```

5. **What should I do if the cltalloc command fails with the following messages?**

   ```
   cltalloc: mount request failed with rc=-122
   security check failed - check your network security setup.
   ```

   The solution to the problem depends on the NetTAPE security method that is being used by your installation. Ask your system administrator to check the files that are related to the NetTAPE security method that your installation is using and fix any problems with them.

For NetTAPE 1.1, the only security method available is the Remote Execution Using .netrc method (netrc).

For NetTAPE 1.2, the security method your installation is using is determined by the option that is specified on the `SECURITY_MODE=` keyword in the **/etc/clnettape.security** file.

This problem can exist for both local and remote device access. For remote device access, the **/etc/clnettape.security** file must be the same on both nodes.

Once your system administrator has determined that the **/etc/clnettape.security** file is the same on both nodes and has determined the security method that is in use at your installation, he or she can take the appropriate action, as follows:

Security Method	Administrator Action
netrc	Make sure that a **$HOME/.netrc** file exists in the user's home directory on that node. Make sure that the user's **$HOME/.netrc** file is owned by the user and not by root.

trusted	Make sure that the **/etc/hosts.equiv** file exists on that node and that the nodes are correctly specified. For example, if a user on Node A accesses a device on Node B, Node A's **/etc/hosts.equiv** file should contain:
	`Node A`
	`Node B`
	Node B's **/etc/hosts.equiv** file should contain:
	`Node A`

restrict	Make sure that the **/etc/clhosts.equiv** file exists on that node and that the nodes and userids are correctly specified. For example, if User user1 on Node A accesses a device on Node B, Node A's **/etc/clhosts.equiv** file should contain:
	`Node A user1`
	`Node B user1`
	Node B's **/etc/clhosts.equiv** file should contain:
	`Node A user1`

encrypt	Make sure that the **/etc/clnetrc** file exists on that node. Verify that the user is authorized for local and remote access.

6. **What should I do if a NetTAPE API subroutine fails?**

   If the error code from the NetTAPE subroutine does not provide enough information to diagnose and correct the problem, look in the the status daemon log file for any relevant messages.

   If you still cannot resolve the problem, turn on the following NetTAPE debug environment variables:

```
C Shell:
  setenv DBG -1
  setenv CLIODEB 1792

Korn Shell:
  export DBG=-1
  export CLIODEB=1792
```

Then, rerun your application and capture the debug output. Enter:

```
application_program | tee /tmp/program.log
```

Note that the /**tmp**/*program*.**log** file that results can become very large if your application fails in the middle of read/write operation.

Now examine the /**tmp**/*program*.**log** file for information about the failure. If the log file is huge, look at the last 300 lines of it. Enter:

```
tail -300 /tmp/program.log | more
```

If you still cannot determine the cause of the failure, save both the status daemon log file and the /**tmp**/*program*.**log** file, and contact IBM service personnel for additional help. IBM service personnel will request the trace log file information.

7. **What should I do when the "cltopr -q" command fails?**

   Ask the system administrator to verify that the status daemon is running. For information about how to do this, see Question 1 on page 237 in "Questions about Administering NetTAPE" on page 237.

   If you have your own version of **nettape.config**, verify that the keyword, **stsdmn.hostname** is correctly assigned to the host name of the system where the NetTAPE status daemon is running.

   If you don't have your own version of **nettape.config**, ask the system administrator to perform this check on the /**etc**/**nettape.config** file.

Index

Special Characters

/etc/clhosts.equiv file 39
/etc/clnettape.security file 37, 40
/etc/hosts.equiv file 38
/etc/services, registering in 44, 63
.netrc file 39

Numerics

3494 tape library daemon 92

A

adding device 95
administration tasks 91
administrative commands, NetTAPE 101
ADSM
  authorizing server 85
  defining library to 89
  defining library to NetTAPE 88
  external manager 86
  scratch cartridge 87
  storage pool migration 87
  storage pool, defining an ADSM 85
  using with NetTAPE 85
ADSM, operation with 15
alias pool name, setting 64
allocating a NetTAPE tape device 143
allocation error, retrying 65
AMPEX tape device restrictions 135
anonymous FTP server xv, 24
API usage examples 213
APIs, list of 165
audience of this book xi
authentication 37
authorization for NetTAPE functions 44
automatic volume recognition 51
AVR
  See automatic volume recognition
avr daemon 92
AVR daemon, scanning interval 56

B

book, how to use xi
book, terms used xiii
books, related xii
bootable system image, creating 99
buffers, flushing 140
buffers, write-behind 140

C

category, default private tape 55
category, default scratch tape 55
changes, summary of xvii
cl3494d daemon 92
client daemon, debugging 126
client.alias_poolname 64
client.cross.tm keyword 64
client.error.retry 65
client.flush 140
client.tapepos 64
client.wbh 140
CLIO/S, coexistence with 15, 17
CLIODEB environment variable 125
clnetrc command 38, 102
clnetrc file 38, 102
closing a tape file 173
closing the volume information file 153
clscsid daemon 92
clsilod daemon 92
cltalloc command 143
cltclntd 124
cltclntd daemon 92
cltclntd daemon, debugging 126
cltclose command 153
cltopen command 155
cltopr command 105
cltoprgcommand 117
cltterm command 120
cltunall command 162
cltvols command 163
clutil daemon 92
clutild 37, 38, 40, 41
clutild daemon 37, 38, 40, 41, 92
coexistence with CLIO/S 17
coexistence with other products 15
commands
  clnetrc command 102
  cltalloc command 143
  cltclose command 153
  cltopen command 155
  cltopr command 105
  cltoprg command 117
  cltterm command 120
  cltunall 162
  cltvols command 163
  examples of using together 129
commands, list of 141
commands, list of administrative 101
compiling 165

© Copyright IBM Corp. 1996, 1997

configuration
  adding device 95
  deleting device 95
  files, creating and customizing 33
configuration file
  SCSI library 70
configuring
  NetTAPE 33
  tape library 91
copying files from anonymous FTP server xv, 24
crossing tape marks 64
ctpalloc subroutine 166
ctpclose subroutine 173
ctperr subroutine 174
ctpflush subroutine 175
ctpioctl subroutine 177
ctpopen subroutine 178
ctpqwbh subroutine 185
ctpread subroutine 186
ctpreads subroutine 187
ctprew subroutine 188
ctpskpf subroutine 189
ctpskpr subroutine routine 190
ctpunall subroutine 191
ctpvols subroutine 192
ctpweof subroutine 193
ctpwrite subroutine 194
ctpwrites subroutine 195

D

daemon
  avr 92
  cl3494d 92
  clscsid 92
  clsilod 92
  cltclntd 92, 124
  clutil 92
  clutild 92
  nettaped 92
  pvl daemon 92
  tape client 124
  tapesrv 92
daemon error log 123
daemons, about 92
DBG environment variable 125
debugging
  aids 125
  client daemon 126
  status daemon 125
default device pool 54
default private tape category 55
default scratch tape category 55
default scratch tape pool 55
deleting device 95
device 48
  adding 95
  defining to NetTAPE 48
  deleting 95
  failure to deallocate 124
  reserving 98
  resetting 97
  shared 53
  state, specifying 50
  states, about 95
  supported 11
device address
  SCSI tape library 50
  STK tape library 51
device driver types 51
  OMI 51
  OST 51
device pool 43, 48
  about 42
  access control lists 45
  default, defining 54
  defining 48
  esoteric 43
  esoteric, defining 54
  finding available 130
  user access 45
DEVICE_ACL 37, 40
documentation, where to find xiv
domain, operator 50
downloading files from anonymous FTP server xv, 24
dynamic allocation for tape server 166

E

Encrypted Password security method 38
end of tape handling 139
environment variables
  CLIODEB 125
  DBG 125
  setting 125
error log, daemon 123
esoteric device pool 54
  creating 54
  invalid 125
  planning 43
examples
  API 213
exit
  scratch tape mount 68
  volume check 66

F

failure
  restarting NetTAPE 125
  to deallocate device 124

FAQs 237
file
  clnetrc file 102
  downloading from anonymous FTP server xv, 24
  header 165
  makefile 165
  nettape.adm.config 42
  nettape.config 63
  README xiv
file open error handling, retrying 65
flushing write-behind buffer data to tape 175
formats of MVS tapes 132
frequently asked questions 237
FTP server, anonymous xv, 24

G

graphical user interface
  See GUI
GUI
  about 7
  customizing 91
  README 91
  starting 94

H

hardware, supported 11
header file 165
help, online xv
how to use this book xi

I

IBM tape library
  See tape library
installation 21
  after 29
  information about 91
intervention required, tape library 48
ioctl command, issuing 177
ioctl commands
  migration considerations 207
ioctl table
  customizing 203
issuing an ioctl command 177

L

library
  See tape library
library server node 47
library, NetTAPE 165
linking 165
log, error 123

M

makefile 165
man pages
  tips on using xv
  where to find xv
MANPATH environment variable xv
manual, where to find xiv
manuals, related xii
messages 196
migration
  new ioctl commands 207
migration of ADSM storage pool 87
mksysb 99
mode, operation 49
mount queue settings 56
mount.queue 56
mount.queue.max.wait 56
mount.queue.scan.interval 56
MVS
  sharing tape device with 98
  tapes, volume information 131
MVS tape formats 132

N

name, tape library 50
NetTAPE
  ADSM, operation with 15
  CLIO/S, coexistence with 15
  commands, examples of using together 129
  header file 165
  how to install 21
  makefile 165
  operation with other products 15
  starting or restarting 94
  stopping 94
  subroutine library 165
  subroutines, examples of using together 130
  tips on using xv
nettape.adm.config
  authorization for NetTAPE functions 44
  automatic volume recognition 51
  AVR daemon, scanning interval 56
  changing 62
  client.flush 140
  client.wbh 140
  default device pool 54
  default private tape category 55
  default scratch tape category 55
  device driver types 51
  device pool 48
  device pool, about 42
  device state 50
  esoteric device pool 43, 54
  mount queue setting 56

nettape.adm.config *(continued)*
operation mode, types 49
operator domain 50
sample file 58
scratch tape mount installation exit 57
SCSI tape library device address 50
shared device 53
STK tape library device address 51
stsdmn.blp 44
stsdmn.devpool.access.group 45
stsdmn.devpool.access.user 45
stsdmn.devpool.no_access.group 45
stsdmn.devpool.no_access.user 45
stsdmn.ibmacs 47
stsdmn.library.retry 48
stsdmn.library.volcheck 48
stsdmn.operators 44
stsdmn.operators.adm 44
stsdmn.operators.view 44
stsdmn.scratch.mount 57, 68
stsdmn.stkacs 47
stsdmn.util.portno 44
stsdmn.volcheck 56, 66
tape library name 50
tape pool 42, 48
user authority control list 44
utility daemon port number 44
volume check installation exit 56
nettape.adm.config file, about 42
nettape.config
alias for pool name 64
client.alias_poolname 64
client.cross.tm 64
client.error.retry 65
client.tapepos 64
customizing 63
error retry 65
status daemon host name 63
status daemon port number 63
stsdmn.hostname 63
stsdmn.portno 63
tape mark crossing 64
tape position update interval 64
nettaped daemon 92
nettaped daemon, debugging 125
node, library server 47
notation, syntax xiii

O

objectives for this manual xi
OMI device driver type 51
online help, where to find xv
open file error handling, retrying 65
opening a tape device for use 178
operation mode
IBMACF 49
IBMACL 49
IBMACS 49
SCSIACS 49
STKACS 49
operation with other products 15
operator command 105
operator domain 50
operator GUI, starting 94
organization of this book xi
OST device driver type 51

P

parconf file
sample 84
Physical Volume Repository (PVR)
See SCSI tape library daemon
pool 42, 48
pool name alias, setting 64
pool, default private tape 55
pool, default scratch tape 55
port number, status daemon 63
port number, utility daemon 44
position, tape 64
positioning, tape
by device driver type 51
understanding 136
private tape category, default 55
private tape pool, default 55
programming information 165
programming interfaces, NetTAPE 165
publications, related xii
pvl daemon 92
PVR (Physical Volume Repository)
See SCSI tape library daemon

Q

querying the number data blocks in write-behind buffers 185

R

readers of this book xi
reading a tape 186, 187
README, where to find xiv
Remote Execution Using .netrc security method 39
removing device 95
requirements for NetTAPE 11
reserving, device 98
resetting, device 97
restarting NetTAPE, failure 125
Restricted Network Access security method 39

restriction on AMPEX tape devices 135
return values, tape 196
REWIND_REJECT allocation parameter 169, 181
rewinding a tape 188

S

sample file
  parconf 84
  security 40
scratch tape mount installation exit 57, 68
scratch tape pool, default 55
SCSI library configuration file
  defining 70
SCSI PVR daemon
  See SCSI tape library daemon
SCSI tape library daemon 92
security
  about 37
  authorizing ADSM server 85
  Encrypted Password method 38
  Remote Execution Using .netrc method 39
  Restricted Network Access method 39
  sample file 40
  Trusted Network Access method 38
shared device 53, 95
sharing tape device with MVS 98
shell script, xcltopr 29
skipping
  tape files 189
  tape records 190
software, supported 11
starting a remote tape server 166
starting NetTAPE 94
state, specifying device 50
states, about device 95
status daemon, debugging 125
status daemon, stopping 94
STK silo daemon 92
STK tape library
  See tape library
stopping
  NetTAPE 94
  NetTAPE command 130
  NetTAPE subroutine 130
  status daemon 94
  tape client daemon 120, 124
storage pool, migration of ADSM 87
stsdmn.blp 44
stsdmn.devpool.access.group 45
stsdmn.devpool.access.user 45
stsdmn.devpool.no_access.group 45
stsdmn.devpool.no_access.user 45
stsdmn.hostname 63
stsdmn.ibmacs 47
stsdmn.library.retry 48
stsdmn.library.volcheck 48
stsdmn.operators 44
stsdmn.operators.adm 44
stsdmn.operators.view 44
stsdmn.portno 63
stsdmn.scratch.mount 57, 68
stsdmn.scsiacs 47
  stsdmn.scsiacs 47
stsdmn.stkacs 47
stsdmn.util.portno 44
stsdmn.volcheck 56, 66
subroutine library 165
subroutines
  ctpalloc C function 166
  ctpclose C function 173
  ctperr C function 174
  ctpflush C function 175
  ctpioctl C function 177
  ctpopen C function 178
  ctpqwbh C function 185
  ctpread C function 186
  ctpreads C function 187
  ctprew C function 188
  ctpskpf C function 189
  ctpskpr C function 190
  ctpunall C function 191
  ctpvols C function 192
  ctpweof C function 193
  ctpwrite C function 194
  ctpwrites C function 195
  return values 196
  tpalloc FORTRAN function 166
  tpclose FORTRAN function 173
  tperr FORTRAN function 174
  tpflush FORTRAN function 175
  tpopen FORTRAN function 178
  tpqwbh FORTRAN function 185
  tpread FORTRAN function 186
  tpreads FORTRAN function 187
  tprew FORTRAN function 188
  tpskpf FORTRAN function 189
  tpskpr FORTRAN function 190
  tpunall FORTRAN function 191
  tpvols FORTRAN function 192
  tpweof FORTRAN function 193
  tpwrite FORTRAN function 194
  tpwrites FORTRAN function 195
subroutines, examples of using together 130
summary of changes xvii
syntax notation in book xiii

T

tape category, default private 55

tape category, default scratch 55
tape client daemon
about 92
stopping 120, 124
tape device
See also device
allocating by command 143
failure to deallocate 124
sharing with MVS 98
unallocating 162, 191
tape drive
See device
tape drives, supported 11
tape formats, MVS 132
tape label, errors 48
tape library
configuring 91
daemon 48
defining to NetTAPE 47
intervention required 48
name 50
SCSI device address 50
STK device address 51
tape library manager retry interval 48
tape marks
crossing 64
tape pool 42, 48
tape position information 64
tape positioning
by device driver type 51
understanding 136
tape return values 196
tape server daemon 92
tape volume information 192
tapesrv daemon 92
tasks
administration 91
user 129
terminating
NetTAPE command 130
NetTAPE subroutine 130
terms, used in book xiii
tips xv
tpalloc subroutine 166
tpclose subroutine 173
tperr subroutine 174
tpflush subroutine 175
tpopen subroutine 178
tpqwbh subroutine 185
tpread subroutine 186
tpreads subroutine 187
tprew subroutine 188
tpskpf subroutine 189
tpskpr subroutine routine 190
tpunall subroutine 191
tpvols subroutine 192
tpweof subroutine 193
tpwrite subroutine 194
tpwrites subroutine 195
translating an error code to a message 174
troubleshooting tips
for administrators 124
for users 201
Trusted Network Access security method 38

U

unallocating a tape device 162
unfinished job, handling 98
user authority control list 44
user tasks 129
using this book xi
utility daemon 92

V

VFILE
administration considerations 43
closing the file 153
format 131
how to use 131
option 146, 158, 171, 182
sample 131
with MVS tapes 131
volume check installation exit 56, 66
volume information file
See VFILE

W

World Wide Web, NetTAPE documentation on xiv
write-behind processing 140
WRITE_TM_ACCEPT allocation parameter 172, 183
writing
tape marks 193
to tape 194, 195

X

xcltopr shell script 29, 121