



System Administrator's Guide

StorHouse Release 5.6

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Welcome

Welcome to the StorHouse® *System Administrator's Guide*. This book explains how to manage and administer your StorHouse system.

About StorHouse

StorHouse is FileTek's enterprise-wide software solution for managing the capture, storage, movement, and access of gigabytes to petabytes of relational and non-relational detail data. StorHouse technology combines industry-leading, scalable storage devices and Open Systems processors with FileTek's specialized storage management and relational database management system (RDBMS) software components.

StorHouse/SM

StorHouse/SM, FileTek's storage management component, controls a hierarchy of storage devices including cache, RAID disks, erasable and write-once-read-many (WORM) optical disk jukeboxes, and high-performance and high-capacity tape (erasable and WORM) in automated libraries. StorHouse/SM is also responsible for automating critical system management tasks such as data migration, backup, and recovery.

StorHouse/RM

StorHouse/RM, FileTek's RDBMS component, works in conjunction with StorHouse/SM to specifically administer the storage, access, and movement of relational data. For more information on the StorHouse/RM product, refer to the StorHouse/RM User Document Set.

In this book, StorHouse refers to the StorHouse/SM product.

Welcome

Purpose of This Document

StorHouse/Control Center

StorHouse/Control Center (CC) is FileTek's Windows®-based application for StorHouse system and database administration. It provides an easy-to-use graphical user interface (GUI) that simplifies StorHouse storage and database management tasks. You can use the StorHouse/Control Center *StorHouse/Admin module* to define and manage StorHouse system resources.

This manual presents instructions for performing system administration tasks using Command Language commands rather than StorHouse/Admin. For information about how to use StorHouse/Admin, refer to the *Getting Started with StorHouse/Admin* manual, publication number 900135, and the *StorHouse/Admin System Administrator's Quick Reference*, publication number 900147, in the StorHouse/Control Center User Document Set.

Purpose of This Document

The *System Administrator's Guide* describes guidelines used in StorHouse system administration. It explains such tasks as controlling access to StorHouse; allocating storage; working with volumes, volume sets, file sets, and files; protecting user and system files; recovering files and volumes; and controlling StorHouse activities. It is designed to help you provide StorHouse users with responsive, efficient, and economical service.

Intended Audience

The *System Administrator's Guide* is intended for you, the StorHouse system administrator, or whomever is responsible for performing system administration functions. It assumes that you already understand basic StorHouse concepts and terminology and are familiar with the StorHouse Interactive Interface. FileTek suggests that you read the *StorHouse Concepts and Facilities Manual* and become familiar with the *Command Language Reference Manual* before reading this manual.

At some sites, the same person performs the functions of the system administrator and the system operator. At other sites, these functions are distributed among many people. In the discussions that follow, the system administrator is referred to as *you*. The system operator is specifically referred to as *system operator*.

Contents

This document is organized as follows:

- Chapter 1, “Introduction,” outlines system administrator responsibilities, describes StorHouse tools that are available for system tuning, and provides an overview of StorHouse operations and administrative functions.
- Chapter 2, “Controlling Access to StorHouse,” provides guidelines for controlling user access to system resources.
- Chapter 3, “Understanding the Storage Hierarchy,” defines the StorHouse storage hierarchy and introduces basic StorHouse concepts.
- Chapter 4, “Allocating Storage for User Files,” presents strategies for allocating files to StorHouse volume sets and file sets, and describes how to create StorHouse volume sets and file sets.
- Chapter 5, “Managing User Files,” describes system administrator tasks for managing StorHouse user files.
- Chapter 6, “Managing Volume Sets,” describes system administrator tasks for managing StorHouse volume sets.
- Chapter 7, “Managing File Sets,” describes system administrator tasks for managing StorHouse file sets.
- Chapter 8, “Managing Volumes,” describes system administrator tasks for managing StorHouse volumes.
- Chapter 9, “Protecting User and System Files,” explains how to make copies of your user and system files.
- Chapter 10, “Recovering User and System Files,” discusses methods for recovering user and system files.
- Chapter 11, “Recovering Volumes,” discusses methods for creating replacement volumes.
- Chapter 12, “Controlling and Scheduling System Activity,” discusses various types of activity control and system housekeeping procedures.
- Appendix A, “System Parameter Descriptions,” lists and explains the meanings and settings of all StorHouse system parameters.
- Appendix B, “Kernel Parameter Descriptions,” lists and explains the meanings and settings of selected StorHouse kernel parameters.

- Appendix C, “Using Cycle, Deactivate, and Expire Timers,” provides guidelines and examples for using volume set cycle, deactivate, and expire attributes.
- Appendix D, “Understanding Storage and Buffer Allocation,” explains how to allocate storage for system, directory, and Virtual Record Access Manager (VRAM™) scratch files, and how to set StorHouse system parameters to control buffer allocation.
- Appendix E, “File and Volume Integrity,” discusses system parameters that control error detection, as well as system and site identification.

Related Documentation

You should also be familiar with the material in these documents:

- The *StorHouse Concepts and Facilities Manual*, publication number 900026, defines the basic concepts, structures, and functions of StorHouse. This manual is intended for all users. You should read this manual before reading the *System Administrator's Guide*.
- The *StorHouse Glossary*, publication number 900027, defines the terminology used in FileTek publications. You can use it as a stand-alone reference manual or as a companion to the StorHouse User Document Set.
- The *Command Language Reference Manual*, publication number 900005, contains descriptions of StorHouse commands and is intended for all users. You should be familiar with the information presented in this manual before reading the *System Administrator's Guide*.
- The *Messages and Codes Manual*, publication number 900032, lists all StorHouse system and host software messages. This manual is intended for all users.
- The *System Operator's Guide*, publication number 900008, contains basic operating instructions for StorHouse hardware and software. It is intended for the system operator, but you should read it, also.
- The *User Log Format*, publication number 900028, defines the record format for the user log file. Programmers can access this file for report generation purposes.

The vendor of the network that connects StorHouse to host computers provides documentation on network operation and management. This information is useful to you and the operator.

Notational Conventions

This guide assumes that you use the StorHouse Interactive Interface to invoke StorHouse Command Language commands. This book uses the following conventions for illustrating command formats, presenting examples, and identifying special terms:

Convention	Meaning
Angle brackets (< >)	Enclose optional entries
Braces ({ })	Enclose descriptive terms or a choice of entries
Courier font	Code
<i>Italics</i>	New terms and emphasized text
lower case Helvetica font	User entries
UPPER CASE	System responses and StorHouse terms
▼	Procedures



Welcome

Notational Conventions

Introduction

StorHouse is a central storage repository that provides efficient and responsive file storage services to end-users. Although it is a highly automated system, it requires assistance for some operations. You and the system operator provide this assistance by initially configuring and subsequently monitoring StorHouse to best satisfy the needs of your end-user departments.

This chapter discusses:

- Your responsibilities as system administrator
- StorHouse system administration support tools available to you
- The StorHouse operating system environment.

Roles and Responsibilities

As StorHouse system administrator, you are responsible for maintaining StorHouse security, managing day-to-day system operations, tuning the system, and reporting problems should they occur. You also determine the roles and responsibilities of the system operator at your site. The remaining chapters in this manual explain how to use StorHouse resources to perform these various functions.

Maintaining Security

One of your most important job functions is to maintain StorHouse security. You are responsible for providing end-users with appropriate and secure access to their data. You control access to StorHouse files and resources by creating and deleting user accounts, assigning user privileges, and regulating access to user files.

Managing StorHouse Operations

You also oversee the day-to-day operation of the StorHouse software and hardware. This responsibility includes tasks like:

- Allocating and deallocating storage for files on appropriate media and volumes
- Keeping critical resources in use when there is work to be done
- Reducing the vulnerability of files and volumes to failures
- Implementing a backup and recovery strategy for user and system files
- Scheduling file and system management functions.

Tuning the StorHouse System

System parameters are one of many StorHouse system administration tools. They provide system-wide defaults for things like file and volume attributes, data integrity checking, logging, file backup, buffer sizes, custom volume labeling, checkpointing, file duplexing, and migration. You are responsible for configuring StorHouse system parameters at installation to meet your site's initial needs and for adjusting parameter values to satisfy changing user requirements. Refer to "System Parameters" on page 1-6 for more information about how to work with system parameters.

Your job also includes gathering StorHouse performance statistics and figuring out ways to optimize StorHouse operations. FileTek's StorHouse/Performance Monitor software can assist you with this task. Ask your FileTek account manager for information about this product.

Reporting Problems

FileTek provides Call Home error reporting software for StorHouse. Call Home automatically identifies specific error conditions at your site, reports them to FileTek's Support Center at headquarters, and notifies FileTek customer support personnel, as appropriate.

Call Home responds to the following events and conditions:

- Predictive maintenance
- Critical disk space shortages
- Termination of a critical StorHouse program
- Unrecoverable device errors
- Excessive (recovered) device errors
- Disabled volumes.

FileTek typically activates the Call Home feature on your StorHouse system upon installation. If necessary, you can activate this feature by setting the CALL_HOME system parameter to TRUE. Refer to "Setting System Parameters" on page A-3 for information about how to set StorHouse system parameters.

Contact your FileTek customer support representative to report other problems with your StorHouse system. In some cases, your representative can diagnose and solve your problem remotely by discussing the problem with you over the telephone or by logging on to your system through a telephone dial-up line. If necessary, your representative can help you submit a Customer Problem Report. This report and any other pertinent documentation (like log files) help FileTek identify, track, and resolve problems quickly. In addition, FileTek encourages you to discuss your suggestions for improving FileTek products with us.

System Administration Support Tools

StorHouse provides a set of tools to support system administration. These tools are:

- StorHouse account system
- StorHouse Command Language
- System parameters
- Administration and user logs
- Online help.

StorHouse Account System

StorHouse controls user access through an *account system*. Each user account has an identification code, a password, a set of privileges, and other administrative information. End-users can gain access to StorHouse and enter commands by starting a StorHouse session. A *session* begins when a user signs on to StorHouse and ends when that user signs off. The system limits the actions of a user based on information in the user's account.

A StorHouse end-user can be a system administrator, an operator, an application, a general user of a StorHouse host, or a FileTek field systems engineer. As system administrator, you have an account with the privileges to create, change, and remove other accounts. You create additional StorHouse accounts to meet the specific needs of each end-user while maintaining the security and integrity of the entire system.

StorHouse Command Language

The *StorHouse Command Language* is the standard command interface between StorHouse and its host computers. System administrators monitor and control StorHouse through the StorHouse Command Language. With the proper privileges, any user can execute any Command Language command through the StorHouse Interactive Interface. You set account privileges to control which commands a user may execute.

This section introduces you to frequently used commands for system administration. The *Command Language Reference Manual* describes all StorHouse commands in detail.

Frequently Used Commands

The StorHouse commands that you will use most frequently do the following:

- Create backup and archive copies of files
- Create and manage file replicas
- Control storage allocation and deallocation
- Create user accounts, groups, volume sets, and file sets
- Set values for accounts, groups, volumes, volume sets, files, file sets, and system parameters
- Display information about accounts, groups, volumes, volume sets, files, file sets, and devices
- Remove accounts, groups, and files
- Control the movement of volumes in and out of StorHouse, between library devices and storage levels, and within storage levels
- Back up, archive, and checkpoint user files
- Configure file retention periods
- Erase volumes and volume sets that reside on erasable optical or tape media
- Control StorHouse log files
- Monitor system activities.

Table 1-1 lists frequently used commands:

Table 1-1: Frequently Used StorHouse Commands

Command	Description
ARCHIVE	Copies primary files to archive volume sets in preparation for export and archiving.
BACKUP	Copies (writes back) new file extents from the performance buffer to their primary file sets.
CATALOG VSET	Adds file and file set information into the StorHouse directory from uncataloged volumes in a volume set.
CHECKPOINT	Copies recoverable system files to a checkpoint volume set.
CREATE ACCOUNT	Creates a user account.
CREATE BACKUP	Copies primary files to backup volume sets.
CREATE FSET	Creates a file set.
CREATE GROUP	Creates a file access group.
CREATE PRIMARY	Creates a primary copy of a file version by copying a backup or archive copy to a primary volume set and updating the primary directory.
CREATE VSET	Creates a volume set in a directory.

Table 1-1: Frequently Used StorHouse Commands (continued)

Command	Description
ERASE VOLUME	Erases file data on a specific volume.
ERASE VSET	Erases file data on a specific volume set.
EXPORT	Exports part or all of a volume set from StorHouse.
EXTRACT DIRECTORY	Copies StorHouse directory information to a set of StorHouse user files, called extraction files.
HELP	Displays documentation for commands and general information.
IMPORT	Imports a volume or volume set into StorHouse.
MIGRATE	Migrates (removes) files from the performance buffer or from one volume set to another. Also migrates blank volumes into a library device.
MONITOR	Displays current system activity and performance information.
MOVE VOLUME	Moves a volume to a specified location.
MOVE VSET	Moves all volumes in a volume set to a specified location.
NEWLOG	Closes the current system logs and opens new ones.
RELOCATE	Copies a file version to a new location and deletes the source copy.
REMOVE ACCOUNT	Removes a specified account from StorHouse.
REMOVE FILE	Removes files from the deleted file directory.
REMOVE GROUP	Removes a file access group from the directory.
REMOVE SCHEDULE	Removes a scheduled event.
REPLICATE	Replicates a primary file from one StorHouse system to another.
RESERVE SYSTEM	Controls access to StorHouse by other accounts.
RESTORE DIRECTORY	Reads extraction files containing directory information from one or more source StorHouse systems and inserts the information into a destination StorHouse system.
RETIRE VOLUME	Deactivates a volume or volumes, moves all file extents off the specified volumes, and either exports or erases the volumes.
RUN	Runs the procedures that have been installed on a StorHouse system, usually by FileTek Customer Support.
SCHEDULE	Schedules a command to be run automatically by StorHouse.
SET ACCOUNT	Changes parameters for an account.
SET FSET	Changes attributes for a file set.
SET GROUP	Changes passwords for a group.
SET SYSTEM	Changes values for system parameters, which control various StorHouse features.

Table 1-1: Frequently Used StorHouse Commands (continued)

Command	Description
SET USER	Changes user session characteristics for the remainder of the user's session or until another SET USER command changes these characteristics again.
SET VOLUME	Changes the status of a volume.
SET VSET	Changes a volume set's attributes.
SHOW ACCOUNT	Displays user account information.
SHOW DEVICE	Displays the device status and, if applicable, mode and supported media of a StorHouse device.
SHOW FILE	Displays information for a file version.
SHOW FSET	Displays information about a file set.
SHOW GROUP	Displays information for a group.
SHOW PARTITION	Displays information about the part of a file set on a specific volume side.
SHOW SCHEDULE	Displays the events in the schedule of commands to be run.
SHOW SYSTEM	Displays the current value of a system parameter.
SHOW VOLUME	Displays information about a volume.
SHOW VSET	Displays information about a volume set.
STAGE	Queues a transfer (copy) of a specified file to the performance buffer.
UNCATALOG VOLUME	Removes directory information for files on a volume and reduces the size of any file set on the volume.
UNCATALOG VSET	Removes directory information for files and file sets on a volume set.
VALIDATE VOLUME	Verifies that all file extents on a volume can be read.

System Parameters

System parameters are named data fields that StorHouse uses to manage resources and provide default information for system operations. You use them to define things like:

- Default values for file attributes
- Limits, constants, and values that control file migration
- Limits that control system activity.

You choose values for many system parameters during system installation. Each parameter has an assigned default. You can give a system parameter a different value from the default.

During system operation, StorHouse uses the value of some system parameters as the default value for command modifiers that you omit. For example, if you write FILEA to StorHouse with the PUT command and omit the ATF modifier, StorHouse assigns FILEA an ATF value equal to the value of the ATF system parameter.

Appendix A, “System Parameter Descriptions,” defines all available StorHouse system parameters, lists their default values, and indicates whether you can change the parameter value (user access of SET), display the parameter value (user access of SHOW), or do both (user access of SET and SHOW). This appendix also explains the types of system parameters and includes instructions on displaying and modifying system parameter values.

Administration and User Logs

From the time the StorHouse software starts until the shutdown procedure completes, the software writes information to two logs: the administration log and the user log.

Administration Log

The *administration log* is a system-generated file that contains hardware status, error information, and general data used by FileTek customer support representatives to analyze system operations. This log is not accessible to users.

User Log

The *user log* is a StorHouse file that contains statistical and administrative information about StorHouse operations. Information is logged when a certain event occurs or after a specified amount of time. Logged information helps you monitor system activity.

User log records report the following statistical information:

- System startup and shutdown information
- User signon and signoff statistics
- Security and retention violation attempts (e.g., for signons, access groups, files, and commands)
- Command execution
- File opens and closes
- Volume mounts, dismounts, and volume movement information
- Device errors and device state changes
- Library device information (over an interval)
- Drive information (over an interval)
- System heartbeats
- Discarded log record count
- Operator messages
- File copies

- Extent transfers
- Error and device usage statistics
- StorHouse/RM session connections and disconnections, and security violations
- Structured Query Language (SQL) statements received
- Completed SQL transactions
- Permanently closed StorHouse/RM files or ended transactions.

For information about the user log file record format and the user log message protocol, refer to the document *User Log Record Format*, publication number 900028, in the StorHouse User Document Set. For procedures on closing and opening new logs and for a list of system parameters that affect logging, see the section “Controlling Log Files” on page 12-9.

Online Help

You can obtain online help about StorHouse commands, system parameters, and messages. Using the HELP command, you specify keywords to identify the categories of information you want. The information is arranged in a hierarchical order. The first keyword specified identifies the most general category; the last keyword specified identifies the most specific area within the general category.

▼ To obtain online help:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press Enter ↵:

```
HELP <keyword</keyword> <...>>
```

where **keyword** is the category of information or commands, parameters, and modifiers for which information is to be displayed. Below are some examples:

- To obtain general online help, type:

```
? HELP
```

A description of the HELP command and a list of topics display.

- To obtain online help on a specific topic, such as the PUT command, type:

```
? HELP PUT
```

A brief description of the PUT command and a list of PUT command subtopics display.

- To obtain online help on a specific subtopic, such as the parameters of the PUT command, type:

? HELP PUT PARAMETERS

A brief description of the subtopic displays.

- To obtain online help on a return code, such as 4897, type:

? HELP RETURN_CODE 4897

A brief description of the return code displays.

The HELP command is described fully in the *Command Language Reference Manual*.

The StorHouse Operating System Environment

StorHouse runs on Sun Microsystems® Ultra™ Enterprise and Sun Fire servers, Hewlett-Packard® PA-RISC platforms, and IBM® pSeries servers. You can log in to the StorHouse server operating system (UNIX®) and use operating system features even when the StorHouse software is down. However, the StorHouse server operating system software must be up and running before you can sign on to StorHouse.

StorHouse Server Operating System Accounts


FileTek delivers StorHouse systems with three standard operating system accounts: root, operator, and filetek. The root account is the default super-user account for the operating system. You and the system operator should log in to the StorHouse server operating system with the operator account, which is for standard users. The default password for this account is operator. The filetek account is a standard user account that is reserved for FileTek customer support personnel.




Upon system delivery, the StorHouse operating system operator account does not have the privileges to execute the UNIX halt and reboot commands. If your StorHouse system operator needs to execute halt and/or reboot, you can change the sys_maint program in /filetek/bin to be setuid root. If you have questions about operator account privileges, please contact your FileTek customer support representative.

Changing Passwords for Operating System Accounts

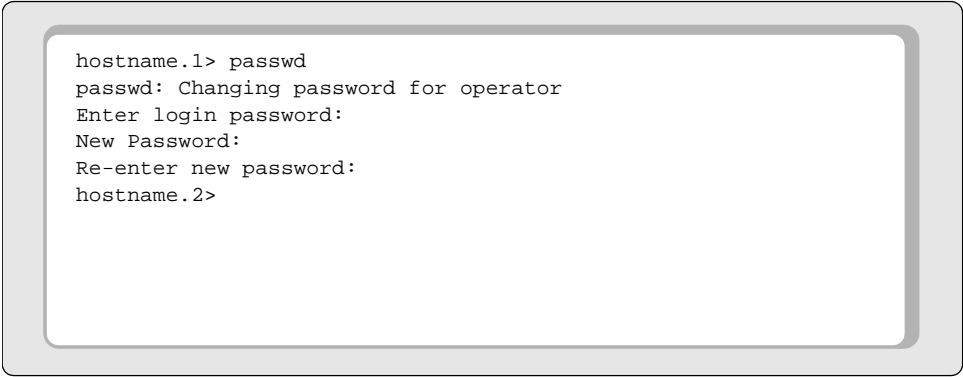
After installation, you should change the StorHouse server operating system operator account password from its default value to prevent unauthorized use of the system. Passwords can contain five to eight printable characters.

▼ **To change the operating system account password:**

1. Log in to the StorHouse server operating system using the operator account.
2. Type the following UNIX command at the system prompt and press **Enter** :

passwd
3. Type the existing password at the Enter login password prompt and press **Enter** .
- Passwords do not display on the screen.
4. Type the new password at the New password prompt and press **Enter** .
5. Retype the new password for verification and press **Enter** .

An example of user operator changing the operator account password on the machine hostname is shown in Figure 1-1.



```
hostname.1> passwd
passwd: Changing password for operator
Enter login password:
New Password:
Re-enter new password:
hostname.2>
```

Figure 1-1: Changing Operating System Account Passwords

Starting a StorHouse Session From the StorHouse Server

Follow this procedure to start a StorHouse session from the StorHouse server.

▼ **To start a StorHouse session from the StorHouse server:**

1. At the system prompt, type the following command and press **Enter** (↵):

```
sm
```

The interface displays FileTek's StorHouse/SM and prompts you to type an account identification code (aid).

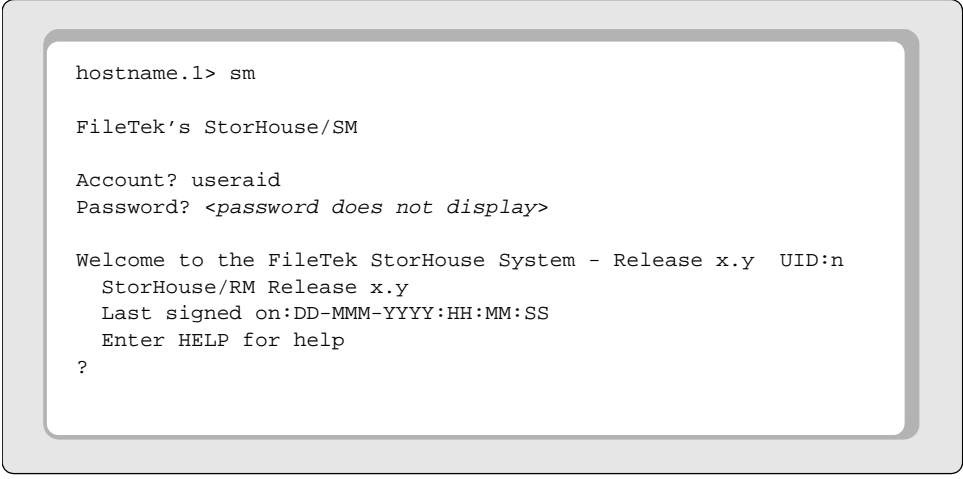
2. At the Account? prompt, type an aid and press **Enter** (↵).

The interface prompts you for a password.

3. At the Password? prompt, type your password and press **Enter** (↵).

The interface does not display the password when you type it.

Upon signon verification, the interface displays the welcome message and prompts you for a command. Figure 1-2, "StorHouse Signon from the StorHouse Server" shows a sample signon screen.



```
hostname.1> sm

FileTek's StorHouse/SM

Account? useraid
Password? <password does not display>

Welcome to the FileTek StorHouse System - Release x.y UID:n
StorHouse/RM Release x.y
Last signed on:DD-MMM-YYYY:HH:MM:SS
Enter HELP for help
?
```

Figure 1-2: StorHouse Signon from the StorHouse Server

The first line of the welcome message indicates the release number of the StorHouse software in the format version (x) and release (y). The user identification code (uid) is a number (n) that the system uses to identify your session.

1

Introduction

The StorHouse Operating System Environment

On the second line, Last signed on gives the day (DD), the first three characters of the month (MMM), the year (YYYY), the hour (HH), the minute (MM), and the second (SS) of the last time the account was signed on. If you have not signed on before, Last signed on does not display.

The ? is the StorHouse command prompt. You have now signed on to StorHouse and can execute StorHouse Command Language commands.

Controlling Access to StorHouse

As system administrator, you must provide end-users with access to StorHouse resources while maintaining system and user file security. You can use a combination of accounts, account privileges, and file access groups to give each user an appropriate security profile that limits command usage and file access.

This chapter explains how to:

- Create StorHouse accounts and file access groups
- Display information about StorHouse accounts and file access groups
- Change StorHouse accounts and file access groups
- Remove StorHouse accounts and file access groups.

About StorHouse Accounts

A StorHouse *account* is a collection of administrative data used to monitor and control the use of StorHouse by one or more end-users. A StorHouse end-user can be a system administrator, an operator, an application, a general user of a StorHouse host, or a FileTek customer service representative. One account can be dedicated to a single user or shared by many users. Multiple users with the same or different accounts can sign on to and use StorHouse concurrently. StorHouse accounts are separate from the host system accounts.

Note FileTek recommends that you assign one account to each end-user.

You can disable an account to prevent users of that account from signing on to StorHouse. Subsequently, you can enable the account when users may sign on. You can change account parameters and privileges, and display account information while an account is enabled or disabled.

A StorHouse account has four components:

- Account identification code
- Password
- Privileges
- Other administrative information used to set up a default environment for the account.

Account Identification Code

Each StorHouse account has an *account identification code* (aid) to provide a name for the account. A StorHouse aid consists of 1 to 12 characters that may include A-Z (uppercase), 0-9, \$ (dollar sign), and _ (underscore). StorHouse always translates account identification codes to uppercase characters. This means that you cannot use case to distinguish account identification codes. For example, MYACCOUNT is the same as myaccount. Here are some sample valid and invalid account names:

Valid Names	Invalid Names
GENERAL	GENERALGROUPS (contains 13 characters)
HOME_GROUP	HOME GROUP (contains a blank)
SERVICE1	SERVICE.1 (contains a period)

Account Password

Each account can have a password to protect the account from unauthorized use. An account password can be null or contain up to 32 of the following ASCII characters: A-Z (uppercase), 0-9, \$ (dollar sign), and _ (underscore). StorHouse always translates account passwords to uppercase characters. This means that you cannot use case to distinguish passwords. For example, MYPASSWORD is the same as mypassword. Here are some sample valid and invalid passwords:

Valid Passwords	Invalid Passwords
GENERAL	MINNEAPOLIS_MINNESOTA_HEADQUARTERS (contains 34 characters)
HOME_GROUP	HOME GROUP (contains a blank)
SERVICE1	SERVICE.1 (contains a period)

Account Privileges

Each account has a set of privileges. There are two types of account privileges:

- *Access privileges* allow an account user to bypass various security checks.
- *Command privileges* allow an account user to perform specific commands and functions, or groups of commands and functions.

Access privileges and command privileges do not override each other. In other words, you must have both the required command and access privileges (or pass all required security checks) to execute commands. The access and command privileges are listed and defined in the *Command Language Reference Manual*. The *Command Language Reference Manual* also lists which privilege or privileges, if any, are required for each command, modifier, or parameter discussed in this guide.

The following rules apply to account privileges:

- By default, an account with SHOW or ACCOUNT command privilege can show and/or access information and parameters pertaining to that account.
- An account must have the access privilege SHOACCOUNT, ANYACCOUNT, or ALLPRIVILEGE to show account information for other accounts.
- An account must have the access privilege ANYACCOUNT or ALLPRIVILEGE to access other accounts.

Default Account Environment

When you create an account, you can optionally specify administrative information that gives the account a default environment. The *default environment* defines default values for the account's file access group, access rights to the default file access group, volume set, and file set. Following account signon, StorHouse uses these default values in commands that require this information unless the account user specifies different values on the command, or the command has its own built-in defaults.

A user can temporarily change his or her account's default file set, volume set, and/or file access group using the SET USER command (with the /FSET, /VSET, and/or /GROUP modifiers, respectively). These changes remain in effect until the end of the account's current session or until the user changes the account defaults again. An account needs SETGROUP privilege to change its default file access group for the current session.

For definitions of and more information about file access groups, default access rights, volume sets, and file sets, refer to:

- “About File Access Groups” on page 2-15.
- /RIGHTS modifier in Appendix B, “Data Field, Parameter, and Modifier Definitions,” of the *Command Language Reference Manual*.
- Chapter 6, “Managing Volume Sets,” of this manual.
- Chapter 7, “Managing File Sets,” of this manual.

Standard StorHouse Accounts

StorHouse contains four standard accounts at installation. Table 2-1 shows these accounts, which can be used to configure the system for normal use.

Table 2-1: StorHouse Standard Accounts

Account ID	Password	Privileges	Intended for
SYSTEM	SYSTEM	ALLPRIVILEGE	System administrator
OPERATOR	OPERATOR	CONSOLE, OPERATOR, SCHEDULE, SHOW,	System operator
SERVICE	SERVICE	CONSOLE, DELETE, FILE, GET, OPERATOR, PUT, RECORD, SCHEDULE, SERVICE, SETGROUP, SHOW, VTF	FileTek customer support representatives. ¹
USER	USER	ACCOUNT, DELETE, GET, LOCK, PUT, SHOFIELD, SHOW	System administrator to provide a convenient template for setting up new user accounts.

1. SERVICE and SYSTEM are the only standard accounts with a default volume set, file set, and group. The default volume set for these accounts is SYSTEM. The default file set and group are SERVICE. These defaults are used to test StorHouse when you install new hardware or software.

Note These are StorHouse accounts, which can be accessed through a StorHouse host interface. These are not StorHouse server operating system accounts, which can only be accessed through the StorHouse console or a terminal attached to StorHouse.

You should change the passwords for the standard StorHouse accounts before allowing general users to sign on to StorHouse.

Working With Accounts

You can use the following Command Language commands to manage accounts:

- **CREATE ACCOUNT** – Creates a user account and initializes account information
- **SHOW ACCOUNT** – Displays account information
- **SET ACCOUNT** – Changes account information
- **SET USER** – Temporarily changes selected account information for the current session
- **REMOVE ACCOUNT** – Removes a user account from the system.

Creating a StorHouse Account

You can create a StorHouse account using the **CREATE ACCOUNT** command. You must create accounts for all StorHouse end-users, including custom applications that access StorHouse and FileTek applications that do not have pre-installed StorHouse accounts (for example, AMMO-II®).

When you create a StorHouse account, you must specify a name (or account identification code) for the account. Optionally, you can assign an account password, privileges, and a default environment. You can also copy selected information from an existing account to a new account to expedite the account creation process.

The following table defines the modifiers you can use with the **CREATE ACCOUNT** command:

Modifier	Description	Default
/COPY=...	Specifies the account identification code (aid) of an existing account that contains default information for the account being created.	-
/DISABLED	Prevents users from signing on to StorHouse with the specified account.	-
/FSET=...	Specifies the account's default file set name at signon.	/NOFSET
/GROUP=...	Specifies the account's default file access group name at signon.	/NOGROUP
/PRIVILEGE=...	Specifies one or more privileges to be granted or denied to an account.	No privileges

Modifier	Description	Default
/RIGHTS=...	Specifies the account's default access rights to the default group.	/NORIGHTS
/VSET=...	Specifies the account's default volume set name at signon.	/NOVSET

You must have ACCOUNT and ANYACCOUNT privileges to use this command, and SETGROUP privilege to use the /GROUP modifier.

▼ **To create a StorHouse account:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

CREATE ACCOUNT aid <password> modifiers

where aid is the account identification code, <password> is the optional account password, and modifiers are other command and parameter modifiers you use to assign values other than the defaults. Some examples follow:

- To create the account USER1 with a password of PASSWD; assign USER1's default file set, volume set, and file access group to USERFSET, USERVSET, and USERGRP, respectively; and assign USER1 all privileges as well as read, write, and delete access to USER1's default file access group USERGRP, type:

```
? CREATE ACCOUNT USER1 PASSWD /FSET=USERFSET
/VSET=USERVSET /GROUP=USERGRP /PRIV=ALLPRIVILEGE
/RIGHTS=R:W:D
```

- To copy the account information from USER1 (excluding password) and use it to create USER2 (with a password of PASSWD2), type:

```
? CREATE ACCOUNT USER2 PASSWD2 /COPY=USER1
```

This is the equivalent of entering the command used to create USER1 in the previous example but with USER2 in place of USER1 and PASSWD2 in place of PASSWD. If you omitted PASSWD2 in this example, the command would assign a null password to USER2.

- To create the disabled account USER3 with a password of PASSWD3 and give USER3 the same default information, excluding password, assigned to account USER2 in the previous example, type:

```
? CREATE ACCOUNT USER3 PASSWD3 /COPY=USER2 /DISABLED
```


/DISABLED makes the account USER3 unavailable for signon. /DISABLED is useful when creating an account that will not be used immediately, such as a future employee's account. (To enable an account, see "Changing a StorHouse Account" on page 2-10.)

Displaying Information About a StorHouse Account

You can display information about a StorHouse account by using the SHOW ACCOUNT command. Using different modifiers, you can display information in several ways:

- A brief display using the /BRIEF modifier lists the following information:
 - Account name
 - Default file access group name
 - Last access date and time
 - Default access rights.
- A full display using the /FULL modifier lists all available information for an account:
 - Account name
 - Default file access group name
 - Default volume set
 - Default file set
 - Last access date and time
 - Account privileges
 - Default access rights.
- A selected display based on other specified modifiers lists information for those modifiers plus the information in a brief display.

SHOW ACCOUNT modifiers determine items of information to be displayed and/or accounts to be included. Specifying a value for a modifier displays accounts that have the specified value. Specifying multiple modifiers with values displays accounts that have all specified values. The following table defines the modifiers you can use with the SHOW ACCOUNT command:

Modifier	Description	Default
/BRIEF	Displays the account name, default access group, the default rights, and last access date and time for the account.	/BRIEF
/DISABLED	Indicates that only disabled accounts will be displayed.	-
/ENABLED	Indicates that only enabled accounts will be displayed.	-

Modifier	Description	Default
/FSET=...	Selects for display accounts with the specified file set name as their default file set and displays the default file set name for the account.	-
/FULL	Displays all available information for the account.	-
/GROUP=...	Selects for display accounts with the specified group name as their default access group and displays the default group name for the account.	-
/LASTACCESS	Displays the date and time of the account's last signon to StorHouse.	-
/PRIVILEGE=...	Selects for display accounts with the specified privileges and all the privileges assigned to those accounts.	-
/RIGHTS	Displays the default access rights to the account's default file access group.	-
/SINCE=...	Selects accounts that were accessed since the specified date and time.	-
/VSET=...	Selects for display accounts with the specified volume set name as their default volume set and displays the default volume set name for the account.	-

You must have SHOW or ACCOUNT privilege to use this command, and SHOACCOUNT or ANYACCOUNT privilege to specify an aid other than your own.

If you omit the aid, the system uses your own account.

▼ **To display information about a StorHouse account:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

SHOW ACCOUNT <aid> modifiers

where *aid* is the optional account identification code and *modifiers* are other command modifiers you use to assign values other than the defaults. Below are some examples:

- To display all available information for your account (because the aid is omitted), type:

? SHOW ACCOUNT /FULL

The system returns the following information:

```
ACCOUNT=USER1 GROUP=USERGRP VSET=USERVSET  
FSET=USERFSET LASTACCESS=30-MAR-2000:08:00:00  
PRIVILEGE=(SHOACCOUNT,SHOGROUP) RIGHTS=RWD
```

- To display all available information for the account USER2, type:

```
? SHOW ACCOUNT USER2 /FULL
```

The system returns the following information:

```
ACCOUNT=USER2 GROUP=USERGRP VSET=USERVSET  
FSET=USERFSET LASTACCESS=31-MAR-2000:10:31:06  
PRIVILEGE=(GET,PUT) RIGHTS=RW
```

- To display the default file access group, default volume set and file set, last access date and time, and default rights for all accounts whose default volume set and file set are USERVSET and USERFSET, respectively, type:

```
? SHOW ACCOUNT * /FSET=USERFSET /VSET=USERVSET
```

The system returns the following information:

```
ACCOUNT=USER1 GROUP=USERGRP VSET=USERVSET  
FSET=USERFSET LASTACCESS=30-MAR-2000:08:00:00  
RIGHTS=RWD
```

```
ACCOUNT=USER2 GROUP=USERGRP VSET=USERVSET  
FSET=USERFSET LASTACCESS=31-MAR-2000:10:31:06 RIGHTS=RW
```

Accounts with either the default volume set USERVSET or the default file set USERFSET, but not both, do not display.

- To list accounts that were accessed since 8:00 a.m., March 29, 2000, type:

```
? SHOW ACCOUNT * /SINCE=29-MAR-2000:08:00:00
```

The following information displays:

```
ACCOUNT=USER1 GROUP=USERGRP LASTACCESS=30-MAR-  
2000:08:00:00 RIGHTS=RWD
```

```
ACCOUNT=USER2 GROUP=USERGRP LASTACCESS=31-MAR-  
2000:10:31:06 RIGHTS=RW
```


- To display all accounts that have `CONSOLE` or `ANYACCOUNT` privilege, type:

```
? SHOW ACCOUNT * /PRIVILEGE=(CONSOLE, ANYACCOUNT)
```

The following information displays:

```
ACCOUNT=USER1 GROUP=USERGRP LASTACCESS=30-MAR-2000:08:00:00 PRIVILEGE=(CONSOLE, SHOACCOUNT) RIGHTS=RWD
```

```
ACCOUNT=USER2 GROUP=USERGRP LASTACCESS=31-MAR-2000:10:31:06 PRIVILEGE=(ANYACCOUNT, GET, PUT) RIGHTS=RW
```

Changing a StorHouse Account

You can change or set parameters for a StorHouse account by using the `SET ACCOUNT` command. Parameters include the account password, account privileges, and the default account environment. You can also use `SET ACCOUNT` to enable or disable an account. Changes to an account become effective the next time the user signs on to StorHouse.

The following table defines the modifiers you can use with the `SET ACCOUNT` command:

Modifier	Description
<code>/DISABLED</code>	Prevents users from signing on to StorHouse with the specified account.
<code>/ENABLED</code>	Allows users to sign on to the account.
<code>/FSET=...</code>	Specifies the account's default file set name at signon.
<code>/GROUP=...</code>	Specifies the account's default file access group name at signon.
<code>/NEWPASSWORD</code>	Sets a new password for an account.
<code>/PRIVILEGE=...</code>	Specifies one or more privileges to be granted or denied to an account.
<code>/RIGHTS=...</code>	Specifies the account's default access rights to the default group.
<code>/VSET=...</code>	Specifies the account's default volume set name at signon.


You must have:

- `ACCOUNT` privilege to use `SET ACCOUNT`
- `PASSWORD` privilege to use `/NEWPASSWORD`
- `SETGROUP` privilege to use `/GROUP`

If you omit the aid, the system uses your own account.

This section also explains how to temporarily change an account's default file set, volume set, or file access group using the SET USER command.

▼ **To change or set parameters for a StorHouse account:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

SET ACCOUNT <aid> modifiers

where aid is the optional account identification code and modifiers are other command and parameter modifiers you use to assign values other than the defaults. Here is an example:


- To change USER1's default file access group, volume set, and file set to NEWGROUP, NEWVSET, and NEWFSET, respectively; give USER1 read and write access to files located in NEWGROUP; give USER1 the privileges ANYFILE, COPY, GET, and PUT but take away ANYGROUP; and disable the account, type:

```
? SET ACCOUNT USER1 /GROUP=NEWGROUP /RIGHTS=R:W  
/DISABLED /PRIVILEGE=(ANYFILE, NOANYGROUP, COPY, GET, PUT)  
/VSET=NEWVSET /FSET=NEWFSET
```

Changing an Account Password

You can change the password for a StorHouse account using the SET ACCOUNT /NEWPASSWORD command. You must have ACCOUNT and PASSWORD privileges to use this command.

▼ **To change the password for a StorHouse account:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

SET ACCOUNT <aid> /NEWPASSWORD


where aid is the optional account identification code. For example:

- To change USER1's account password, type:

```
? SET ACCOUNT USER1 /NEWPASSWORD
```


The system responds:


Enter new password or RETURN for none?
Reenter new password or RETURN for none?

Type the new password in response to each prompt and press **Enter** . The passwords entered do not display on the screen.

Enabling or Disabling an Account

You can enable or disable a StorHouse account using the SET ACCOUNT /ENABLED or SET ACCOUNT /DISABLED command. You must have ACCOUNT privilege to use these commands.

▼ To enable a StorHouse account:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** :


```
SET ACCOUNT <aid> /ENABLED
```

where aid is the optional account identification code. For example:

- To enable the account USER1, which allows users to use the account to sign on to StorHouse, type:

```
? SET ACCOUNT USER1 /ENABLED
```

▼ To disable a StorHouse account:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** :

```
SET ACCOUNT <aid> /DISABLED
```

where aid is the optional account identification code. For example:


- To disable the account USER1, type:

```
? SET ACCOUNT USER1 /DISABLED
```


Adding or Removing Account Privileges

You can add or remove privileges for a StorHouse account using the SET ACCOUNT /PRIVILEGE command. You must have ACCOUNT privilege to use this command.

▼ To add a privilege to a StorHouse account:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :


```
SET ACCOUNT <aid> /PRIVILEGE=privilege
```

where aid is the optional account identification code and privilege is the privilege you want to add. For example:

- To add ANYGROUP to USER1's StorHouse account privileges, type:

```
? SET ACCOUNT USER1 /PRIVILEGE=ANYGROUP
```

▼ To remove a privilege from a StorHouse account:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

```
SET ACCOUNT <aid> /PRIVILEGE=NOprivilege
```

where aid is the optional account identification code and privilege is the privilege you want to remove. For example:

- To remove ANYGROUP from USER1's StorHouse account privileges, type:

```
? SET ACCOUNT USER1 /PRIVILEGE=NOANYGROUP
```

Temporarily Changing Selected Default Values for an Account

Account users can temporarily change their account's default file set, volume set, or file access group by using the SET USER command. This command is useful if account users want to temporarily write data to another file set or volume set without having to specify the volume set or file set on the PUT command, for example. Changes become effective immediately and remain in effect until the end of the current session, or until the users change the values again. The following table defines the modifiers that can be used with the SET USER command:

Modifier	Description
/FSET	Specifies the account's default file set name for the rest of the session or until the account user changes it again.
/GROUP	Changes the account's default file access group and default access rights for the current session or until the account user changes it again.
/VSET	Specifies the account's default volume set name for the rest of the session or until the account user changes it again.

You must have SETGROUP privilege to assign a new default file access group.

▼ **To temporarily change your account's default file set, volume set, or file access group:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

SET USER modifiers

where modifiers are other command and parameter modifiers you use to assign values other than the defaults. Below are some examples:

- To change your default file set to NEW for the current session, type:

? SET USER /FSET=NEW

- To change your default file set to NEW, the default volume set to NEW, and the default file access group to GROUPB for the current session, type:


? SET USER /FSET=NEW /VSET=NEW /GROUP=GROUPB

Removing a StorHouse Account

You can remove a StorHouse account by using the REMOVE ACCOUNT command. If the account user is signed on when the command is executed, that user's current session is not affected. However, after the user's session is terminated, that account ID cannot be used again for signon.

You must have ACCOUNT and ANYACCOUNT privileges to use this command.

▼ To remove a StorHouse account:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

REMOVE ACCOUNT aid

where aid is the account identifier of the account to be removed. An example follows:

- To remove the account USER1, type:

? REMOVE ACCOUNT USER1

About File Access Groups

A *file access group* is a collection of files that are grouped together for access control. You typically assign files that are accessed by the same application or end-users to the same file access group. This allows you to manage which users can access which files. A user can be limited to his or her default group or given passwords to specific other groups. StorHouse uses the file access group as the high-level qualifier for file names in the StorHouse directory.

You can reserve part of the performance buffer for file extents belonging to a group if adequate space is available (relative to the minimum amount of performance buffer space reserved for the general area by the MIG_GENERAL system parameter). You specify the amount of space to be reserved using the CREATE GROUP or SET GROUP command, and display the amount of space reserved and allocated for the group with the SHOW GROUP command. Migration threshold values apply only to unreserved (general) performance buffer space. If the amount of space required for a file extent exceeds the amount of reserved space, the system automatically migrates files off the general performance buffer to free enough reserved space.

You must have SETGROUP privilege to specify /GROUP in a command unless the specified group is your default file access group. The /GROUP modifier allows you to access files that are not part of your default group. You must have SYSTEM privilege to use the /PERF_BUF modifier in the CREATE GROUP and SET GROUP commands.

Working With File Access Groups

You can manage file access groups using the following Command Language commands:


- **CREATE GROUP** – Creates a file access group and optional file access group passwords
- **SHOW GROUP** – Displays information about a file access group
- **SET GROUP** – Changes a group's access passwords and lets you change the amount of reserved performance buffer space for the group
- **REMOVE GROUP** – Removes a file access group from the system.

Creating a File Access Group

You can create a StorHouse file access group by using the **CREATE GROUP** command. When you create a file access group, you specify the group name, optionally group passwords, and you can reserve performance buffer space for the group.

You must have **GROUP** privilege to use this command. You must have **SYSTEM** privilege to use the **/PERF_BUF** modifier.

▼ To create a file access group:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

```
CREATE GROUP groupname<:<readpw><:<writepw><:<deletepw>>>
modifiers
```

where **groupname** is the name of the file access group to be created, **readpw** is the optional read password to be assigned, **writepw** is the optional write password to be assigned, **deletepw** is the optional delete password to be assigned, and **modifiers** are other command and parameter modifiers you use to assign values other than the defaults. An example follows:

- To create the file access group **USERGRP**, assign it write and delete passwords of **WRITEPW** and **DELETEPW**, respectively, assign its read password to null, and reserve 100 MB of performance buffer space for **USERGRP**'s exclusive use, enter:


```
? CREATE GROUP USERGRP::WRITEPW:DELETEPW /PERF_BUF=100M
```


Displaying Information About a File Access Group

You can display information about a StorHouse file access group by using the `SHOW GROUP` command. With this command, you can display the group name and the type of passwords assigned to the group. `SHOW GROUP` also supports two modifiers: `/PROTECTION`, which displays the types of passwords (if any) that protect the group and `/PERF_BUF`, which displays the amount of performance buffer space that is reserved and allocated to the group.

You must have `SHOW` or `GROUP` privilege to use this command.

▼ To display a file access group:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

```
SHOW GROUP groupname<:readpw> modifier
```

where `groupname` is the name of the file access group to be displayed, `readpw` is the group's existing read password, and `modifier` is the optional parameter `/PROTECTION`. Two examples follow:

- To display the name of your default file access group, type:

```
? SHOW GROUP
```

The system displays:

```
GROUP=USERGRP
```

- To display the group name and the types of passwords assigned to `USERGRP`, type:

```
? SHOW GROUP USERGRP /PROTECTION
```

The system responds as follows:

```
GROUP=USERGRP PROTECTION=WD
```

- To display the amount of performance buffer space reserved for (MINIMUM) and currently allocated (CURRENT) to `USERGRP`, enter:

```
? SHOW GROUP USERGRP /PERF_BUF
```


The system displays the following information. The performance buffer minimum and current values are in bytes.


```
GROUP=USERGRP PB_MINIMUM=2000000 PB_CURRENT 1000000
```

Changing a Password for a File Access Group

You can change the passwords for a StorHouse file access group by using the SET GROUP command. SET GROUP supports the /NEWPASSWORDS modifier, which allows you to replace one or more existing passwords for a file access group.

You must have GROUP privilege to use this command, and you must have PASSWORD privilege to replace one or more existing passwords for a file access group.

▼ To change a password for a file access group:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

```
SET GROUP groupname<:::deletepw> modifier
```

where *groupname* is the name of the file access group to be changed, *deletepw* is the group's existing delete password, and *modifier* is the optional parameter modifier /NEWPASSWORDS. An example follows:

- To replace all group passwords for the file access group USERGRP with new read, write, and delete passwords (READ, WRITE, and DELETE, respectively), type:

```
? SET GROUP USERGRP /NEWPASSWORDS=READ:WRITE:DELETE
```

Changing the Amount of Reserved Performance Buffer Space for a File Access Group

You can change or specify the amount of reserved space on the performance buffer for a StorHouse file access group by using the /PERF_BUF modifier on the SET GROUP command.

You must have SYSTEM privilege to use the /PERF_BUF modifier.

▼ To change the amount of reserved performance buffer space for a file access group:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

```
SET GROUP groupname /PERF_ BUF
```

where `groupname` is the name of the file access group to be changed. An example follows:

- To increase the size of the performance buffer space reserved for `USERGRP` to 200 MB, enter:

```
? SET GROUP USERGRP /PERF_BUF=200M
```

Removing a File Access Group

You can remove a StorHouse file access group by using the `REMOVE GROUP` command. You must have `GROUP` privilege to use this command and `SETGROUP` privilege to specify the file access group to be removed (and, optionally, a group delete password).

Note Before a group can be removed, all files in the group must be deleted and removed.

▼ To remove a file access group:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

```
REMOVE GROUP groupname<:::deletepw>
```

where `groupname` is the name of the file access group to be removed and `deletepw` is the group's existing delete password. An example follows:

- To remove the file access group `USERGRP` from the StorHouse directory, type:

```
? REMOVE GROUP USERGRP
```

For more information on removing files, see the section “Removing User Files” on page 5-31.

2

Controlling Access to StorHouse

Working With File Access Groups

Understanding the Storage Hierarchy

This chapter defines the StorHouse storage hierarchy and introduces basic concepts that appear in subsequent chapters. As you read this manual, you may want to refer back to this chapter from time to time.

In addition to the storage hierarchy, this chapter discusses:

- The differences between physical, logical, blank, and empty volumes
- Volume sets for user files
- Level L free pool volume sets
- File sets for user files.

About the Storage Hierarchy

StorHouse uses a seamless hierarchy of storage devices and media to satisfy different end-user requirements for response time, cost of storage, data retention, and space allocation. The components of this hierarchy can include:

- RAM (which the system uses for data caching)
- RAID
- ATA disks
- MAID
- Erasable and write-once-read-many (WORM) optical disk jukeboxes
- High-capacity and high-performance (erasable and WORM) tape in automated libraries
- Shelf storage.

StorHouse software automatically manages the devices and media in the storage hierarchy and moves data to the appropriate location based on system- and user-controllable parameters.

Understanding Storage Levels

StorHouse divides the storage hierarchy into three distinct levels as depicted in the following table:

Table 3-1: Levels in the Storage Hierarchy

Level	Storage Devices	Characteristics
Fixed (level F)	Two separate layers: <ul style="list-style-type: none"> • RAID • ATA disk 	Fixed storage of nonremovable volumes. Level F is typically used as a <i>performance buffer</i> to write data from the client at faster speeds and as a staging area for higher frequency data retrievals. StorHouse automatically migrates, or removes, files from the performance buffer.
Library (level L)	Five separate layers: <ul style="list-style-type: none"> • MAID • Erasable optical disk • WORM optical disk • Erasable tape • WORM tape 	Library storage of removable volumes. Robotic accessors in the libraries transfer cartridges between slots and drives automatically as users request information. The erasable and WORM optical layers may reside in the same jukebox.
Shelf (level S)	Separate shelf storage units for each jukebox and automated tape library in level L.	Storage of removable volumes unloaded from level L libraries. Operators must be available to load and unload cartridges to and from level S. StorHouse automatically manages all volumes on level S.

The following drawing illustrates the levels and layers in the storage hierarchy.

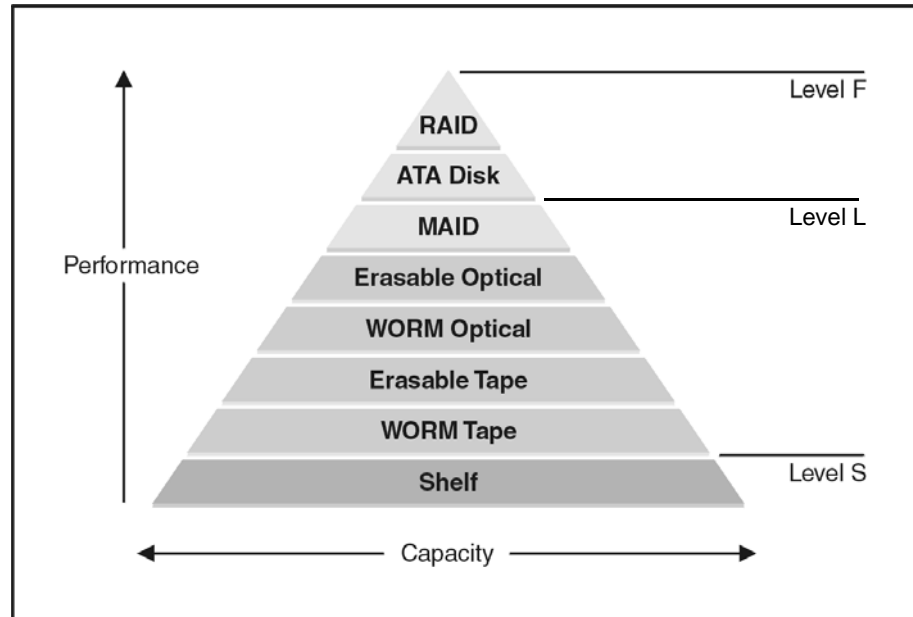


Figure 3-1: Levels and Layers in the Storage Hierarchy

Understanding File Movement Within the Storage Hierarchy

StorHouse system software lets you control data availability strategies and migration paths through the different levels and layers in the storage hierarchy. For example, you can configure your system to initially write specific files to the level F performance buffer. Files written to the performance buffer remain there temporarily until StorHouse migrates (removes) them. Alternatively, you can choose to bypass the performance buffer for other files and write them directly to the level L optical or tape layer. Then as your file access requirements diminish, StorHouse can migrate files to lower-cost-per-megabyte media or move files located on selected level L volumes to level S (shelf storage).

The following drawing illustrates how StorHouse manages the movement of two files to different layers in the storage hierarchy.

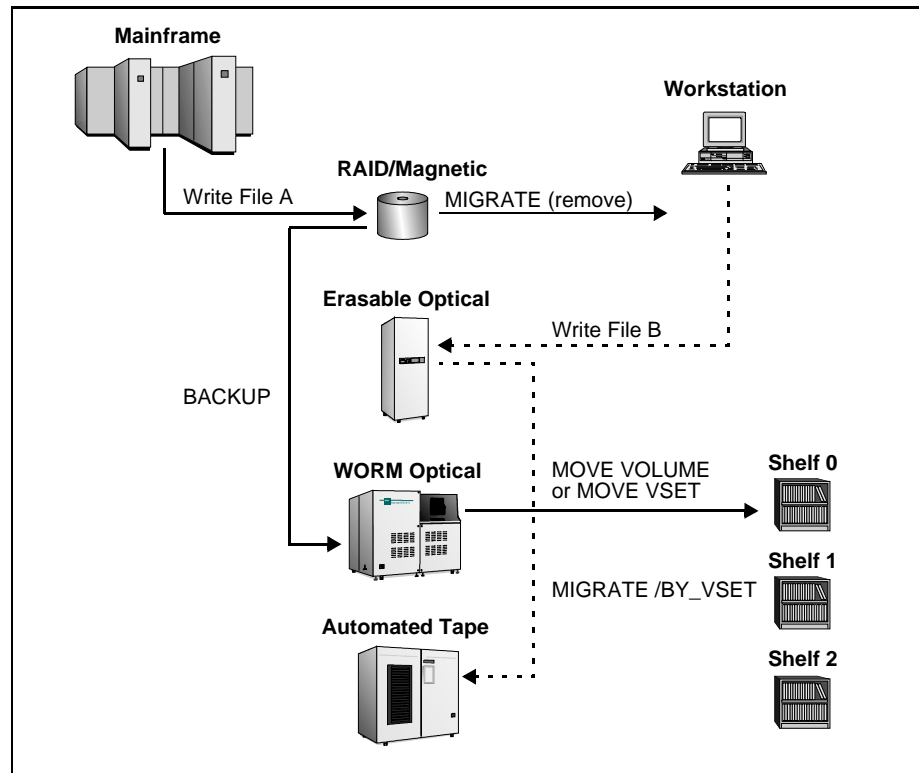


Figure 3-2: Data Movement Through the Storage Hierarchy

Subsequent chapters in this manual discuss file migration and movement in greater detail. Refer to Chapter 10, “Migrating Files,” for more information about file migration. Refer to “Migrating Volumes” on page 8-14 for more information about moving level L volumes to shelf storage.

Managing the Storage Hierarchy

StorHouse’s patented Volume Storage Allocation and Control (VSAC™) software manages the storage hierarchy for you. VSAC is responsible for assigning your files to specific volumes, managing groups of volumes in volume sets, and managing groups of files in file sets. It is your responsibility to create and configure these volume sets and file sets. Before you can do that, you need to understand the concepts presented in the following sections.

Understanding Volumes

A *volume* is a unit of media on which data can be recorded and read. RAID, magnetic disk, erasable and WORM optical disks, and tape cartridges are all examples of StorHouse volumes, or media. The *residence* of a StorHouse volume is the location of the volume in one of the three storage levels.

A *physical* volume is a unit of media where data can be recorded and read. The portion of a physical volume that can be accessed when mounted in a drive is called a *logical* volume. A logical volume consists of one or more physical volume sides, or surfaces. For example, some optical drives can access both sides of a two-sided optical volume simultaneously. In this case, each two-sided optical volume has only one logical side. Tape volumes also have one logical side. Other optical drives can access only one side of a double-sided optical disk at a time. In this case, the two-sided optical volume has two logical sides, side A and side B.

From time to time, StorHouse will request the system operator to load one or more blank volumes into a specific library device. A *blank* volume is any volume that has not been initialized by the StorHouse software. When StorHouse initializes a volume, it writes an internal volume label on the media. Once a volume has been initialized, it becomes an *empty* volume. An empty volume contains an internal volume label, but no data or file labels. A collection of empty volumes in a library device is called a *free pool*.

StorHouse uses a *volume identification code* (vid) to uniquely identify every volume. The format for a sample StorHouse optical vid is:

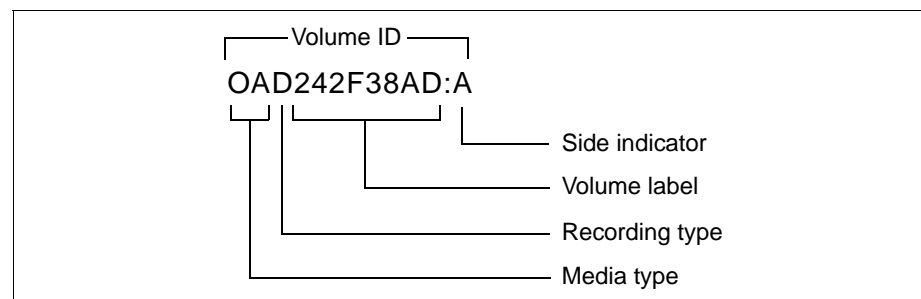


Figure 3-3: Sample Volume Identification Code

For tape, the vid format is the same as optical, except for the volume label component, which contains 1 to 6 characters instead of 1 to 8.

Other chapters in this manual and other books in the StorHouse user document set contain more information about volume labels. Refer to the *StorHouse Concepts and Facilities Manual* for an explanation and listing of the valid StorHouse media and recording types. In this manual refer to Chapter 8, “Managing Volumes,” for information about how to customize the volume label component of the vid for your site.

Understanding Volume Sets and File Sets

Volume sets and file sets provide a way for you to control the physical grouping of files on StorHouse volumes. A *volume set* is a collection of one or more physical volumes that StorHouse treats as a unit. Every removable StorHouse volume must be a member of a volume set. A *file set* is an area of storage for user files within a StorHouse volume set. Every StorHouse user file must be assigned to a file set. The part of a file set that is located on a single volume side is called a *partition*.

You create volume sets and file sets for user files with the Command Language CREATE VSET and CREATE FSET commands according to user-defined attributes. Refer to Chapter 4, “Allocating Storage for User Files,” for specific information about how to create volume sets and file sets.

All volume sets have a *residence*, or location, that indicates where member volumes reside. Volume sets consisting of removable media can reside on different storage levels and/or in different level L libraries. For example, a three-volume set may initially reside in library 1. One member volume may subsequently be moved out of the library to shelf storage (level S). In this case, the volume set resides on level L and level S.

All user files have a *resident*, or *primary*, *file set* within a volume set. A file's resident file set always contains the *primary copy* of the file. This copy is available to a StorHouse account for normal access. The StorHouse *primary directory* contains entries for primary file copies. These copies are typically written to the performance buffer on level F and subsequently migrated. Refer to “Migrating User Files” on page 5-10 for more information about file migration.

Each StorHouse primary file can have one backup and one archive copy. You create these copies with the StorHouse Command Language CREATE BACKUP and ARCHIVE commands. A *backup copy* of a primary file resides in a *backup file set* in a *backup volume set*. The StorHouse *backup directory* contains entries for these backup copies. An *archive copy* of a primary file resides in an *archive file set* in an *archive volume set*. The StorHouse *archive directory* contains entries for these archive copies.

About Level F Volume Sets and File Sets

At installation, FileTek configures your StorHouse system with one level F volume set that contains all level F volumes and one level F file set for the performance buffer. The following system parameters determine the names of your level F volume set and performance buffer file set:

- `PERF_BUF_VSET` – specifies the name of your level F volume set. The default value of this parameter is `MAGDISK`.
- `PERF_BUF_FSET` – specifies the name of the performance buffer file set in `MAGDISK`. The default value of this parameter is `$$BUFFER`.

StorHouse limits the number of level F volume sets to one per system. There is no limit on the number of level F file sets. However, the total size of all level F file sets (including the performance buffer file set `$$BUFFER`) cannot exceed the total available level F storage space.

At installation the performance buffer encompasses all of the `MAGDISK` volume set. This file set can contain only the performance copies of files. If you want some of your user files to reside on level F rather than level L, then you must create additional level F file sets in the `MAGDISK` volume set. Before you create any additional level F file sets, you must reduce the size of the performance buffer file set as described in Chapter 4, “Allocating Storage for User Files.”

Note StorHouse does not use the performance buffer as a staging area for files that have resident file sets on level F. This means that StorHouse does not automatically back up or migrate these level F files, because they never reside in the performance buffer. You are responsible for manually backing up these files to level L file sets with the StorHouse `CREATE BACKUP` command. Refer to Chapter 9, “Protecting User and System Files” for information about how to use `CREATE BACKUP`.

About Free Pool Volume Sets

StorHouse manages two types of level L volume sets: volume sets for user files and *free pool volume sets*. Free pool volume sets contain the empty volumes in a library device. In addition, they follow a special naming convention, which is presented in “About Volume Sets” on page 6-1. You do not need to create free pool volume sets.

Each library device in level L contains one free pool volume set for each media and recording type combination that the library supports. For example, if a library supports 5.25-inch erasable and WORM optical, then that library has two separate free pools: one for the erasable media and a second free pool for WORM. StorHouse automatically allocates empty volumes from the appropriate library device free pool to specific volume sets as necessary to meet user storage requirements.

While you do not need to create free pool volume sets, you are responsible for setting system parameters that control the minimum number of empty volumes in each library device free pool. Every StorHouse free pool has a corresponding `FREE_POOL_didmmr` system parameter. The format of the name of this parameter is:

`FREE_POOL_didmmr`

where did is the device identification code of the library containing the free pool, mm is the media type, and r is the recording type of the media in that specific free pool.

An example of a valid FREE_POOL_didmmr system parameter name is:

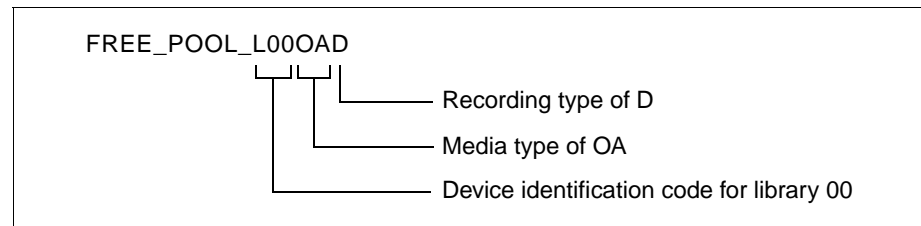


Figure 3-4: FREE_POOL_didmmr System Parameter

Chapter 6, “Managing Volume Sets,” includes examples for setting values for free pool volume sets.

Determining Strategies for User File Storage

Now that you understand the StorHouse storage hierarchy, you need to develop strategies for allocating files to StorHouse volume sets and file sets. Chapter 4, “Allocating Storage for User Files,” presents different strategies you should consider and explains how to allocate system storage for your user files.

Allocating Storage for User Files

As system administrator, you are responsible for allocating and controlling resources for StorHouse applications. Part of this responsibility includes planning how to group files on StorHouse volume sets and file sets. Your strategy depends on your purpose, such as using space most efficiently or preventing access conflicts.

This chapter presents strategies for allocating files to StorHouse volume sets and file sets. It also explains how to:

- Create volume sets
- Create level L file sets
- Create additional level F file sets.

Strategies for Allocating Files to Volume Sets

Files can be grouped in volume sets according to the specific needs of an application. For example, files can be grouped together for the following reasons:

- For simultaneous removal
- To prevent access conflicts
- To enhance performance
- To limit the use of StorHouse resources.

Note that these goals can often conflict with one another. In the short term, performance is often the most important criterion for grouping files in volume sets. In the long term, ease of file removal may be more important. You must balance these requirements to derive the best overall allocation plan.

Choosing the Storage Medium for a Volume Set

StorHouse supports a variety of media, including:

- Magnetic disk, including RAID
- 12-inch WORM optical disk
- 5.25-inch WORM optical disk
- 5.25-inch erasable optical disk
- High performance and high-capacity (erasable and WORM) tape in automated libraries

The cost and performance of each media and your site's data retrieval requirements are the primary considerations for selecting the appropriate mix of media for your site. Your FileTek customer support representative can provide valuable guidance in helping you make storage media decisions.

Grouping Files for Removal Purposes

If your primary concern is to organize files so that they can be removed from StorHouse at the same time, then place files that can be removed together in a single volume set. When users no longer need to access information in those files, you can remove the volumes from StorHouse and replace them with blank volumes, if necessary.

Reasons to remove files together include:

- Archiving or backing up associated data for export to off-site storage
- Erasing data with the same aging pattern from erasable volumes.

You use the volume set deactivation, cycle, and expire attributes to group together files that will be removed from StorHouse at the same time. An *attribute* is a characteristic you assign to a volume set. The cycle, deactivate, and expire attributes are timers that control when files can be placed on individual volume sides in a volume set and indicate when files on a volume side are no longer needed and can be expired. You initially set these timers by providing values for the /CYCLE, /DEACTIVATE, and /EXPIRE modifiers on the CREATE VSET command. The command and the timers are explained in "Creating StorHouse Volume Sets" on page 4-4.

For general guidelines and sample commands for using the cycle, deactivate, and expire attributes, see Appendix C, "Using Cycle, Deactivate, and Expire Timers."

Grouping Files to Prevent Access Conflicts

Magnetic disk supports multiple concurrent reads and writes to the same volume and does not present access conflicts. On the other hand, removable optical and tape media have access limitations that may lead to conflicts. Here are some basic guidelines for avoiding access conflicts when using different removable media types. (The check indicates that the guideline applies to the storage medium.)

Table 4-1: Guidelines for Grouping Files to Prevent Access Conflicts

Guideline	Optical	Tape
If two files must be written concurrently, assign them to different volume sets so they will not be placed on the same volume.	✓	✓
If two files must be read concurrently: <ul style="list-style-type: none"> Assign them to different volume sets <i>or</i> Assign them to the same file set on a media type that supports concurrent reads. For double-sided media, limit the file set to one side of a volume. 	✓ ✓	✓
If a file must be read while concurrently writing another file (or another version of the file): <ul style="list-style-type: none"> Assign files to different volume sets <i>or</i> Assign files to the same file set on a media type that supports reads concurrently with a write. For double-sided media, limit the file set to one side of a volume. 	✓ ✓	✓

Grouping Files to Enhance Performance

To enhance performance, group files according to the following guidelines. (The check indicates that the guideline applies to the storage medium.)

Table 4-2: Guidelines for Grouping Files to Enhance Performance

Guideline	Optical (1-sided)	Optical (2-sided)	Tape
If files are normally accessed in sequence, place them in the same volume set to minimize volume mount and dismount operations.	✓	✓	✓
If files are normally accessed concurrently, place them in different volume sets to make use of multiple optical disk or tape drives.	✓	✓	✓

Table 4-2: Guidelines for Grouping Files to Enhance Performance

Guideline	Optical (1-sided)	Optical (2-sided)	Tape
Use the CYCLE attribute to prevent the system from placing files on the second side of a volume while files on the first side are still heavily used.	✓		
Use the DEACTIVATE attribute to prevent the system from placing small new files on a volume side that contains significantly older files.	✓	✓	✓

Grouping Files to Limit the Use of Storage Resources

If your goal is to limit the use of resources by a single application or user, assign one or more volume sets to each application, user, or group of users. You can control the storage and growth capacity of every volume set by specifying values for the /SIZE and /LIMIT parameters on the CREATE VSET command for the volume set.

Creating StorHouse Volume Sets

You create a StorHouse volume set with the CREATE VSET command. You use this command to specify the volume set name and optionally assign volume set attributes. Any number of volumes with the same media and recording type can belong to the same volume set.

Volume set names must contain 1 to 8 characters and consist of the following ASCII characters: A-Z (uppercase), 0-9, _ (underscore), and \$ (dollar sign). An example of a valid volume set name is ACCTS00.

With CREATE VSET, you can optionally assign the following volume set attributes:

Table 4-3: Volume Set Attributes

Attribute	Definition
CYCLE	<p>Time period (in number of days) that controls which side of a logically two-sided volume StorHouse uses to allocate file space.</p> <p>When the specified number of days has elapsed since the last (most recent) file space was allocated on side A of the volume, StorHouse deactivates side A and activates side B. No storage allocations can occur on a deactivated volume side.</p>
DEACTIVATE	<p>Time period (in number of days) that controls when StorHouse prevents additional storage allocations on a volume side.</p> <p>When the specified number of days has elapsed since the first file space allocation on a volume side, StorHouse deactivates that volume side.</p>
EXPIRE	<p>Time period (in number of days) that controls when files on a volume side are ready to be removed from StorHouse. You can read but not write data on an expired volume side.</p> <p>When the specified number of days has elapsed after the last (most recent) file space was allocated on a volume side, StorHouse marks that volume side as expired.</p>
HOLD	Value of the HOLD attribute for the volume set. This attribute helps to determine the order in which volumes are migrated from a library device to shelf storage. For any one library device, StorHouse migrates volumes with a HOLD value of NOHOLD before migrating volumes with a HOLD value of HOLD.
LIBRARY	Library device where new volumes in the volume set will reside.
LIMIT	Maximum number of bytes that the volume set can contain.
SIZE	Number of bytes in the volume set after the command completes.

You can also use CREATE VSET to assign:

- A default archive and/or backup file set and volume set for files in the primary volume set
- The directory where the volume set will reside
- The media type and recording type of the library device free pool volume set.

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Allocating Storage for User Files

Creating StorHouse Volume Sets

The following table defines the modifiers you can use with CREATE VSET:

Modifier	Description	Default
/ARCFSET=...	Specifies the default destination archive file set for files in the new primary volume set. The archive file set does not have to exist before you specify it on this modifier.	/ARCFSET=*
/ARCVSET=...	Specifies the default destination archive volume set for files in the new primary volume set. The archive volume set does not have to exist before you specify it on this modifier.	-
/BKPFSET=...	Specifies the default destination backup file set for files in the new primary volume set. The backup file set does not have to exist before you specify it on this modifier.	/BKPFSET=*
/BKPVSET=...	Specifies the default destination backup volume set for files in the new primary volume set. The backup volume set does not have to exist before you specify it on this modifier.	-
/CYCLE=...	Specifies the number of days after which the second side of a volume in the volume set can be used.	/CYCLE=0 (no cycling)
/DEACTIVATE=...	Specifies the number of days after which the system will no longer allocate space for files on a volume side in the volume set.	/DEACTIVATE=0 (no deactivation)
/DIRECTORY=...	Specifies the directory where files in the volume set are to be cataloged.	/DIRECTORY=PRIMARY
/EXPIRE=...	Specifies the number of days after the last file space allocation on a volume side that the system will mark the side as deactivated and expired.	/EXPIRE=0 (no expiration)
/HOLD	Specifies the value of the HOLD attribute for the volume set.	If omitted, default is VSET_HOLD system parameter value.
/LIBRARY=...	Specifies the library device where the volume set is to be created.	If omitted, default is DEFAULT_LD system parameter value.
/LIMIT=...	Specifies the maximum number of bytes that the volume set can contain.	/LIMIT=0 (unlimited)
/MEDIA=...	Specifies the media type and recording type of the library device free pool volume set that StorHouse uses when allocating volumes to the new volume set.	If omitted, default is the value of the DEFAULT_MED_did system parameter.

Modifier	Description	Default
/REPORT	Controls the generation of special text responses for the completion of significant actions.	-
/SIZE=...	Specifies the initial number of bytes to be allocated to the volume set.	/SIZE=0 (system allocates volumes to the volume set when needed)

You must have ALLOCATION privilege to use CREATE VSET.

▼ **To create a StorHouse volume set:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

```
CREATE VSET vset_name modifiers
```

where *vset_name* is the unique volume set name and *modifiers* are other command and parameter modifiers you use to assign values other than the defaults. Below are some examples:

- To create the volume set ACCTS00 in the default primary directory and specify the following:
 - The media type is OED (5.25-inch erasable optical).
 - No volumes will be allocated to ACCTS00 until the storage is actually required (/SIZE=0).
 - The maximum size of the volume set is unlimited (/LIMIT=0).
 - StorHouse will deactivate side A and activate side B nine days after the last file space is allocated on side A (/CYCLE=9).
 - StorHouse will no longer allocate space for files on a side five days after the first space on the volume side is allocated to a file (/DEACTIVATE=5).
 - StorHouse will mark a side as deactivated and expired 15 days after the last file space is allocated on that volume side (/EXPIRE=15).
 - The system will assign a value of HOLD to the HOLD attribute for volumes allocated to this volume set.

Enter:

```
? CREATE VSET ACCTS00 /MEDIA=OED /SIZE=0 /LIMIT=0 /CYCLE=9
/DEACTIVATE=5 /EXPIRE=15 /HOLD
```

- To create a volume set called ACCTS00 in the archive directory of library device 1 using media type TBA, enter:

```
? CREATE VSET ACCTS00 /DIRECTORY=ARCHIVE /LIBRARY=L01
/MEDIA=TBA
```

Because you omitted /SIZE, the command uses the default size value, which is 0. When needed, the system will allocate volumes to ACCTS00 from the free pool of tape media TBA in library device 1. Omitting /LIMIT gives ACCTS00 an unrestricted maximum size. /DEACTIVATE and /EXPIRE also default to 0. Therefore, the volumes in ACCTS00 will not deactivate or expire automatically.

Strategies for Allocating Files to File Sets

As with volume sets, files can be grouped in file sets according to the specific needs of an application. For example, files can be grouped together to:

- Enhance performance
- Use space efficiently
- Limit the use of storage resources.

Note Unless certain applications have special restrictions, you can simplify storage management by creating a single file set in each volume set.

Grouping Files to Enhance Performance

If users normally access files in sequence, or you want all components, or *extents*, of one or more files on the same side of a volume, then:

1. Place files in the same file set.
2. Limit the file set to the size of one volume side.
3. Allocate the size based on the boundaries of physical volume sides.

For an example, see the first CREATE FSET command on page 4-13. It illustrates the guidelines listed above.

Grouping Files to Use Space Efficiently

If you can accurately predict the amount of storage required by an application, you can create file sets in volume sets to make the best use of the volume space. Note that this is more difficult than it appears because StorHouse uses some space for overhead functions and media failures. In addition, aborted file transfers can use up write-once space. If you can predict the average growth of files, you can place multiple file sets or one file set containing multiple files in a volume set with enough free space to satisfy average file growth.

Grouping Files to Limit the Use of Storage Resources

If certain applications do not require enough storage to make use of an entire volume but do require limits, use file sets to set the limits.

- Assign one or more file sets to each application, user, or group of users.
- Allow each file set to expand to a specified limit.

Limits can also be used to minimize waste due to applications that may experience write loops.

Creating StorHouse Level L File Sets

You create a StorHouse file set with the CREATE FSET command. You use this command to specify the file set name, assign the file set to a volume set, and optionally set file set attributes.

File set names must be unique within a volume set. They may contain 1 to 8 of the following ASCII characters: A-Z (uppercase), 0-9, _ (underscore), and \$ (dollar sign). An example of a valid file set name is JAN00.

File Set Attributes

With CREATE FSET, you can optionally set the following file set attributes:

Table 4-4: File Set Attributes

Attribute	Definition
AUTO_STAGE	Indicates that the files in the specified file set should be automatically staged (copied) to the performance buffer when accessed.
CONTIGUOUS	Restricts initial storage allocation based on the boundaries of physical volumes sides.
LIMIT	Indicates the maximum number of bytes that a file set can contain.
NONCONTIGUOUS	Allocates the first space found until enough storage is assigned to satisfy the size request.
RPL_CLASS_NAME	Specifies the name of the replication class for files in the file set.
RETENTION	Under certain conditions, specifies the retention period for files in the file set. See page 4-11 for more information.
SIZE	Specifies the number of bytes in a file set after the command completes.
UPDATE	Specifies the percentage of the file set size to be reserved for VRAM file updates.

CONTIGUOUS and NONCONTIGUOUS. With contiguous allocation, the largest file extent that can fit in a file set is limited by the largest allocation for the file set on any single volume side. The contiguous attribute allocates file set size on the minimum number of sides. This ensures that the file set size contains as many full sides as possible or that the file set is allocated on a single side. A contiguous file set is suitable for one or more large files or for collections of files that users normally access around the same time.

With noncontiguous allocation, a size can result in small space allocations on more than one volume side. Because this attribute can cause files to be scattered, a noncontiguous file set is best suited for small files with occasional or unpredictable accesses.

AUTO_STAGE. Automatic staging copies files to the performance buffer when they are accessed based on the AUTO_STAGE attribute of the file's resident file set. Two system parameters, MIG_REPOP_LOAD and MIG_REPOP_MAX, control whether auto-staging is enabled. MIG_REPOP_LOAD determines the number of stage requests that can be queued for transfer. MIG_REPOP_MAX specifies the maximum file extent size (in bytes) that can be considered for staging. Refer to page A-21 for more information about these parameters.

When auto-staging is enabled, StorHouse stages file extents with the AUTO_STAGE attribute to the performance buffer when they are accessed. If a file extent already resides in the performance buffer, it is not recopied. If the performance buffer

contains insufficient space, StorHouse does not stage the file nor does it initiate a regular migration to free up additional space.

RPL_CLASS_NAME. StorHouse can perform application-independent replication of primary files from one StorHouse system to a target, or destination, StorHouse system. A replication class defines information (replication parameters) about the StorHouse system that will contain the file copies.

The replication class name attribute specifies the name of the replication class for files in the file set. A replication class name can consist of from 1 to 8 of the following ASCII characters: A-Z, 0-9, _, and \$. StorHouse always forces replication class names to uppercase, even when enclosed in quotes.

Assigning a replication class name to a file set is one way to make files in the file set eligible for replication. At file create time, a file inherits its file set's replication class. Refer to page 5-25 for more information about file replication and replication class components.

RETENTION. A file set retention attribute determines the retention period for files in the file set. A retention period determines the time span that files may not be deleted from StorHouse.

At file create time, a file inherits its retention period from its file set if:

- The application or user specifies no file retention period or a file retention period of DEFAULT.
- /FORCE_RETENTION is in effect on the file set. This modifier tells StorHouse to override the file retention value with the file set retention value.

You can specify one of the following values for the file set retention attribute:

Value	Description
DEFAULT	Sets the retention period to the default value.
number_of_days	<p>Sets the retention period to the specified number of days. The retention period ends when the current date is beyond the file's last_modified date plus the retention value.</p> <ul style="list-style-type: none"> • The maximum retention period is 65,000 days, or approximately 178 years. • A value of 0 indicates no retention period (same as specifying ZERO). <p>Example: /RETENTION=3</p> <p>In this example, the retention period is 3 days. The retention period for a file that was last modified at 11 p.m. on December 12 expires at 11 p.m. on December 15.</p>
ZERO	Sets no retention period.

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Allocating Storage for User Files

Creating StorHouse Level L File Sets

Value	Description
FOREVER	Sets an infinite retention period.

The file set retention attribute applies only to primary file sets.


CREATE FSET Modifiers

The following table defines the modifiers you can use with CREATE FSET:

Modifier	Description	Default
/AUTO_STAGE	Assigns the AUTO_STAGE attribute to the file set.	/NOAUTO_STAGE
/CONTIGUOUS	Gives the file set the contiguous storage allocation attribute.	/CONTIGUOUS
/FORCE_RETENTION	Specifies whether the file set retention value overrides the file retention value (for files in this file set) explicitly supplied by an application at file create time.	/NOFORCE_RETENTION
/LIMIT=...	Specifies the maximum number of bytes that this file set can contain.	/LIMIT=0 (no limit)
/NONCONTIGUOUS	Gives the file set the noncontiguous storage allocation attribute.	-
/REPORT	Controls the generation of special text responses for the completion of significant actions.	-
/RPL_CLASS=...	Specifies the name of the replication class for files written to this file set.	-
/RETENTION=...	Specifies the file set retention attribute (retention period).	DEFAULT
/SIZE=...	Specifies the initial number of bytes to be allocated to the file set.	/SIZE=0 (system allocates space to the file set when needed)
/UPDATE=...	Specifies a percentage of the file set size to be set aside for VRAM file updates.	/UPDATE=0 (system reserves no space for updates and uses general free space instead)
/VSET=...	Specifies the volume set assignment for the file set.	If omitted, is the current default volume set.

You must have ALLOCATION privilege to use this command.

▼ To create a StorHouse file set:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

```
CREATE FSET fset_name modifiers
```

where `fset_name` is the unique file set name and `modifiers` are other command and parameter modifiers you use to assign values other than the defaults. Some examples follow:

- To create the contiguous file set JAN00 in volume set ACCTS00 with a limit of 3500M (for a 3.5 GB volume side) and a size of zero so that StorHouse will allocate space only when needed, and to set the `AUTO_STAGE` attribute for JAN00, type:

```
? CREATE FSET JAN00 /VSET=ACCTS00 /LIMIT=3500M /SIZE=0
/CONTIGUOUS /AUTO_STAGE
```

- To create the noncontiguous file set JAN00 in the volume set ACCTS00 with an initial size of 0, a retention attribute of 365 days, a replication class of `STANDARD`, and a size limit of 0, type:

```
? CREATE FSET JAN00 /NONCONTIGUOUS /VSET=ACCTS00 /SIZE=0
/LIMIT=0 /RETENTION=365 /RPL_CLASS=STANDARD
```

Because the initial size is zero, StorHouse does not allocate space to the file set until it is required to store a file. The size of file set JAN00 is unlimited. When StorHouse allocates space for JAN00, it allocates only the amount of space required to store the first file being written. It allocates space on the first volume it finds that has at least the required amount of free space; however, the first volumes it searches are those that already have space allocated to the file set.

Creating Additional Level F File Sets

As introduced in Chapter 3, “Understanding the Storage Hierarchy,” StorHouse is initially configured with a holding area on level F called the performance buffer that stores performance copies of files waiting to be backed up to their primary file sets or migrated. The performance buffer is configured as the level F file set `$$BUFFER` on the level F volume set `MAGDISK`.

At installation, the performance buffer encompasses the entire `MAGDISK` volume set. Therefore, before you can create additional level F files sets in `MAGDISK`, you must

reduce the size of the performance buffer accordingly. You reduce the performance buffer size by submitting two separate SET FSET commands. The first SET FSET reduces the performance buffer size, and the second reduces its limit. Once you have submitted these commands, you can use CREATE FSET to create additional MAGDISK file sets. FileTek recommends the noncontiguous attribute setting for level F file sets.

Before you determine a new size and limit for the performance buffer, FileTek suggests that you submit a SHOW FSET command to display the performance buffer's current size and the amount of performance buffer space that has already been allocated to files (see Chapter 7, "Managing File Sets" for more information on SHOW FSET). You cannot set the new performance buffer size to a number that is less than the already allocated storage value. You may need to issue a MIGRATE command to completely empty the performance buffer before you reduce its size. (Refer to "Migrating User Files" on page 5-10 for information about the system parameters that control migration and the MIGRATE command.)

The command sequence for creating additional level F file sets is:

1. SET USER /VSET=MAGDISK to temporarily set your account default volume set to MAGDISK
2. SET FSET with a new /SIZE value to reduce the size of the performance buffer
3. SET FSET with a new /LIMIT value to reduce the limit of the performance buffer
4. CREATE FSET to create the new level F file set.

Changing Your Default Volume Set

When administering MAGDISK file sets, FileTek recommends using the SET USER /VSET=MAGDISK command to set MAGDISK as the default volume set for your current session. This eliminates the need for you to specify a value for the /VSET modifier on the SET FSET and CREATE FSET commands. In addition, you do not risk forgetting to specify MAGDISK and accidentally creating the new level F file set in the wrong volume set. The change takes effect immediately and remains in effect until the end of the current session or until you change it again.

▼ To temporarily change your account's default volume set to MAGDISK:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press Enter ↵:

```
SET USER /VSET=MAGDISK
```


Reducing the Size of the Performance Buffer File Set

You use the SET FSET command with the following modifiers to reduce the size of the performance buffer file set:

Modifier	Description	Default
/LIMIT=...	Specifies the maximum number of bytes that the file set can contain.	-
/SIZE=...	Specifies the number of bytes in the file set after the command completes.	-


For more information on the SET FSET command and how to use it to modify existing file sets, see Chapter 7, “Managing File Sets.”

The following requirements apply to SET FSET:


- The `fset_name` parameter is required.
- You must have ALLOCATION or SYSTEM privilege to use this command.
- The value of /SIZE must be less than or equal to the value of /LIMIT for the file set.
- The /LIMIT and /SIZE modifiers are mutually exclusive. You can specify only one modifier in each command.

When you assign a new size for the performance buffer file set (/SIZE), you should assign the same number for the limit (/LIMIT). This ensures that the file set cannot grow larger than intended and use space in the volume set that was meant for other file sets. For both modifiers, the value for `number_of_bytes` can range from 0 up to 4294967295 (do not use commas in the specification). Use K to indicate 1,000-byte units, M to indicate 1,000,000-byte units, and G to indicate 1,000,000,000-byte units. If you do not specify K, M, or G, the number defaults to 1-byte units.

▼ **To reduce the size of the \$\$BUFFER performance buffer file set located on volume set MAGDISK:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press  to temporarily change you account's default volume set to MAGDISK:

```
SET USER /VSET=MAGDISK
```

3. At the StorHouse command prompt (?), type the following command and press  to set the new (reduced) size of \$\$BUFFER:

```
SET FSET $$BUFFER /SIZE=number_of_bytes
```



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Allocating Storage for User Files

Creating Additional Level F File Sets

For example, to assign a new size of 3 GB to the performance buffer file set, enter:

```
? SET FSET $$BUFFER /SIZE=3G
```

4. At the StorHouse command prompt (?), type the following command and press  to assign a new limit to \$\$BUFFER:

```
SET FSET $$BUFFER /LIMIT=number_of_bytes
```

For example, to assign a new limit of 3 GB to the performance buffer file set, enter:


```
? SET FSET $$BUFFER /LIMIT=3G
```

Creating the File Set


You create an additional level F StorHouse file set with the CREATE FSET command. If necessary, ask your FileTek customer support representative for assistance with creating additional level F file sets.

When you create additional level F file sets, you should create them as noncontiguous file sets and specify a limit equal to the size of the file set.

▼ To create an additional level F StorHouse file set:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press  to temporarily change your account's default volume set to MAGDISK:

```
SET USER /VSET=MAGDISK
```

3. At the StorHouse command prompt (?), type the following command and press :

```
CREATE FSET fset_name /NONCONTIGUOUS modifiers
```

where `fset_name` is the unique file set name in the MAGDISK volume set and `modifiers` are other command and parameter modifiers you use to assign values other than the defaults. An example follows.

- To create noncontiguous level F file set INDEX in the volume set MAGDISK with an initial size of 2 GB and a size limit of 2 GB, enter:

```
? CREATE FSET INDEX /NONCONTIGUOUS /SIZE=2G /LIMIT=2G
```


Managing User Files

Once you have allocated storage for StorHouse files, you can use Command Language commands to manage them. This chapter explains how to:

- Display information about a file
- Change file attributes or passwords
- Migrate (move) a file
- Stage a file
- Relocate a file
- Retain a file
- Replicate a file
- Delete a file
- Undelete a file
- Remove a file
- Purge older versions of a StorHouse file
- Enable a disabled file.

For information about creating files, see the *Callable Interface Programmer's Guide*. For information about files that are loaded and accessed using StorHouse/RM software, see the *StorHouse Database Administration Guide*.

About Files

A *file* is a collection of logically related data, located on a medium, and treated as a unit. A file is uniquely identified by a file identifier. A file identifier consists of two numbers: the *system identifier* (sid) and a *file number* (fno). All files created in a single StorHouse system have the same system identifier. The file number makes the file identifier unique within a StorHouse system. For example, files 234.77, 234.108, and 234.8211 were created in StorHouse system 234.

Files are also named. A *file name* uniquely identifies a file within a file access group. StorHouse file names must contain 1 to 56 printable ASCII characters. At least one character must be non-blank. Lowercase characters are distinct from uppercase

characters. In a command, you must enclose a file name in quotes if it contains lowercase or special characters, or spaces. Examples of valid StorHouse file names are BANKFILE and “BankFile”.

Some Command Language commands allow you to use wildcards in filenames. For example, the SHOW FILE command lets you use multiple wildcards anywhere in the filename specification. Other commands, such as ARCHIVE, CREATE BACKUP, and SET FILE, let you use a wildcard as the last or only character in the filename. Finally, the CREATE FILE, GET, and PUT commands require the full filename without wildcards. See the *Command Language Reference Manual* for more information on filename requirements for specific commands.

You can manage StorHouse files using the following Command Language commands:

Command	Description
DELETE	Marks a file as deleted.
ENABLE	Enables a disabled file.
MIGRATE	Copies files from the performance buffer or from one volume set to another.
PURGE	Deletes all older versions of StorHouse files until the number of versions remaining equals the value of the file's LIMIT attribute.
RELOCATE	Copies a file version to a new location and then deletes the source copy.
REMOVE FILE	Removes files from the deleted file directory.
REPLICATE	Copies eligible primary files from one StorHouse system to another.
SET FILE	Changes file information, such as attributes and passwords.
SHOW FILE	Displays file version information.
STAGE	Queues a transfer (copy) of a specified file to the performance buffer.
UNDELETE	Moves the most recently deleted version of a file from the deleted file directory back to its original directory.

For more information on file structures and organizations, including access groups, extents, versions, and revisions, see the *StorHouse Concepts and Facilities Manual*.

Displaying Information About User Files

You can use the SHOW FILE command to display information about a StorHouse file. Using different modifiers, you can display information in several ways:

- A default display using no modifiers lists the following information:
 - File name
 - Access group name

- Version number
- File identifier.
- A brief display using the /BRIEF modifier lists all the information for the default display plus the following:
 - Creation date
 - Number of bytes.
- A full display using the /FULL modifier lists all available information for a file, which includes the information for the brief display plus the following:
 - Highest revision number
 - Directory record number
 - Last access date and time
 - Last modification date and time of file's directory entry
 - Last modification date and time of file's data
 - Backup date (if applicable)
 - LIMIT attribute
 - Protection indicators
 - VTF attribute
 - ATF attribute
 - Organization code
 - File system code
 - Host type code
 - Frame structure version
 - Bytes per frame
 - Frame header size
 - Record header size
 - Host data unit size
 - Maximum record size
 - Number of records (only for VRAM files)
 - Attribute code
 - Number of accesses
 - EDC code
 - Status
 - Flags
 - Volume set name
 - File set name
 - Retention period
 - Replication class name
 - Number of extents.

For descriptions of these items, see the *StorHouse Concepts and Facilities Manual*.

- A selected display using one or more modifiers (except /BRIEF and /FULL), which displays specific information about the file.

SHOW FILE modifiers determine items of information to be displayed. The following table defines the modifiers you can use with SHOW FILE:

Modifier	Description	Default
/ARCHIVE_EXISTS	Selects files based on whether or not they have an archive copy.	-
/BACKUP_EXISTS	Selects files based on whether or not they have a backup copy.	-
/BEFORE=...	Displays file versions with a creation date and time value that is the same as or earlier than a specified date and time.	-
/BKP_ATTR	Selects files based on whether their BACKUP attribute is set.	

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Managing User Files

Displaying Information About User Files

Modifier	Description	Default
/BRIEF	Displays creation date and number of bytes in addition to the default display for the file version.	-
/BUFFERED	Displays files with copies of all extents in the performance buffer.	-
/DAMAGED	Displays files marked PENDING, SOFT_DISABLED, or HARD_DISABLED and files that are missing one or more extents (in other words, files that are marked as truncated or partial).	-
/DELETED	Displays files that are deleted, but not yet removed.	-
/DIRECTORY=...	Specifies the directory from which the command is to select file information for display.	/DIRECTORY=PRIMARY
/EXTENT	Displays one set of extent information fields for each extent of a file version, in addition to other information requested for that file version.	-
/FSET=...	Displays file versions located in the specified file set.	-
/FULL	Displays all fields for the file version.	-
/GROUP=...	Specifies a file access group name and, optionally, the group's read password.	Current default
/LEVEL=...	Displays files whose primary file sets are located on the specified storage level.	-
/NAME	Displays the file name in the format: "filename" /GROUP=group_name /VERSION=version_number	-
/ORDER=...	Specifies the order in which files are displayed.	/ORDER=NATURAL
/PASSWORDS=...	Specifies the file's read password.	-
/PRIMARY_EXISTS	Selects files based on whether or not they have a primary copy.	-
/RESIDENT	Displays files with all extents written to their resident file sets.	-
/SAFE_COPIES=...	Displays files with at least the specified number of safe copies in the PRIMARY, BACKUP, and ARCHIVE directories. (For a file to be considered safe, it must have no missing extents, and it must be usable (not marked PENDING, SOFT_DISABLED, or HARD_DISABLED). Performance buffer copies and replicas are not considered safe.	-
/SINCE=...	Displays file versions with a creation date and time value that is the same as or later than a specified date and time.	-
/UNUSED=...	Displays files that have not been accessed since the specified time.	-

Modifier	Description	Default
/VERSION=...	Displays the specified versions of a file.	/VERSION=0
/VOLUME=...	Displays files whose primary file sets are located on the specified volume.	-
/VSET=...	Displays files on the specified volume set.	-

You must have SHOW or FILE privilege to use SHOW FILE. There are also restrictions to using selected modifiers. See the *Command Language Reference Manual* for these restrictions.

▼ **To display information about a StorHouse file:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

SHOW FILE filename modifiers

where **filename** is the name of the file and **modifiers** are other command modifiers you use to assign values other than the defaults. Below are some examples:

- To display default information for the latest version of all files in your default file access group to which you have read access, enter:

? SHOW FILE *

The system returns the following information:

FILE="EXTKEY" GROUP=USERGRP VERSION=0 FID=234.118

FILE="LOGFILE" GROUP=USERGRP VERSION=0 FID=234.8

FILE="USERFILE" GROUP=USERGRP VERSION=0 FID=234.201

Total files displayed=3

- To display all available information for version 0 of the file USERFILE, enter:
- To display all information available for version 0 of the file USERFILE, enter:

? SHOW FILE SAMPLE /FULL

The system displays the following information:


```
FILE="SAMPLE" GROUP=SERVICE VERSION=0 FID=4444.2
DATE=26-MAR-2004:14:05:06 SIZE=401 REVISION=1 DIRECT_REC=2
LASTACCESS=26-MAR-2004:14:05:06 MODIFIED_DIR=26-MAR-
2004:14:05:29 MODIFIED_FILE=26-MAR-2004:14:05:06 BACKUP=none
LIMIT=128 PROTECTION=none VTF=NEXT ATF=3
ORGANIZATION=SEQUENTIAL FILE_SYSTEM=67 HOST_TYPE=33
FRAME_VER=1 FRAME_SIZE=31744 FRAME_HDR=20
RECORD_HDR=5 HOST_UNIT=8 MAX_LENGTH=16384
RECORD_COUNT=0 ATTRIBUTES=0 ACCESSES=1 EDC=2
STATUS=COMPLETE DESCRIPTOR=(NAMED, REPLICATED)
VSET=P FSET=P RETENTION=365 RPL_CLASS=STANDARD
EXTENT_COUNT=1
```

Total files displayed=1

Because you omitted the /GROUP modifier on the command, SAMPLE must be located in your default access group, or the command returns an error message.

- To display the file name, access group name, version number, fid, creation date, size, and last access date for all files that were created before midnight of January 31, 2000 and are in the access group USERGRP, enter:

```
? SHOW FILE * /GROUP=USERGRP /BEFORE=31-JAN-2000 /BRIEF
```

The system displays the following information:

```
FILE="EXTKEY" GROUP=USERGRP VERSION=0 FID=234.105
DATE=29-JAN-2000:19:03:25 SIZE=398
```

```
FILE="USERFILE" GROUP=USERGRP VERSION=0 FID=234.2
DATE=28-JAN-2000:18:43:45 SIZE=1310
```

Total files displayed=2

- To display all information available for version 0 of the file VRAMFILE, including file extent information, enter:

```
? SHOW FILE VRAMFILE /EXTENT /FULL
```

The system displays the following information:

```
FILE="VRAMFILE" GROUP=SERVICE VERSION=0 FID=234.8
DATE=16-NOV-1999:14:38:59 SIZE=75282 REVISION=2
DIRECT_REC=9 LASTACCESS=16-NOV-1999:14:47:14
MODIFIED_DIR=16-NOV-1999:14:47:14 MODIFIED_FILE=16-NOV-
```


1999:14:42:20 BACKUP=none LIMIT=128 PROTECTION=none
 VTF=DIRECT ATF=3 ORGANIZATION=KEYSEQUENTIAL
 FILE_SYSTEM=66 HOST_TYPE=17 FRAME_VER=1
 FRAME_SIZE=31744 FRAME_HDR=20 RECORD_HDR=5
 HOST_UNIT=8 MAX_LENGTH=80 RECORD_COUNT=500
 ATTRIBUTES=0 ACCESSES=7 EDC=2 STATUS=COMPLETE
 DESCRIPTOR=(NAMED, NOBACKUP, REPLICATED) VSET=SYSTEM
 FSET=SERVICE RETENTION=365 RPL_CLASS=SMBACKUP
 EXTENT_COUNT=3

EXTENT_NUMBER=1000002 EXTENT_SID=234
 EXTENT_DATE=16-NOV-1999:14:41:48
 EXTENT_WRITTEN=16-NOV-1999:14:42:19 EXTENT_REVISION=2
 EXTENT_SIZE=5154 EXTENT_LOCATION=OAD"2523A699":A
 EXTENT_LEVEL=L EXTENT_STATUS=(LAST) EXTENT_MF=none
 EXTENT_RETENTION_DATE=16-NOV-2000:11:59:59

EXTENT_NUMBER=1000001 EXTENT_SID=234
 EXTENT_DATE=16-NOV-1999:14:41:40
 EXTENT_WRITTEN=16-NOV-1999:14:41:46 EXTENT_REVISION=2
 EXTENT_SIZE=67022 EXTENT_LOCATION=OAD"2523A699":A
 EXTENT_LEVEL=L EXTENT_STATUS=(none) EXTENT_MF=none
 EXTENT_RETENTION_DATE=16-NOV-2000:11:59:59

EXTENT_NUMBER=1000000 EXTENT_SID=234
 EXTENT_DATE=16-NOV-1999:14:39:01
 EXTENT_WRITTEN=16-NOV-1999:14:39:02 EXTENT_REVISION=1
 EXTENT_SIZE=3106 EXTENT_LOCATION=OAD"2523A648":A
 EXTENT_LEVEL=L EXTENT_STATUS=(LAST) EXTENT_MF=none
 EXTENT_RETENTION_DATE=16-NOV-2000:11:59:59

EXTENTS_DISPLAYED=3

Total files displayed=1

- To display version 0 of all deleted files in the current file access group, enter:

? SHOW FILE * /DELETED

The system displays the following information:

FILE="CHCONFIG" GROUP=SERVICE VERSION=0 FID=100.5
 FILE="NETCONFIG" GROUP=SERVICE VERSION=0 FID=100.1
 FILE="SMCONFIG" GROUP=SERVICE VERSION=0 FID=100.4

Modifying User File Attributes and Values

You can use the SET FILE command to change the attributes or other values for a StorHouse user file. Attributes for file versions include the following:

Attribute	Definition
ARCHIVED	Allows you to manually change the status of a file in the PRIMARY directory to archived or not archived.
ATF	Value for the file's access time factor, which helps control when StorHouse migrates a file from the performance buffer.
BACKUP	Indicates that the file will be selected for backup or archive.
LIMIT	Maximum number of versions for a file.
RETENTION	Specifies the retention period for the specified file version.
RPL_CLASS	Specifies the name of the replication class for the specified file version.
VTF	Value for the vulnerability time factor, which controls when StorHouse copies a file from the performance buffer to its resident file set.

You can also use SET FILE to:

- Specify a file's file access group
- Replace all current passwords for a file
- Specify a delete password for a file
- Clear the replicated status of a file version
- Relink the primary file version with its backup and archive copies.

You can specify the version number of the files selected to be modified and select only files with one or more extents on the specified volume or volume set. All changes take effect immediately. You can schedule the SET FILE command.

The following table defines the modifiers you can use with SET FILE:

Modifier	Description	Default
/ARCHIVED	Changes the archived status of a file version.	-
/ATF=...	Specifies a value for the ATF (Access Time Factor) attribute for a file version.	-
/BACKUP	Controls whether the file version is to be selected for backup by the CREATE BACKUP and ARCHIVE commands.	-
/FSET	Indicates that the command will select only files in the file set specified by this modifier.	-

Modifier	Description	Default
/GROUP=...	Specifies the file's file access group and, optionally, the group's delete password.	Current default
/LIMIT=...	Specifies a value for the LIMIT attribute for a primary file.	-
/NEWPASSWORDS=...	Replaces all current passwords for a file.	-
/NOREPLICATED	Clears the replicated status of a file version.	-
/PASSWORDS=...	Specifies the file's delete password.	-
/RELINK=...	Indicates that the command will check the BACKUP or ARCHIVE directory for copies of the specified file versions and then mark the file versions in the PRIMARY directory as backed up or archived where appropriate.	-
/RETENTION=...	Specifies the retention period for the specified file version.	-
/RPL_CLASS=...	Specifies the replication class name for the specified file version.	
/REPORT	Controls the generation of special text responses for the completion of significant actions.	-
/VERSION=...	Specifies the version number of the files to be modified.	/VERSION=0 (only valid for ARCHIVED, ATF, BACKUP, and VTF attributes)
/VOLUME=...	Indicates that the command will select only files with one or more extents on the volume specified by this modifier.	-
/VSET=...	Indicates that the command will select only files in the volume set specified by this modifier.	-
/VTF=...	Specifies a value for the VTF (Vulnerability Time Factor) attribute for a file version.	-
/WAIT	Instructs StorHouse to wait for a locked file to be unlocked before attempting to use it in the command execution.	-

You must have FILE privilege to use SET FILE. In addition, you must have these other privileges to use the following command modifiers:

- ATF privilege for /ATF
- SETGROUP privilege for /GROUP
- DELETE privilege for /LIMIT
- PASSWORD privilege for /NEWPASSWORDS
- SYSTEM privilege for /NOREPLICATED
- VTF privilege for /VTF.

See the *Command Language Reference Manual* for restrictions on selected modifiers.

To change or set attributes or other values for a StorHouse file:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press Enter ↵:

SET FILE filename modifiers

where filename is the name of the file to be changed and modifiers are other command and parameter modifiers you use to assign values other than the defaults. Below are some examples:

- To specify that all files in volume set MAR00 will be written to the performance buffer and then copied to their primary file sets the next time a backup occurs, enter:

```
? SET FILE * /VSET=MAR00 /VTF=NEXT /GROUP=* /VERSION=*
```

- To specify that version 0 (the default version) of the file USERFILE is not to be archived or backed up if an ARCHIVE or CREATE BACKUP command is executed, enter:

```
? SET FILE USERFILE /NOBACKUP
```

- To change the BACKUP attribute for version -1 to TRUE, enter:

```
? SET FILE USERFILE /BACKUP /VERSION=-1
```

- To assign the STANDARD replication class to the current version of the file USERFILE in the group ACCT, enter:

```
? SET FILE USERFILE /GROUP=ACCT /RPL_CLASS=STANDARD
```

Migrating User Files

File migration is the movement of files from:

- The performance buffer (level F storage)
- One volume set to another.

StorHouse supports automatic and manual file migration from the performance buffer, and manual file migration by volume set.

Figure 5-1 illustrates the file migration processes.

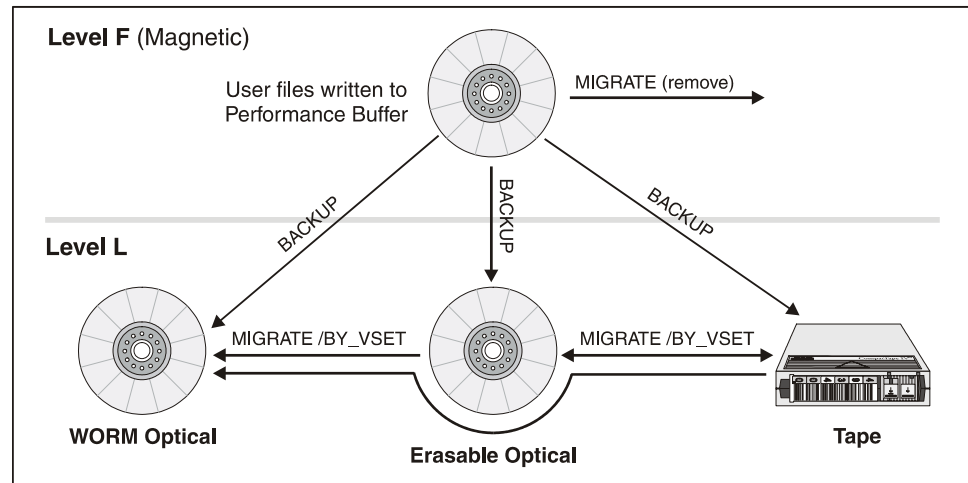


Figure 5-1: File Migration

This chapter defines general file migration and migration by volume set. It also explains how to:

- Set system parameters to regulate general file migration
- Manually migrate files from the performance buffer
- Manually migrate files from one volume set to another.

About General File Migration

General file migration is the movement (removal) of file extents from the performance buffer. Migration occurs automatically. In addition, you can manually initiate a general file migration with the StorHouse Command Language MIGRATE command.

The purposes of general file migration are to:

- Keep performance buffer space available for new files
- Keep as many files as possible on the performance buffer to benefit from its high performance and shared access

Unless you specify /ALL, StorHouse does not migrate file extents from performance buffer space that is reserved by a group for its exclusive use.

Migration Factor

StorHouse uses a number called the *migration factor* to determine which file extents to move off the performance buffer. The migration factor is derived from a file's ATF

attribute, size, and access history. See the *StorHouse Concepts and Facilities Manual* for more information about the migration factor.

System Parameters That Control General File Migration

StorHouse also uses system parameters to regulate general file migration. System parameters determine things like when to start a migration and the amount of data to migrate.

The following system parameters regulate general file migration:

Table 5-1: System Parameters That Control General File Migration

Parameter	Specifies
ATF	Default value for the ATF attribute for new file versions.
MIG_FAC_PERIOD	Number of seconds the system waits between migration factor updates.
MIG_FAC_UNIT	Number of bytes used by StorHouse when calculating the accesses per unit of storage for the migration factor.
MIG_FROM	Whether the system will perform migrations from the performance buffer.
MIG_GENERAL	Minimum amount of space (MB) on the performance buffer reserved for the general area.
MIG_MAX	Percentage of the performance buffer capacity that should be available after a migration has completed.
MIG_MAX_LOAD	Maximum number of data transfers to be queued at one time for migration operations.
MIG_MIN	Smallest amount of storage that can remain available in the performance buffer before StorHouse automatically begins to migrate file extents.
VTF	Default value for the VTF attribute for new file versions.

Typically, you use the default values set at installation for these system parameters. Refer to Appendix A, “System Parameter Descriptions,” for information about these defaults. If you are not sure whether to change these defaults for your site, consult your FileTek customer support representative.

Changing the Values of MIG_MAX and MIG_MIN. StorHouse automatically migrates files from the performance buffer when the amount of free storage in the performance buffer drops below the percentage indicated by the MIG_MIN system parameter. When this occurs, the system migrates enough file extents off the performance buffer to bring the percentage of free storage back up to the value of the MIG_MAX system parameter.

If the available space in the performance buffer equals or exceeds the amount indicated by the MIG_MAX system parameter, no extents are migrated. If available space in the performance buffer is less than the amount indicated by the MIG_MAX system parameter, the system migrates file extents until the available space equals or

exceeds MIG_MAX. If MIG_MAX was not reached and there are new extents, the system initiates a BACKUP command to copy new file extents from the performance buffer to their primary file sets. Once the backup is complete, the migration continues.

The following example shows how to set MIG_MAX and MIG_MIN using the SET SYSTEM command. You must have SYSTEM privilege to use this command.

▼ **To set the values of MIG_MIN and MIG_MAX:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following commands and press

```
SET SYSTEM MIG_MAX <value> modifiers  
SET SYSTEM MIG_MIN <value> modifiers
```

where value specifies a value for the named system parameter and modifiers are other command modifiers you use to assign required values other than the defaults. Below is an example:

- To change the default values of the MIG_MAX and MIG_MIN system parameters to 100% so that all file extents migrate out of the performance buffer as soon as they are placed in the buffer, type:

```
? SET SYSTEM MIG_MAX 100  
? SET SYSTEM MIG_MIN 100
```

Manually Initiating a General File Migration


You can submit the MIGRATE command to initiate a general file migration. Migration occurs if the current available space on the performance buffer is less than the value of the MIG_MIN system parameter.

MIGRATE returns the StorHouse question mark (?) prompt after initiating the migration. The return of this prompt indicates that the command was submitted, not that the migration operation completed.

Migration can take a long time. The length of time depends upon the number of files on the performance buffer, the period of time since the last BACKUP or MIGRATE, and the amount of user activity. The MONITOR /COMMAND command displays any BACKUP or MIGRATE operations in progress.

You must have SYSTEM privilege to use MIGRATE.


▼ **To migrate StorHouse user files from the performance buffer, excluding those from reserved performance buffer space:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

MIGRATE

If the available space on the performance buffer exceeds the value of MIG_MAX, StorHouse displays a message indicating that no migration is necessary.

▼ **To migrate StorHouse user files from the performance buffer, including those from reserved performance buffer space:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

? MIGRATE /ALL

About File Migration By Volume Set

File migration by volume set is the transfer of files from one volume set to another. You can manually initiate file migration by volume set by using the MIGRATE /BY_VSET command. StorHouse does not automatically perform file migrations by volume set.

You can move files by volume set from one erasable medium to another medium within StorHouse to obtain the best trade-off between performance and cost of storage. For example, you might want to move infrequently accessed files that reside on erasable optical disk to tape for long-term, less expensive storage. Rather than moving individual files from one volume set to another, you can run one MIGRATE /BY_VSET command to move all the files on selected volumes in a volume set at the same time. Other than the difference in access performance, the data's change in residence is transparent to the application and its users. In other words, users can continue to access the files on those volumes as usual.

Migrating User Files From One Volume Set to Another

The MIGRATE /BY_VSET command initiates migration of files between volume sets based on migration criteria you specify. For this type of migration, StorHouse migrates all files off a source volume so that it can erase the source volume to make room for new files. The source volume set must be erasable media and cannot be a level F volume set. Also, the source and destination volume sets must be different, but both must reside in the same directory. StorHouse allows multiple MIGRATE /BY_VSET commands to be executed at one time.

The MIGRATE /BY_VSET command migrates files off volumes only if these two conditions are true:

- The number of empty volume sides in the source volume set is below the level specified by the /MINIMUM modifier.
- The source volume set's LIMIT attribute prevents the system from allocating the desired space from the free pool.

You can specify the following selection criteria for migrations using the /MINIMUM, and /ORDER_BY modifiers:

- Minimum number of volume sides in the source volume set that are empty and available for allocations after a /BY_VSET migration
- Age or usage of the data.

For a detailed discussion on how the MIGRATE /BY_VSET command is processed, see the *Command Language Reference Manual*.

Note You must limit the size of the source volume set using the volume set LIMIT attribute. Otherwise, StorHouse will continue to add empty volumes to the volume set from the free pool when new space allocations are made and MIGRATE /BY_VSET will not obtain empty volume sides by migrating and erasing files.

To use the MIGRATE /BY_VSET command, you must have COPY and ALLOCATION privileges.

MIGRATE /BY_VSET Example

The following example shows you how to use the MIGRATE /BY_VSET command. Before reading it, you should be familiar with the command syntax as it is presented in the *Command Language Reference Manual*. Assume the following:

- A host application writes and then accesses data on host DASD for days 1-30 due to high demand and immediate access requirements.
- After 30 days, demand drops dramatically and the data on DASD is written to StorHouse. For the first 90 days after the data was written to StorHouse (day 31 to 120), the desired average access time requires that the data be stored on optical disk.
- The application writes data (slightly less than 1 GB per day) to 5.25-inch erasable optical disk media that holds approximately 2 GB per volume (1 GB per side of a two-sided volume).
- The frequency of access for the application data drops to a very low rate approximately 90 days after the data has been written to StorHouse (day 120), so data older than 90 days can be stored on magnetic tape with little impact on average access time. (Also, tape access can be made more efficient if requests for data older than 90 days are batched together and sorted according to the age of the data.)

- Library device L00 supports 5.25-inch erasable and/or non-erasable optical media. The application can use 50 to 55 slots in this library device. The rest of the slots must be left available for volumes written by other applications and for free pool volumes.
 - Library device L01 supports DLT magnetic tape media.
 - The source volume set will reside on erasable optical media in L00. The name of the source volume set is ACCOUNTS. ACCOUNTS is created with a size of zero and a limit of 100 GB (about 50 volumes). This size is high enough for the volume set to hold about 92 days of data and 8 empty volume sides.
 - The destination volume set will reside on magnetic tape in L01. It is created with a size of zero and no size limit, and is named ACCARC.
 - The MIGRATE /BY_VSET command is scheduled to run every night and will keep at least eight empty volume sides available for new data. Keeping eight empty sides allows the application to write up to eight days' worth of data at a time if problems prevent it from downloading data to StorHouse for an extended period of time.
 - After ACCOUNTS reaches its limit, the MIGRATE /BY_VSET command will migrate and erase source volumes at the same rate they are being used for new data—approximately one physical volume (two sides) every two days.
- ▼ **To set up your system to migrate files by volume set from optical media to tape, using the /MINIMUM modifier to control the minimum number of volume sides that should be empty and available for allocations after a MIGRATE /BY_VSET migration, follow these steps:**
1. Sign on to StorHouse.
 2. At the StorHouse command prompt (?), type the following command to set the free pool minimum for erasable optical media in library device L00 to 6 so that there will always be enough free pool volumes to satisfy the /MINIMUM value specified in the MIGRATE /BY_VSET command as the source volume set increases in size, and press **Enter**:


```
SET SYSTEM FREE_POOL_L00OEB 6
```

If necessary, you can decrease the free pool minimum after the source volume set reaches its limit.
 3. At the StorHouse command prompt (?), type the following command to create the ACCOUNTS source volume set on erasable optical media:


```
CREATE VSET ACCOUNTS /LIBRARY=L00 /MEDIA=OEB /LIMIT=100G /HOLD=HOLD
```


ACCOUNTS consists of 5.25-inch erasable optical media (media type OE, recording type B). StorHouse will allocate empty volumes from the OEB media free pool in library device L00 to ACCOUNTS. By default, ACCOUNTS starts with a size of zero. StorHouse will allocate empty volumes from the free pool whenever additional space is needed for new data. ACCOUNTS can grow to 100 GB, which is about 50 volumes.

If StorHouse must migrate volumes out of the library device, HOLD ensures that it will keep volumes in ACCOUNTS in the library device until it has first migrated all volumes from other volume sets that have the NOHOLD value.

4. At the StorHouse command prompt (?), type the following command to create the ACCOUNTS source file set on the ACCOUNTS source volume set:

CREATE FSET ACCOUNTS /VSET=ACCOUNTS

By default, the file set starts with a size of zero and can grow to the size of the ACCOUNTS volume set (that is, the file set has a limit of zero). It is contiguous by default and will allocate entire sides of volumes at a time. The application can begin to write data to the ACCOUNTS source file set as soon as you create it.

5. At the StorHouse command prompt (?) sometime during the first 90 days (before the ACCOUNTS source volume set reaches its limit), type the following command to create the destination volume set on DLT magnetic tape media:

CREATE VSET ACCARC /LIBRARY=L01 /MEDIA=TBB

ACCARC consists of DLT magnetic tape media (media type TB, recording type B). It will allocate empty volumes from the TBB media free pool in library device L01. By default, ACCARC starts with a size of zero and can grow indefinitely (that is, it has a limit of zero).

6. After the source and destination volume sets have been created and before the source volume set runs out of empty volumes, type the following command at the StorHouse command prompt (?) to schedule the MIGRATE /BY_VSET command to run nightly:

**SCHEDULE /START=:23:30 /SCHEDULE=DAILY !MIGRATE /BY_VSET
ACCOUNTS /MINIMUM=8S ACCARC**

StorHouse will invoke the MIGRATE /BY_VSET command every night at 11:30 p.m.

StorHouse automatically invokes the MIGRATE /BY_VSET command each night as long as the command remains scheduled. At first, the command simply returns a successful completion because the volume set's LIMIT allows the system to allocate volumes from the free pool when additional space is needed. When the ACCOUNTS volume set nearly reaches its /LIMIT of 100 GB, the command will free optical volumes for reuse by migrating older data to the ACCARC volume set on tape and erasing the optical volumes.

Each night, the MIGRATE /BY_VSET command determines if the ACCOUNTS source volume set has at least eight empty volume sides (the /MINIMUM). If it does, the command does nothing more and completes successfully.

If ACCOUNTS has fewer than eight empty volume sides, the command determines if the volume set's LIMIT will allow the system to allocate enough volume sides to reach the eight-side /MINIMUM. If the LIMIT minus the current volume set size is large enough to meet the requirement, the command completes successfully without migrating files.

If the LIMIT will not allow enough volume sides to be allocated, the command selects the remainder from the volume sides that are not empty in the ACCOUNTS volume set. Because /ORDER_BY was not specified in the MIGRATE /BY_VSET command, the command selects by default the volume side with the oldest time of last space allocation. This volume side normally contains the oldest data. Assuming that a file set named ACCOUNTS did not already exist in the destination volume set (ACCARC), the command automatically creates it as a contiguous file set with a size and limit of zero. The command then migrates all files from the selected physical volume (both sides) to the ACCOUNTS file set in the ACCARC volume set. After relocating all the files, it uncatalogs and erases the selected volume. (The volume is left in the cataloged state.)

The command continues to select and migrate volumes with the next oldest time of last space allocation until it has attempted to migrate enough volumes to reach the /MINIMUM. If the command migrates all the selected volumes successfully, it completes successfully. If it fails to migrate one or more volumes, it returns an error message.

Staging User Files

Staging is the act of copying files from their resident file sets on level L storage to the performance buffer for faster access. StorHouse supports both automatic (the file set AUTO_STAGE attribute) and manual file staging (the STAGE command). Files cannot be staged from a Level F file set. The staging process is also known as *upward migration*.

When manually staging a file, StorHouse copies all extents (or all special extents if you specified /SPECIAL on the STAGE command) of the specified file that are not already in the performance buffer. When automatically staging files in a file set, StorHouse copies only the referenced file extents that are not already in the performance buffer. In both cases, source files are left intact and files can be staged from any media.

If sufficient performance buffer space is not available for a staging operation, StorHouse will not stage the file(s), nor will StorHouse initiate a general file migration to make space available.

System Parameters That Control File Staging

StorHouse uses several system parameters to control file staging.

Table 5-2: System Parameters That Control File Staging

Parameter	Specifies
MIG_REPOP_LOAD	Maximum number of data transfers to be queued at one time for repopulating (copying to) the performance buffer when a file is accessed. This parameter affects files that are automatically staged with the AUTO_STAGE attribute.
MIG_REPOP_MAX	Maximum size (in bytes) of an extent that StorHouse will consider for repopulating (copying to) the performance buffer when a file is accessed. If this value is zero, no extents will be considered. This parameter affects files that are automatically staged with the AUTO_STAGE attribute.
MIG_STAGE_LOAD	Maximum number of data transfers to be queued at one time for manual staging operations. This parameter affects files that are manually staged with the STAGE command.

For complete information on these system parameters, see Appendix A, “System Parameter Descriptions.”

Manually Staging Files to the Performance Buffer


You use the STAGE command to manually stage files from Level L storage to the performance buffer. Assuming the MIG_STAGE_LOAD system parameter is set to a non-zero value, StorHouse stages the file to the performance buffer after you submit the STAGE command.

The following table defines the modifiers you can use with STAGE:

Modifier	Description	Default
/GROUP=...	Specifies a file access group to which the file belongs.	Current default
/REPORT	Controls the generation of special text responses for the completion of significant actions.	-
/SPECIAL	Indicates that only special extents of the file should be staged. In this context, special refers to the file's last DF extent and any other control extents.	-
/VERSION=...	Specifies the relative version number of the file.	/VERSION=0

You must have COPY privilege to use the STAGE command. In addition, you need SETGROUP privilege to use the /GROUP modifier.

▼ To manually stage a file from Level L storage to the performance buffer:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

STAGE filename modifiers

where filename is the name of the file to be staged and modifiers are other command and parameter modifiers you use to assign values other than the defaults. Below is an example:

- To stage the file STATEMENTS in your default file access group, enter:

? STAGE STATEMENTS

Automatically Staging Files to the Performance Buffer

You use either the CREATE FSET /AUTO_STAGE or SET FSET /AUTO_STAGE command to set the AUTO_STAGE attribute for a specified file set. When this attribute is set for a file set and a file extent in that file set is accessed for a host read (user request), StorHouse automatically stages the file extent to the performance buffer. You can set the AUTO_STAGE attribute for a file set before or after assigning non-zero values to the system parameters MIG_REPOP_LOAD and MIG_REPOP_MAX.

For command examples on setting the AUTO_STAGE attribute for a file set, see “Creating StorHouse Level L File Sets” on page 4-9 and “Modifying File Sets” on page 7-6.

Retaining User Files

StorHouse provides features for setting and enforcing user file retention. These features ensure StorHouse archiving adequately supports industry-based compliance rules and data remains accessible throughout its required life span.

About File Retention

Each file written to StorHouse has a *retention attribute*, which determines a file's retention period. A *retention period* indicates the time span that a file may not be deleted from StorHouse. A file is considered *retained* when it has a non-zero retention period and that retention period has not expired.

Copies of primary files (for example, backup, archive, replica, and relocated files) inherit the retention attribute of the primary. The exception is the performance buffer copy. It is treated as temporary cache and has no retention attribute.

Calculating File Retention Periods

StorHouse calculates file retention periods by adding the number of days in the retention period to a file's last modified date (the `modified_file` date as displayed by the StorHouse Command Language `SHOW FILE` command). A file retention period ends when the current date exceeds the last modified date plus the retention period. For example, if a file with a 3-day retention period was last modified at 11 p.m. on December 12, it would expire at 11 p.m. on December 15.

StorHouse does not automatically delete files after their retention period expires. It simply allows applications or users to delete them.

Setting File Retention Periods

Retention can be set at the file and file set levels. At file create time, file-level retention takes precedence over file set-level retention, unless the software is configured otherwise (see `/FORCE_RETENTION` on page 5-22).

File-Level Retention

File-level retention can be set when writing a file to StorHouse through the Interactive Interface or the Callable Interface by specifying:

- The `/RETENTION` modifier on the StorHouse Command Language `CREATE FILE` or `PUT` command.

- The retention_interval list member on the Generic Callable Interface LSMCO or LSMOS (MODE=WRITE) function.
- The FATTR_RETENTION_INTERVAL on the mainframe Callable Interface CREATE-OPEN or OPEN-SEQ function.

Refer to the *Command Language Reference Manual* and the *Callable Interface Programmer's Guide* (Generic and IBM) for more information.

A user or an application can specify one of four retention values at file create time:

Table 5-3: RETENTION Values at File Create Time

Value	Description
DEFAULT	Retention is not specified and assumes the default value. Omitting the /RETENTION modifier or the retention_interval attribute at file create time is the same as specifying a retention value of DEFAULT.
FOREVER	Never allow the file to be deleted.
ZERO	Do not apply any retention period to the file.
Number of days	Retain the file for the specified number of days. The maximum retention period is 65,000 days, or approximately 178 years.

StorHouse records a file's retention setting on the media where the file resides. If the retention period is modified, the system updates the media to preserve the change.

File Set-Level Retention

You can configure file set-level retention by specifying the /RETENTION modifier on the CREATE FSET or SET FSET command. Valid retention values are the same as those listed in Table 5-3. CREATE FSET /RETENTION applies to all files in the file set. SET FSET/RETENTION applies only to new files in the file set.

CREATE FSET and SET FSET also support a /FORCE_RETENTION modifier. When /FORCE_RETENTION is in effect on the file's resident file set, the file set retention value overrides the file retention value. You can use /FORCE_RETENTION to supersede the retention period specified by an application through the Callable or Interactive Interface. For example, assume the following:

- The system administrator specified /FORCE RETENTION and a file set-level retention of FOREVER on the CREATE FSET command for FSET_A. These settings indicate that all files in FSET_A will be forced to have an infinite retention period.

- An application creates File A in FSET_A and explicitly specifies a 2-day retention period.

At file create time, the file set-level retention attribute overrides the file-level retention attribute of two days, causing StorHouse to retain File A forever.

Refer to page 4-12 for information about setting file set-level retention and using the /FORCE_RETENTION modifier.

Determining File Retention Values When DEFAULT is Specified

When StorHouse creates a primary file, it checks several places to determine the file's retention value. As soon as StorHouse finds a retention value other than DEFAULT, it assigns that value to the file.

- First, StorHouse checks the Interactive Interface command or Callable Interface function that creates the file. If it finds a value other than DEFAULT, StorHouse assigns that value to the file unless /FORCE_RETENTION is in effect on the file set. In this case, the file set retention value overrides the file retention value.
- If the file retention value is DEFAULT, StorHouse checks the file set retention attribute for a value other than DEFAULT. If found, it assigns that retention value to the file.
- If the file set retention value is DEFAULT, StorHouse uses the value of the RETENTION_MODE system parameter to determine file retention. If RETENTION_MODE is set to BASIC, StorHouse sets the file-level retention to ZERO, which indicates no retention. If RETENTION_MODE is set to STRICT, StorHouse sets the file -level retention to FOREVER, which indicates infinite retention. Refer to Appendix A, "System Parameter Descriptions," for more information about the RETENTION_MODE system parameter.

Table 5-4 provides some examples of how StorHouse determines file-level retention.

Table 5-4: File Retention Examples

Category	Value			
	Example 1	Example 2	Example 3	Example 4
File-level retention	DEFAULT	DEFAULT	30 days	30 days
File set-level retention	DEFAULT	DEFAULT	60 days	60 days
/FORCE_RETENTION	N/A	N/A	No	Yes
RETENTION_MODE	BASIC	STRICT	N/A	N/A
Final File Retention	ZERO	FOREVER	30 days	60 days

Effect of Retention on Select StorHouse Commands

Retention affects the operation of several StorHouse commands. For example, commands like RELOCATE contain internal delete operations. When RELOCATE moves a retained file to a different storage location, it cannot delete the original file copy from the source location because its retention period has not expired. The original file essentially becomes orphaned on the media.

Retention also affects the operation of the following commands, which, like RELOCATE, perform internal delete operations:

- CREATE FILE/REPLACE
- DELETE
- ERASE VOLUME
- ERASE VSET
- EXPORT
- INITIALIZE DEVICE
- PURGE
- PUT
- RECOVER VOLUME
- RELOCATE
- RETIRE VOLUME
- UNCATALOG VOLUME
- UNCATALOG VSET.

Release-Dependent Information

Note the following:

- To specify retention on a StorHouse 5.6 system, you can use any version of the StorHouse Host Application Programming Interface (API) with the Interactive Interface. You must use version 2.5 (for Windows/UNIX) or version 1.8 (for MVS) of the StorHouse Host API with the Callable Interface. If you use prior versions of the Host API, StorHouse assumes that the retention period is the default.
- The new Host API releases do not pass retention information from Callable Interface functions to a StorHouse system running any release prior to StorHouse 5.6. Therefore, the Callable Interface can be used with older StorHouse systems. However, interactive commands with retention parameters/modifiers will fail if executed on a StorHouse system running a release prior to 5.6.
- When an older StorHouse release is upgraded to Release 5.6, files and file sets created with previous StorHouse releases will be assigned a retention attribute of ZERO after the conversion.

Replicating User Files

StorHouse supports application-independent replication of one or more eligible primary files from a source StorHouse system to a destination, or target, StorHouse system. Replication is typically used to provide redundancy for disaster recovery or off-site storage. A file is considered *replicated* when at least one copy resides on the destination system, including on the performance buffer. Any StorHouse file type can be replicated (VRAM, sequential, or STORHOUSE).

About Replication

A primary file is eligible for replication when it has an assigned replication class. A *replication class* is a named set of information about the destination StorHouse system. Table 5-5 describes the components of a replication class.

Table 5-5: Replication Class Components

Component	Specifies the
RPL_CLASS_NAME	Name of the replication class. A replication class name can consist of from 1-8 of the following ASCII characters: A_Z, 0-9, _ and \$. StorHouse always forces replication class names to uppercase, even when enclosed in quotes.
DISABLED_FLAG	Indicator specifying whether the replication class is disabled. A non-blank character indicates disabled.
NETWORK_DEVICE	Network device used to connect to the destination StorHouse system. This value must be set to N00 to indicate TCP/IP.
SYSNAME	Network system name used to connect to the destination StorHouse system. This value must be the same as the SM_HOSTID in the default SMCONFIG file on the destination system.
LINKNAME	Network link name used to connect to the destination StorHouse system. This value must be the same as the SM_LINKNAME in the default SMCONFIG file on the destination system.
VSET	Volume set that will contain the replicated files on the destination StorHouse. Valid values are: <ul style="list-style-type: none"> VSET=volume_set_name VSET=* (indicates to use the same volume set name as the source file) If VSET is omitted, StorHouse uses the account's default volume set on the destination StorHouse.
FSET	File set name that will contain the replicated files on the destination StorHouse system. Valid values are: <ul style="list-style-type: none"> FSET=file_set_name FSET=* (indicates to use the same file set name as the source file) If FSET is omitted, StorHouse uses the account's default file set on the destination StorHouse system.

StorHouse associates a file with a replication class by:

- Assigning a replication class to the file's resident file set (SET FSET or CREATE FSET command). In this case, at create time, the file inherits its replication class from its file set. Refer to page 4-11 for information about how to assign a replication class to a file set.
- Explicitly specifying a default replication class for the file version (SET FILE command example on page 5-10).

Currently, FileTek is responsible for creating and maintaining replication classes. For more information about these tasks, contact your FileTek customer support representative.

Implementing Replication

You implement replication with the StorHouse Command Language REPLICATE command. REPLICATE requires SYSTEM privilege and SETGROUP privilege to use the /GROUP modifier. For convenience, this command can be scheduled to run periodically.

A replication operation works as follows:

- When an application creates or modifies a replication-eligible file, StorHouse queues the same action to occur on the destination StorHouse system the next time the REPLICATE command executes on the source system and selects that file.
- When a file is deleted (and removed) from the source system, StorHouse queues the same action to occur on the destination StorHouse the next time the REPLICATE command executes on the source system and selects any file.

StorHouse does not copy file and file set replication class attributes from one system to another. A replica inherits the replication class attribute of its target file set on the remote system. In addition, the system does not write queued files to the destination system in any particular order or within a set time interval.

REPLICATE uses the same account, password, and file access group on the source and target systems. The system administrator must manually create the respective accounts and volume sets on the target location. If the required groups and file sets do not already exist on the destination system, StorHouse creates them automatically. System-created file sets are noncontiguous and use the other CREATE FSET command defaults.

The following table defines the modifiers you can use with REPLICATE:

Modifier	Description	Default
/CHECK	Tells StorHouse to ignore a file's replicated flag and check whether every specified file has already been replicated on the destination StorHouse system.	-
/CONFIRM	Controls whether StorHouse asks you to confirm the command.	-
/DEF_RPL_CLASS=...	Specifies the name of the default replication class for files with no pre-assigned replication class.	-
/FSET=...	Replicates eligible files in the specified primary file set (and volume set) to the target StorHouse system.	/FSET=*
/GROUP	Replicates eligible files in the specified file access group to the target StorHouse system.	/GROUP=*

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Managing User Files

Replicating User Files

Modifier	Description	Default
/PREVIEW	Indicates that REPLICATE will display the number of files and bytes that will be copied when the command is actually executed.	-
/RECORD	Indicates whether the command will change the replicated flag in the primary directory of the source StorHouse system when it copies a file version to the target StorHouse system.	/RECORD
/REPORT	Controls the generation of special text responses for the completion of significant actions.	/NOREPORT
/VERSION	Specifies the relative version number of files to be replicated.	/VERSIONS=*
/VSET	Replicates eligible files in the specified primary volume set to the target StorHouse system.	
/WAIT	Instructs StorHouse to wait for a locked file to be unlocked before attempting to use it in the command execution.	/NOWAIT

When you specify /FSET, you must also specify /VSET.

▼ To replicate a user file from one StorHouse system to another:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

REPLICATE filename modifiers

where filename is the name of the file to be replicated and modifiers are other command and parameter modifiers you use to assign values other than the defaults. Below are some examples:

- To replicate all eligible files and wait for locked files to be unlocked before attempting to use them in the command execution, enter:

? REPLICATE * /WAIT

- To check whether version 0 of the file USERFILE in the file access group ACCT already exists on the target stem and then copy it there, if required, enter:

? REPLICATE USERFILE /CHECK /GROUP=ACCT /VERSION=0

- To preview the number of files and bytes that will be replicated to the target StorHouse system from volume set MAR_2004 and to generate a text response for each processed file, enter:

```
? REPLICATE * /VSET=MAR_2004 /REPORT /PREVIEW
```

- To assign a default replication class of ONETIME to all versions of USERFILE (which has no assigned replication class) and then replicate USERFILE to a destination StorHouse system, enter:

```
? REPLICATE USERFILE /VERSION=* /DEF_RPL_CLASS=ONETIME
```

Relocating User Files

You can use the RELOCATE command to copy a file version to a new location and then delete the source copy. For example, you can use this command to move one or more files off a volume that you plan to export. RELOCATE always copies an entire file version, even if all or part of the file is in the performance buffer and has not been copied to its primary file set. The command changes the directory entry of the file to reflect its new location but does not change the file's identifier, access group name, or version number. If you attempt to relocate a file while any of its extents are in the process of being written back, the command does not execute for that file. You can schedule the RELOCATE command.

The following rules apply to RELOCATE. The source and destination volume sets must be different, but they must be located in the same directory. You cannot relocate a file from one side of a volume to the other.

You must have read and write access to the file and the COPY privilege to use RELOCATE. In addition, you must have SYSTEM privilege to use the /DIRECTORY modifier and SETGROUP privilege to use the /GROUP modifier.


The following table defines the modifiers you can use with RELOCATE:

Modifier	Description	Default
/BEFORE=...	Selects file versions for relocation that have a creation date and time value that is the same as or earlier than the value you specify.	-
/CONFIRM	Controls whether StorHouse asks you to confirm the command.	-
/DIRECTORY=...	Specifies the directory from which files will be selected for relocation.	-
/FSET=...	Specifies the file set with the files to be copied.	-
/GROUP=...	Specifies a file access group name and, optionally, group passwords.	Current default

Modifier	Description	Default
/PASSWORDS=...	Specifies the file access passwords.	-
/REPORT	Controls the generation of special text responses for the completion of significant actions.	-
/SINCE=...	Selects file versions for relocation that have a creation date and time value that is the same as or later than the value you specify.	-
/TO_FSET=...	Specifies the file set(s) to which files will be copied.	/TO_FSET= *
/TO_VSET=...	Specifies the volume set to which files will be relocated.	Current default
/VERSION=...	Specifies the relative file version(s) to be relocated.	/VERSION=0
/VOLUME=...	Specifies the volume identifier (vid) of the volume where the source file is located.	-
/VSET=...	Specifies the volume set for the selection of the source file.	/VSET= *
/WAIT	Indicates that StorHouse is to wait for a locked file to be unlocked before attempting to use it in the command execution.	-

/DIRECTORY, /VOLUME, and /VSET are mutually exclusive.

▼ **To relocate a user file from one volume set to another:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

RELOCATE filename modifiers

where filename is the name of the file to be relocated and modifiers are other command and parameter modifiers you use to assign values other than the defaults. Below are some examples:

- To copy version 0 (the default) of the primary copy of USERFILE to the file set PFSET2 in the volume set PVSET2, enter:

? RELOCATE USERFILE /TO_VSET=PVSET2 /TO_FSET=PFSET2

- To copy all versions of USERFILE in the primary directory to the file set PFSET1 in the volume set PVSET1, enter:

? RELOCATE USERFILE /TO_VSET=PVSET1 /TO_FSET=PFSET1
/VERSION=*

- To relocate all versions of USERFILE in the ARCHIVE directory to the file set ARCHFS1 in the volume set ARCHVS1, enter:

```
? RELOCATE USERFILE /DIR=ARCHIVE /TO_VSET=ARCHVS1  
/TO_FSET=ARCHFS1
```

- To relocate all files on side A of volume OAB5612C678 to the file set FSET1 in the volume set VSET1, enter:

```
? RELOCATE * /VOLUME=OAB5612C678:A /TO_VSET=VSET1  
/TO_FSET=FSET1
```

- To relocate the primary versions of USERFILE that were created before midnight of January 31, 2002 to file set PFSET1 in volume set PVSET1, enter:

```
? RELOCATE USERFILE /VERSION=* /TO_VSET=PVSET1  
/TO_FSET=PFSET1 /BEFORE=31-JAN-2002
```

Removing User Files

You can use the REMOVE FILE command to permanently remove a file from StorHouse. Before you can remove a file, you must delete it. A file is considered deleted when there is an entry for the file in the DELETED directory. REMOVE FILE removes *all* deleted files from the DELETED directory. Once a file is removed from the system, you may not be able to recover it.

For deleted files stored on magnetic disk, REMOVE FILE frees their storage space for use by other files. If a deleted file resides on a downed level F device, REMOVE FILE does not remove the file.

The DEL_FILE_PERM system parameter determines whether StorHouse writes deleted file labels on removable media. If DEL_FILE_PERM is TRUE when you execute REMOVE FILE for files on a removable volume (erasable or non-erasable), REMOVE FILE writes deleted file labels on the optical or tape volume containing the file and uncatalogs the file. This prevents the file from reappearing if its volume is subsequently cataloged during an import or recovery operation. If DEL_FILE_PERM is FALSE, REMOVE FILE uncatalogs deleted files on a removable volume (erasable or non-erasable) but does not write deleted file labels on the volume.

You are responsible for setting the value for the DEL_FILE_PERM system parameter. If you need to change the value, see “Setting System Parameters” on page A-3 for the procedure.

The command sequence for removing one or more files from StorHouse is:

1. DELETE
2. REMOVE FILE

Figure 5-2 illustrates this sequence and the associated file status.

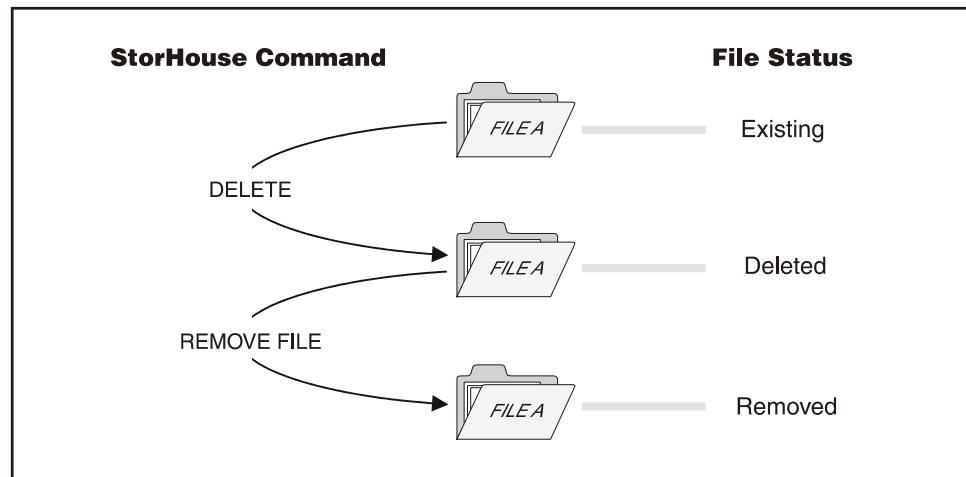


Figure 5-2: File Status During Remove Process

Deleting a File

You prepare a file for removal by deleting it with the **DELETE** command. This command marks the specified file as deleted and creates an entry for it in the DELETED file directory. If the deleted file's source directory is the ARCHIVE or BACKUP directory, **DELETE** also updates the PRIMARY directory to indicate that the deleted file version is no longer archived or backed up.

Once a file is deleted, it is no longer available for use. However, you can undelete a file using the **UNDELETE** command. See the following section, "Undeleting a File."

The following table defines the modifiers you can use with **DELETE**:

Modifier	Description	Default
/CONFIRM	Controls whether StorHouse asks you to confirm the command.	-
/DIRECTORY=...	Specifies the directory from which the files will be deleted.	/DIRECTORY=PRIMARY
/GROUP=...	Specifies a file access group name, and optionally, group passwords.	Current default
/PASSWORDS=...	Specifies the file's delete password.	-

Modifier	Description	Default
/REPORT	Controls the generation of special text responses for the completion of significant actions.	-
/VERSION=...	Specifies the version number (in the directory specified by /DIRECTORY) of the file to be deleted.	(Required)
/WAIT	Instructs StorHouse to wait for a locked file to be unlocked before attempting to use it in the command execution.	-

You must have DELETE privilege to use the DELETE command. In addition, you need SYSTEM privilege to use the /DIRECTORY modifier and SETGROUP privilege to use the /GROUP modifier.

▼ To delete a StorHouse file:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press Enter ↵:

DELETE filename modifiers

where filename is the name of the file to be deleted and modifiers are other command and parameter modifiers you use to assign values other than the defaults. Some examples follow:

- To delete version -2 of the file USERFILE in the BACKUP directory (you have delete access to USERFILE's file access group), enter:

? DELETE USERFILE /DIRECTORY=BACKUP /VERSION=-2

- To delete all versions of the file USERFILE located in the PRIMARY directory (you have delete access to USERFILE's file access group), enter:

? DELETE USERFILE /VERSION=*

Undeleting a File

You can use the UNDELETE command to restore a file that has been deleted, as long as that file has not been removed. The UNDELETE command moves the most recently deleted version of a file from the DELETED file directory back to its original directory and makes it available for use. You can repeat the command to restore multiple deleted versions of a file.

To undelete a backup or archive copy of a file, you must specify /DIRECTORY. If the command undeletes a primary, backup, or archive copy of a file version, it does not change the BACKED UP or ARCHIVED status for the primary.

The following table defines the modifiers you can use with UNDELETE:

Modifier	Description	Default
/DIRECTORY=...	Specifies the directory from which the files will be undeleted.	/DIRECTORY=PRIMARY
/GROUP=...	Specifies a file access group name, and optionally, group passwords.	Current default
/PASSWORDS=...	Specifies the file's write password.	-
/REPORT	Controls the generation of special text responses for the completion of significant actions.	-

You must have DELETE privilege to use the UNDELETE command. In addition, you need SYSTEM privilege to use the /DIRECTORY modifier and SETGROUP privilege to use the /GROUP modifier. Finally, you must also have write access to the file that you are deleting and its file access group.

▼ **To undelete the most recent version(s) of a deleted user file:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

UNDELETE filename modifiers

where filename is the name of the file to be undeleted and modifiers are other command and parameter modifiers you use to assign values other than the defaults. Below is an example:

- To undelete the most recently deleted version of USERFILE, enter:


? UNDELETE USERFILE

Using the REMOVE FILE Command

Once you have deleted a file, you can use the REMOVE FILE command to remove all deleted files from the DELETED file directory. You can use two modifiers with REMOVE FILE: /CONFIRM and /REPORT. /CONFIRM controls whether StorHouse asks you to confirm the command. /REPORT controls the generation of special text responses for the completion of significant actions.

You must have SYSTEM privilege to use REMOVE FILE. You can schedule the REMOVE FILE command.

▼ **To remove all deleted files from the StorHouse DELETED directory:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

REMOVE FILE modifiers

where modifiers are other command modifiers you use to assign values other than the defaults. Below is an example:

- To remove all files from the StorHouse DELETED directory, enter:

? REMOVE FILE

Purging Older Versions of StorHouse Files


You can use the PURGE command to delete older versions of StorHouse files. PURGE deletes all older versions of a primary file until the number of versions remaining equals the value of the file's LIMIT attribute.

The following table defines the modifiers you can use with PURGE:

Modifier	Description	Default
/CONFIRM	Controls whether StorHouse asks you to confirm each item being deleted.	-
/DIRECTORY=...	Specifies the directory where files will be purged.	/DIRECTORY=PRIMARY
/GROUP=...	Specifies a file access group name and, optionally, group passwords.	Current default
/KEEP=...	Specifies the number of versions to keep.	-
/PASSWORDS=...	Specifies a file access password to gain access to the file.	-
/REPORT	Controls the generation of special text responses for the completion of significant actions.	-
/WAIT	Instructs StorHouse to wait for a locked file version to be unlocked before attempting to purge it.	-

You must have DELETE privilege to use PURGE. You can schedule the PURGE command.

▼ To purge older versions of StorHouse files:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

PURGE filename modifiers

where filename is the name of the file and modifiers are other command modifiers you use to assign values other than the defaults. Below are examples:

- To purge versions of the file USERFILE in the PRIMARY directory until the number of versions remaining equals the value of the file's LIMIT attribute, enter:

? PURGE USERFILE

- To purge all versions of the file USERFILE in the PRIMARY directory except for the 10 most recent versions, enter:

? PURGE USERFILE /KEEP=10

Enabling a Disabled File


You can use the ENABLE command to enable a writeback-disabled file extent. StorHouse will *writeback-disable* a file extent if the system does not have enough pre-allocated space to write a file extent from the performance buffer to its primary file set. This can occur because of media, drive, or system problems during a previous write attempt. ENABLE removes the WRITEBACK-DISABLED status and preallocates additional space for the file extent.

The following table defines the modifiers you can use with ENABLE:

Modifier	Description	Default
/DIRECTORY=...	Specifies the directory in which files will be enabled.	/DIRECTORY=PRIMARY
/GROUP=...	Specifies a file access group name and, optionally, group passwords.	Current default
/PASSWORDS=...	Specifies a file access password to gain access to the file.	-
/REPORT	Controls the generation of special text responses for the completion of significant actions.	-
/VERSION=...	Specifies the version number of the file to be enabled.	/VERSION=0

You must have FILE privilege to use ENABLE. In addition, you must have SETGROUP privilege to use the /GROUP modifier.

▼ **To enable a disabled file:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

ENABLE filename modifiers

where filename is the name of the file and modifiers are other command and parameter modifiers you use to assign values other than the defaults. Below is an example:

- To enable version 0 of USERFILE, specify that it is located in GROUP1 in the primary directory, specify GROUP1's write password as WRITEPW, and specify USERFILE's write password as WRITEPW, enter:

```
? ENABLE USERFILE /GROUP=GROUP1::WRITEPW  
/PASSWORDS=:WRITEPW
```


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Managing User Files

Enabling a Disabled File

Managing Volume Sets

In Chapter 4, “Allocating Storage for User Files,” you learned how to create StorHouse volume sets and allocate user files to them. This chapter explains how to manage volume sets once they are created. Specifically, this chapter tells you how to:

- Display information about a volume set
- Change a volume set’s attributes or settings
- Specify a memo for a volume set
- Move a volume set
- Export a volume set
- Import a volume set
- Erase a volume set.

About Volume Sets

A StorHouse *volume set* is a collection of one or more physical volumes that StorHouse treats as a unit. Volume sets should be viewed as a means for controlling the physical grouping of files. Every removable StorHouse volume must be a member of a volume set.

As mentioned in Chapter 3, “Understanding the Storage Hierarchy,” StorHouse manages two types of level L volume sets: volume sets for user files and free pool volume sets. The naming convention is different for the two types of volume sets. User file volume set names can contain 1 to 8 characters and consist of the following ASCII characters: A-Z (uppercase), 0-9, _ (underscore), and \$ (dollar sign). An example is ACCTS00.

Free pool volume set names take the form .Lxxmmr, where Lxx is the device specification for the library device containing the free pool, mm is the media type of the free pool volumes, and r is the recording type of the free pool volumes. An example is .L00OEB.

Classifications of Volumes and Volume Sets

StorHouse volumes and volume sets have the following classifications:

- *Cataloged* volumes are volumes for which StorHouse maintains file and file set information. Whenever you add (import) a volume to a volume set or import an entire volume set, you must catalog the volumes to add file and file set information to StorHouse system files.

You use the Command Language CATALOG VSET command to catalog one or more volumes in a volume set or to catalog an entire volume set. For information on this command, see “Running CATALOG VSET After REMOVE FILE” on page 6-21.

- *Uncataloged* volumes are volumes for which StorHouse maintains no files and file set information. Before you remove (export) a volume or volume set, you must uncatalog it to remove file and file set information from StorHouse system files.

You use the UNCATALOG VOLUME command to uncatalog one or more volumes and the UNCATALOG VSET command to uncatalog a volume set. See Chapter 8, “Managing Volumes,” for information on using the UNCATALOG VOLUME command. See “Uncataloging a Volume Set” on page 6-23 for more information on using the UNCATALOG VSET command.

- *Offline* volumes are volumes for which StorHouse has no knowledge (in other words, exported volumes). StorHouse does not manage offline volumes.

Commands Used With StorHouse Volume Sets

You manage StorHouse volume sets using the following StorHouse Command Language commands:

Command	Description
CATALOG VSET	Adds file and file set information to the StorHouse directory from uncataloged volumes in a volume set.
ERASE VSET	Erases erasable optical or magnetic tape volumes in a volume set.
EXPORT	Removes part or all of a volume set from StorHouse.
IMPORT	Adds volume and volume set information to StorHouse directories.
MOVE VSET	Moves all volumes in a volume set to a specified location within StorHouse.
SET VSET	Changes volume set information.
SHOW FILE * /VSET	Displays all files contained within a volume set.
SHOW VSET	Displays volume set information.
UNCATALOG VSET	Removes directory information for files and file sets on a volume set.

Figure 6-1 shows a sample volume set.

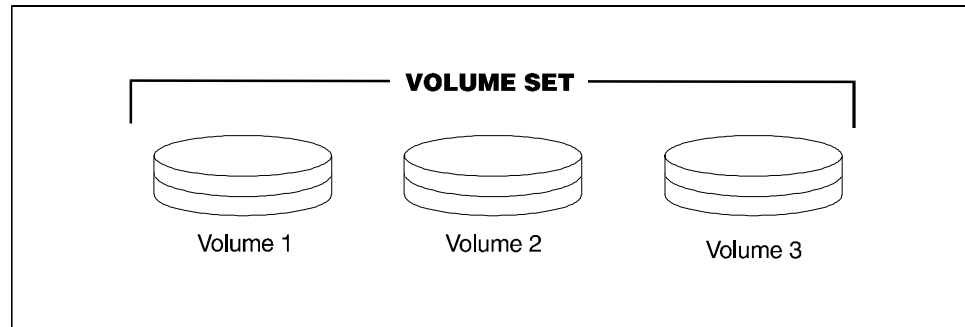


Figure 6-1: Sample Volume Set

Displaying Information About Volume Sets

You can use the `SHOW VSET` command to display information about a StorHouse volume set. Using different modifiers, you can display information in several ways:

- A brief display using no modifiers lists the following information:
 - Volume set name
 - Name of the directory where the volume set resides
 - Size of the volume set
 - Number of volume surfaces (sides) in the volume set
 - Number of bytes available for allocation to file sets
 - Type of media for the volume set.
- A full display using the `/FULL` modifier lists all available information for a volume set, which includes the information for the brief display plus the following:
 - Value of the `LIMIT` attribute for the volume set
 - Number of bytes allocated to file sets for general usage
 - Date and time the volume set was created
 - Date and time the volume set was last modified
 - Value of the `CYCLE` attribute for the volume set
 - Value of the `DEACTIVATE` attribute for the volume set
 - Value of the `EXPIRE` attribute for the volume set
 - Value of the `HOLD` attribute for the volume set
 - Device identification code (`did`) of the library device that contains the pool of empty volumes that are used to extend the volume set
 - Default destination archive volume set for files in the primary volume set
 - Default destination archive file set for files in the primary volume set
 - Default destination backup volume set for files in the primary volume set

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Managing Volume Sets

Displaying Information About Volume Sets

- Default destination backup file set for files in the primary volume set
- User-specified comment about this volume set for the first volume in the set.
- A selected display using one or more modifiers (except /FULL), which displays specific information about the volume set.

SHOW VSET modifiers determine items of information to be displayed. The following table defines the modifiers you can use with SHOW VSET:

Modifier	Displays
/DIRECTORY=...	Volume sets located in the specified directory.
/FULL	All available information for the volume set.
/HOLD	Volume sets with the HOLD attribute value of HOLD.
/LIBRARY=...	Volume sets whose free pool of empty volumes is located in the specified library device.
/MEDIA=...	Volume sets that consist of the specified media/recording type.
/MEMO	The comment that a user added to the StorHouse system file (with the MOVE VOLUME, SET VOLUME, MOVE VSET, or SET VSET command).
/MEMO=...	All volume sets with the specified comment.
/NOHOLD	Volume sets with the HOLD attribute value of NOHOLD.

You must have SHOW, ALLOCATION, or SYSTEM privilege to use SHOW VSET.

▼ **To display information about a StorHouse volume set:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

SHOW VSET vset_name modifiers

where **vset_name** is the name of the volume set and **modifiers** are other parameter modifiers you use to assign values other than the defaults. Some examples follow:

- To display basic information for volume set ACCTS00, type:

? SHOW VSET ACCTS00

The system returns the following information:

VSET=ACCTS00 DIRECTORY=PRIMARY SIZE=20459KB
SURFACES=2 GENERAL_FREE=18604KB MEDIA=OAB

Total vsets displayed=1

- To display all available information for volume set ACCTS00, add /FULL to the previous command:

```
? SHOW VSET ACCTS00 /FULL
```

The system returns the following information:

```
VSET=ACCTS00 DIRECTORY=PRIMARY SIZE=20459KB
SURFACES=2 GENERAL_FREE=18604KB MEDIA=OAB LIMIT=0KB
GENERAL_ALLOCATED=1854KB CREATED=01-JAN-2000:07:54:08
MODIFIED=29-JAN-2000:19:07:14 CYCLE=0 DEACTIVATE=0
EXPIRE=0 HOLD=NOHOLD LIBRARY=L00 ARCVSET=none
ARCFSET=* BKPVSET=none BKPFSET=* MEMO="Rack 4"
```

Total vsets displayed=1

- To display all volume sets in the PRIMARY directory, type:

```
? SHOW VSET * /DIRECTORY=PRIMARY
```

The system returns the following information:

```
VSET=ACCTS00 DIRECTORY=PRIMARY SIZE=20459KB
SURFACES=2 GENERAL_FREE=18604KB MEDIA=OAB
```

```
VSET=CHKPOINT DIRECTORY=PRIMARY SIZE=10095288KB
SURFACES=10 GENERAL_FREE=0KB MEDIA=OEB
```

```
VSET=MAGDISK DIRECTORY=PRIMARY SIZE=2737170KB
SURFACES=2 GENERAL_FREE=1170KB MEDIA=MAA
```

Total vsets displayed=3

Displaying All Files in a StorHouse Volume Set

You can use the SHOW FILE /VSET command to display all the files that reside in a StorHouse volume set. You must have SHOW or FILE privilege to use SHOW FILE.

▼ To display all files in a StorHouse volume set:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press Enter ↵:


```
SHOW FILE * /VSET=vset_name
```

where * means all files and vset_name is the name of the volume set. An example follows:

- To display all the files in volume set ACCTS00, type:

```
? SHOW FILE * /VSET=ACCTS00 /GROUP=* /VERSION=*
```

The system returns a list of files:

```
FILE="ROLB500X.D970711" GROUP=TEST VERSION=0 FID=4444.150381
FILE="ROLD2200.D970711" GROUP=TEST VERSION=0 FID=4444.150382
FILE="ROLS804.D970711" GROUP=TEST VERSION=0 FID=4444.150374
```

Modifying Volume Sets

You can use the SET VSET command to change the attributes or other values for a StorHouse volume set. Attributes include the following:

- CYCLE, DEACTIVATE, and EXPIRE – Settings for a volume set's cycle, deactivate, and expire timers
- HOLD – Value of the HOLD attribute for a volume set
- LIBRARY – Library device where new volumes in the volume set will reside
- LIMIT – Maximum number of bytes that a volume set can contain
- SIZE – Number of bytes in a volume set after the command completes.

You can also use SET VSET to:

- Change the memo for a volume set
- Choose whether to deallocate all empty volumes in the volume set
- Assign a default archive and/or backup file set and volume set for files in the primary volume set.

All changes take effect immediately. However, note that changes to /CYCLE, /DEACTIVATE, /EXPIRE, /HOLD, and /LIBRARY apply only to new volumes added to the volume set.

For general guidelines and sample commands for using the cycle, deactivate, and expire attributes, see Appendix C, "Using Cycle, Deactivate, and Expire Timers."

The following table defines the modifiers you can use with the SET VSET command:

Modifier	Description
/ARCFSET=...	Specifies the default destination archive file set for files in the primary volume set.
/ARCVSET=...	Specifies the default destination archive volume set for files in the primary volume set.
/BKPFSET=...	Specifies the default destination backup file set for files in the primary volume set.
/BKPVSET=...	Specifies the default destination backup volume set for files in the primary volume set.
/CYCLE=...	Specifies a number of days after the last allocation of file space on the first side of a volume that the system will deactivate that side and activate the second side of the volume.
/DEACTIVATE=...	Specifies a number of days after the first allocation of file space on a volume side that the system will deactivate the side; that is, the system will no longer allocate space for files on that side.
/EXPIRE=...	Specifies the number of days after the last file space allocation on a volume side that the system will mark the side as deactivated and expired.
/HOLD	Specifies the volume set's HOLD attribute value. /HOLD sets the value to HOLD; /NOHOLD sets the value to NOHOLD.
/LIBRARY=...	Specifies a new value for the library device attribute of the volume set.
/LIMIT=...	Specifies the maximum number of bytes that the volume set can contain.
/MEMO=...	Specifies up to 32 characters of descriptive text to replace the current memo text, if any.
/RELEASE	Indicates that StorHouse is to deallocate from the volume set all empty volumes that have no space allocated to file sets.
/REPORT	Controls the generation of special text responses for the completion of significant actions.
/SIZE=...	Specifies the number of bytes in the volume set after the command completes.

You must have ALLOCATION and SYSTEM privilege to use SET VSET. The vset_name parameter is required.

▼ **To change or set attributes or other values for a StorHouse volume set:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

SET VSET vset_name modifiers

where `vset_name` is the name of the volume set to be changed and `modifiers` are other command and parameter modifiers you use to assign values other than the defaults. Below are some examples:

- To specify that there is no limit on the maximum number of bytes that ACCTS00 can contain, type:

```
? SET VSET ACCTS00 /LIMIT=0
```

This command changes the volume set's previous value for `/LIMIT`.

- To specify that StorHouse will deactivate the first side of all new volumes in volume set ACCTS00 and activate the second side nine days after the last file space is allocated on the first side, type:

```
? SET VSET ACCTS00 /CYCLE=9
```

- To specify the comment "Rack 4" for a volume set's location, enter:

```
? SET VSET ACCTS00 /MEMO="Rack 4"
```

Moving Volume Sets

You can move a StorHouse volume set between library devices or between a library device and shelf storage using the `MOVE VSET` command. This command moves all the volumes in a volume set to a location you specify within the StorHouse system and updates the last access time for the volumes that you move.

StorHouse moves volumes individually when you move a volume set between library devices. The operator receives two messages for each volume: first, to unload the volume from the source library, and then to load the volume into the destination library. If any volumes are already located in the destination library, StorHouse responds as if it has moved them successfully. (If you move a volume set to shelf, the operator receives only the first message to unload the volumes.)

Each library device has a corresponding shelf storage. For example, the shelf storage for library device L00 is S00. The shelf storage for L01 is S01. If you do not specify a unit number for the destination device in the command when moving volume sets, StorHouse matches the unit number of the volume's current device to the unit number of the destination device.

The HOLD Attribute and the Order of Volume Migration

You can keep volumes with the most heavily accessed data in a library device by setting the HOLD attribute of the volume set to HOLD. This attribute helps determine the order in which volumes are migrated from a library device to shelf storage. When StorHouse has to migrate volumes out of a library device, it selects volumes with the NOHOLD value before it selects volumes with the HOLD value. You initially set this attribute using the CREATE VSET command. You can change the value using the SET VOLUME or SET VSET command. If you do not set this value in the CREATE VSET or SET VSET commands, StorHouse uses the default value you set for the VSET_HOLD system parameter. For more information about the SET VOLUME command, see “Modifying Volumes” on page 8-9 and for more information about the SET VSET command, see “Modifying Volume Sets” on page 6-6. For more information about the HOLD attribute, refer to the *StorHouse Concepts and Facilities Manual*.

Using the MOVE VSET Command


When you move a StorHouse volume set, you must specify the name of the volume set and a device identification code (did) for the destination device. Optionally, you can add or update a memo for the volume set.

The following table defines the modifiers you can use with MOVE VSET:

Modifier	Description
/CONFIRM	Controls whether StorHouse asks you to confirm the command.
/MEMO=...	Specifies up to 32 characters of descriptive text to be added to the StorHouse system files for each volume in the volume set.
/REPORT	Controls the generation of special text responses for the completion of significant actions.

You must have OPERATOR privilege to use this command. FileTek recommends that you use the SCHEDULE command with MOVE VSET. See Chapter 12, “Controlling and Scheduling System Activity,” for more information on the SCHEDULE command.

▼ To move a StorHouse volume set from one location to another:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** :

MOVE VSET vset_name did modifiers

where `vset_name` is the volume set name, `did` is the device identification code for the destination device, and `modifiers` are other command and parameter modifiers you use to assign values other than the defaults. Below are some examples.

Note: The following MOVE VSET command examples assume that the specified volume set resides in library device L00.

- To move all volumes in the volume set ACCTS00 from their current location(s) to library device L01, enter:

```
? MOVE VSET ACCTS00 L01
```

- To move all volumes in the volume set ACCTS00 to level S (device S00) and attach the comment “Rack 4” to designate the volume set’s new location, enter:

```
? MOVE VSET ACCTS00 S /MEMO=“Rack 4”
```

Using Memos for Volume Sets

You can use the SET VSET /MEMO command or the MOVE VSET /MEMO command to specify a comment for all volumes in a volume set. For example, you can specify information about the volume set’s contents or the location of a volume set that has been moved to shelf storage. The SHOW VSET command displays the /MEMO comment for the first volume in the volume set.

The information you specify on the /MEMO parameter modifier is written to the StorHouse system files, but is not written to the optical or tape volume. The memo text also displays in selected operator messages.

Adding a Memo

You can use the SET VSET /MEMO command or the MOVE VSET /MEMO command to add a memo for a volume set. SET VSET /MEMO allows you to add a memo for a volume set anytime. MOVE VSET /MEMO allows you to add a memo for a volume set while moving the volume set.

You must have ALLOCATION and SYSTEM privileges to use SET VSET. The `vset_name` parameter is required.

You must have OPERATOR privilege to use MOVE VSET. The `vset_name` and the `did` parameters are required. You can schedule the MOVE VSET command.

▼ To add a memo for a StorHouse volume set anytime:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

```
SET VSET vset_name /MEMO=value
```

where `vset_name` is the name of the volume set and `value` is the memo text. An example follows:

- To add the memo “Rack 4” to designate the location of volume set ACCTS00, enter:

```
? SET VSET ACCTS00 /MEMO=“Rack 4”
```

▼ To add a memo for a StorHouse volume set while moving all the volumes in the volume set:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

```
MOVE VSET vset_name did /MEMO=value
```

where `vset_name` is the name of the volume set to be moved, `did` is the destination device for the volume set, and `value` is the memo text. An example follows:

- To add the memo “Rack 4” to designate the volume set’s location while moving all volumes in the volume set ACCTS00 to level S, type:

```
? MOVE VSET ACCTS00 S /MEMO=“Rack 4”
```


Changing a Memo

You can use the `SET VSET /MEMO` or the `MOVE VSET /MEMO` command to change a memo for a volume set. `SET VSET /MEMO` command allows you to change a memo for a volume set anytime. `MOVE VSET /MEMO` command allows you to change a memo for a volume set while moving the volume set.

You must have `ALLOCATION` and `SYSTEM` privileges to use `SET VSET`. The `vset_name` parameter is required.

You must have OPERATOR privilege to use MOVE VSET. The vset_name and the did parameters are required. You can schedule the MOVE VSET command.

▼ **To change a memo for a StorHouse volume set anytime:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :


```
SET VSET vset_name /MEMO=value
```

where vset_name is the name of the volume set to be changed and value is the memo text. An example follows:

- To change the memo “Rack 4” to “Rack 5” for the new location of volume set ACCTS00, enter:

```
? SET VSET ACCTS00 /MEMO=“Rack 5”
```

▼ **To change a memo for a StorHouse volume set while moving all the volumes in the volume set:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

```
MOVE VSET vset_name did /MEMO=value
```

where vset_name is the name of the volume set to be moved, did is the destination device for the volume set, and value is the memo text. An example follows:

- To change the memo “Rack 4” to “Rack 5” to designate the volume set’s new location while moving all volumes in the volume set ACCTS00 to level S, type:

```
? MOVE VSET ACCTS00 S /MEMO=“Rack 5”
```

Displaying a Memo

You can use the SHOW VSET /MEMO command to display a memo for a volume set. You must have SHOW, ALLOCATION or SYSTEM privilege to use SHOW VSET.

The vset_name is not required. If you omit the vset_name, StorHouse uses your current default vset_name.

▼ To display a memo for a StorHouse volume set:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press

```
SHOW VSET vset_name /MEMO
```

where `vset_name` is the name of the volume set to be displayed. An example follows:

- To display the memo for the volume set ACCTS00, type:

```
? SHOW VSET ACCTS00 /MEMO
```

The system responds with the following information:

```
VSET=ACCTS00 DIRECTORY=PRIMARY SIZE=10095288KB  
SURFACES=10 GENERAL_FREE=1009611KB MEDIA=OEB  
MEMO="Rack 4"
```

Listing All Volume Sets With a Specific Memo

You can use the `SHOW VSET /MEMO` command to list all volume sets with a specific memo or that contain specific words in their memos. You must have `SHOW`, `ALLOCATION` or `SYSTEM` privilege to use `SHOW VSET`.

▼ To list all volume sets with a specific memo:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press

```
SHOW VSET * /MEMO=value
```

where `*` is all volume sets and `value` is the user-specified comment about the volume set. An example follows:

- To list all volume sets with a memo of "Rack 4", enter:

```
? SHOW VSET * /MEMO="Rack 4"
```


The system displays the list of volume sets:

```
VSET=MAR00 DIRECTORY=PRIMARY SIZE=10095288KB
SURFACES=10 GENERAL_FREE=1009611KB MEDIA=OEB
MEMO="Rack 4"
```

```
VSET=TEST00 DIRECTORY=PRIMARY SIZE=2019057KB
SURFACES=2 GENERAL_FREE=1009528KB MEDIA=OEB
MEMO="Rack 4"
```

Total volume sets displayed=2

- To list all volume sets with a memo beginning with “Moved to”, enter:

```
? SHOW VSET * /MEMO="Moved to*"
```

The system displays the list of volume sets:

```
VSET=MAR00 DIRECTORY=PRIMARY SIZE=4038115KB
SURFACES=4 GENERAL_FREE=3028586KB MEDIA=OEB
MEMO="Moved to Rack 5"
```

```
VSET=TEST00 DIRECTORY=PRIMARY SIZE=2603026KB
SURFACES=2 GENERAL_FREE=1301513KB MEDIA=OED
MEMO="Moved to Rack 3"
```

Total volume sets displayed=2

Exporting Volume Sets

You can use the EXPORT command to *export*, or remove, all or part of a volume set from a StorHouse system. The EXPORT command deletes volume and volume set information from StorHouse directories. Once a volume set is exported, StorHouse no longer has any knowledge of the volume set. All volumes in an exported volume set are considered offline. EXPORT releases all empty volumes from a volume set to the free pool so that it does not export empty volumes as part of a user volume set.

Before you can export a volume set, all member volumes must be uncataloged. A volume is considered uncataloged when the StorHouse directories contain no file or file set information for the volume. You use the UNCATALOG VSET command to uncatalog all volumes in a volume set.

The command sequence for exporting an entire volume set is:

1. UNCATALOG VSET
2. EXPORT

Figure 6-2 illustrates this sequence and the associated volume states. Although this figure shows optical volumes, the same sequence applies to tape volumes.

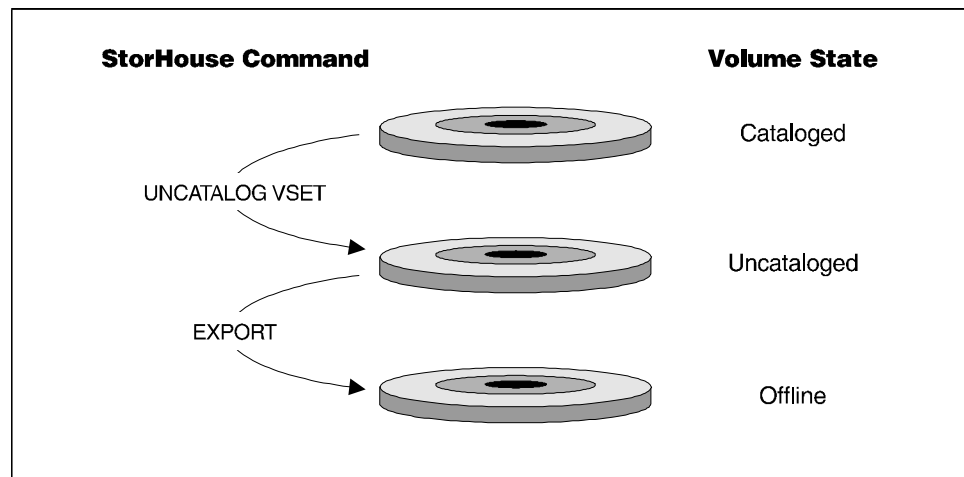


Figure 6-2: Volume States During Volume Set Export Process

You can *import*, or add, an exported volume set to any StorHouse system or store the exported volume set offline as required. See “Using the IMPORT Command” on page 6-19 for a discussion of the IMPORT command.

This section describes how to export an entire volume set. See Chapter 8, “Managing Volumes” for information about how to export individual volumes (part of a volume set).

Uncataloging a Volume Set

You prepare a volume set for export by uncataloging all volumes in the volume set with the UNCATALOG VSET command. This command removes directory information for all files and file sets on each volume in the specified volume set. UNCATALOG VSET requires ALLOCATION and SYSTEM privileges. The vset_name parameter is required. You can schedule the UNCATALOG VSET command.

The following table defines the modifiers you can use with UNCATALOG VSET:

Modifier	Description
/CONFIRM	Controls whether StorHouse asks you to confirm the command.
/NOARCHIVED	Clears the archive flag in the primary directory for every file on an archive volume(s) that you uncatalog. By clearing the archive flag, a file appears as though it is not archived.
/NOREMOVE	Prevents StorHouse from removing directory information for any extents on volumes in the volume set. StorHouse skips these volumes for uncataloging and they remain in the cataloged state.
/REPORT	Controls the generation of special text responses for the completion of significant actions.
/WAIT	Instructs StorHouse to wait for a locked file to be unlocked before attempting to use it in the command execution.

▼ **To uncatalog a volume set:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

UNCATALOG VSET vset_name modifiers

where *vset_name* is the volume set name and *modifiers* are other command modifiers you use to assign values other than the defaults. An example follows:

- To uncatalog the volume set ACCTS00, but skip a volume(s) for uncataloging if any surface of a volume is not empty, enter:

? UNCATALOG VSET ACCTS00 /NOREMOVE

- To remove directory information for files and file sets in the volume set USRAVSET, and clear the archive flag in the primary directory for every file on every archive volume in the volume set, enter:

? UNCATALOG VSET USRAVSET /NOARCHIVED

Using the EXPORT Command


Once you have uncataloged all volumes in a volume set, you can use the EXPORT command to remove the volume set from StorHouse. EXPORT requires ALLOCATION and SYSTEM privileges. The *vset_name* parameter is required.

You can use the following modifiers with EXPORT:

Modifier	Description
/CONFIRM	Controls whether StorHouse asks you to confirm the command.
/DIVIDE=...	Specifies that a volume should be separated from its volume set and exported. See Chapter 8, “Managing Volumes” for information about how to use /DIVIDE.
/REPORT	Controls the generation of special text responses for the completion of significant actions.

StorHouse processes only one EXPORT command at a time. FileTek recommends that you use the SCHEDULE command with EXPORT. See Chapter 12, “Controlling and Scheduling System Activity,” for more information on the SCHEDULE command.

▼ **To export an entire volume set from a StorHouse system:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

EXPORT vset_name modifiers

where vset_name is the volume set name and modifiers are other command modifiers you use to assign values other than the defaults. Below is an example:

- To export the uncataloged volume set ACCTS00, enter:

? EXPORT ACCTS00

Effect of Retention on UNCATALOG and EXPORT

Retention affects the operation of the UNCATALOG command. Therefore, customers who currently use UNCATALOG and EXPORT to remove archive volumes and volume sets from StorHouse may want to rethink this strategy if they also plan to use the StorHouse retention feature.

StorHouse cannot uncatalog a volume that contains retained files because those files cannot be deleted until their retention period expires. When StorHouse attempts to uncatalog such a volume, it ignores the retained files, deletes and removes all non-retained files on the volume, and leaves the volume in the UNCATALOGING state. A volume in the UNCATALOGING state cannot be exported. To circumvent this restriction, FileTek recommends that instead of using UNCATALOG and EXPORT to remove archive volumes from StorHouse, you simply write lock the volumes to be exported and use the MOVE VOLUME command to transfer them from level L to shelf storage.

Importing Volume Sets

You can use the `IMPORT` command to *import*, or add, a previously recorded offline volume set to a StorHouse system. For example, you can export a volume set from one StorHouse system and subsequently import it into a different StorHouse system. The `IMPORT` command adds volume and volume set information to the StorHouse directories. Once a volume set is imported, each member volume in the set is still uncataloged.

After you import a volume set, all member volumes in the set must be cataloged. A volume is considered cataloged when the StorHouse directories contain file and file set information for the volume. You can use the `CATALOG VSET` command to catalog all volumes in an imported volume set.

As a precaution, FileTek recommends that you run a `REMOVE FILE` command after `IMPORT` and prior to `CATALOG VSET`. `REMOVE FILE` removes all files in the `DELETED` file directory. This prevents a potential conflict between files that you are about to catalog and instances of the same file versions that may still reside in the `DELETED` directory.

This section explains how to import an entire volume set. The command sequence for importing an entire volume set is:

1. `IMPORT`
2. `REMOVE FILE`
3. `CATALOG VSET`

Figure 6-3 illustrates the command sequence and the associated volume states. Although this figure shows optical volumes, the same sequence applies to tape volumes.

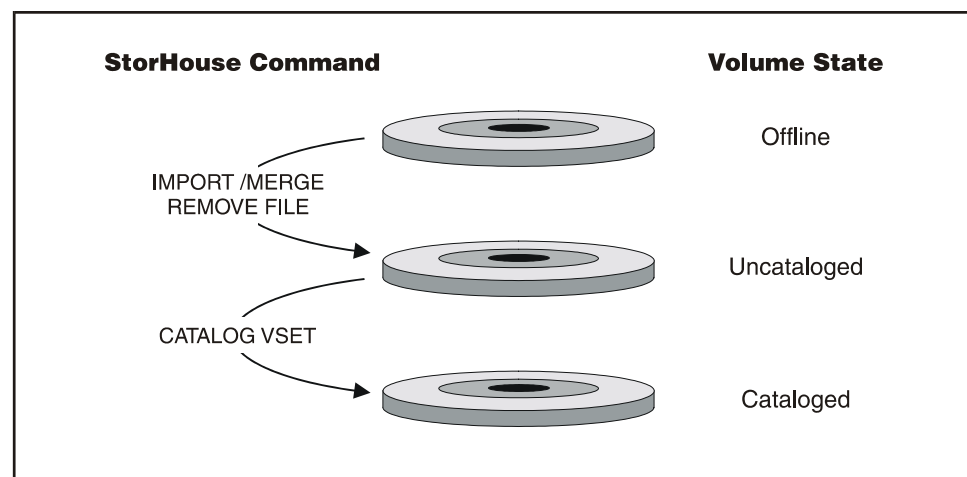


Figure 6-3: Volume States During Volume Set Import Process

See Chapter 8, “Managing Volumes,” for information about how to import individual volumes (part of a volume set).

Using the IMPORT Command

You can use the IMPORT command to add a previously recorded volume set to a StorHouse system. IMPORT requires ALLOCATION and SYSTEM privileges. The vset_name parameter is also required.


The following table defines the modifiers you can use with IMPORT:

Modifier	Description	Default
/CONFIRM	Controls whether StorHouse asks you to confirm the command.	/CONFIRM
/DIRECTORY=...	Specifies the directory where files in the volume set will be cataloged.	If omitted and the volume set does not already exist, the default is the directory recorded in the volume labels or the primary directory if no directory is in the labels. If the volumes are being merged into an existing volume set, they are assigned to the same directory as that volume set.
/LIBRARY=...	Specifies the library device that will receive the imported volume(s).	If omitted, the default is the value of the DEFAULT_LD system parameter.
/MEDIA=...	Specifies the media type and recording type of the volume(s) to be imported.	If omitted, the default is the value of the DEFAULT_MED_did system parameter.
/MERGE	Indicates that the volume(s) being imported will be merged into an existing volume set. See Chapter 8, “Managing Volumes,” for information about how to use /MERGE.	-
/REPORT	Controls the generation of special text responses for the completion of significant actions.	-

StorHouse processes only one IMPORT command at a time. FileTek recommends that you use the SCHEDULE command with IMPORT. See Chapter 12, “Controlling and Scheduling System Activity,” for more information on the SCHEDULE command.

▼ To import an entire volume set into a StorHouse system:

1. Sign on to StorHouse.

2. At the StorHouse command prompt (?), type the following command and press :

```
IMPORT vset_name modifiers
```

where `vset_name` is the volume set name and `modifiers` are other command and parameter modifiers you use to assign values other than the defaults. Some examples follow:

- To import the volume set ACCTS00, enter:

```
? IMPORT ACCTS00
```

Because you omitted `/LIBRARY`, StorHouse imports the volume set into the library device specified by the system parameter `DEFAULT_LD`.

- To import the volume set ACCTS00 into library device 01 and instruct the system to allocate new volumes to the volume set from the free pool of volumes in L01 having media type OA and recording type D, enter:

```
? IMPORT ACCTS00 /LIBRARY=L01 /MEDIA=OAD
```

- To import the volume set ACCTS00 into the BACKUP directory, enter:

```
? IMPORT ACCTS00 /DIRECTORY=BACKUP
```

3. Run a REMOVE FILE command as explained in “Running REMOVE FILE After IMPORT” in the following section.

Running REMOVE FILE After IMPORT

REMOVE FILE removes all files from the DELETED file directory. This command requires SYSTEM privilege. FileTek recommends that you run REMOVE FILE after you import and before you catalog a volume set. You can schedule the REMOVE FILE command.

You can use the `/CONFIRM` and `/REPORT` modifiers with REMOVE FILE. `/CONFIRM` controls whether StorHouse asks you to confirm the command. `/REPORT` controls the generation of special text responses for the completion of significant actions.

▼ To remove files from the DELETED directory:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

REMOVE FILE

Running CATALOG VSET After REMOVE FILE

CATALOG VSET adds file and file set information to the StorHouse directories for all volumes in a recently imported volume set (in other words, all uncataloged volumes). CATALOG VSET requires ALLOCATION and SYSTEM privileges. The vset_name parameter is required.

The following table defines the modifiers you can use with CATALOG VSET:

Modifier	Description
/CONFIRM	Controls whether StorHouse asks you to confirm the command.
/REPORT	Controls the generation of special text responses for the completion of significant actions.
/WAIT	Instructs StorHouse to wait for a locked file to be unlocked before attempting to use it in the command execution.

You can schedule the CATALOG VSET command. See “Scheduling a StorHouse Event” on page 12-12.

▼ To catalog a volume set:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

CATALOG VSET vset_name modifiers

where vset_name is the volume set name and modifiers are other command modifiers you use to assign values other than the defaults. An example follows:

- To catalog the volume set ACCTS00, enter:

? CATALOG VSET ACCTS00

Erasing Volume Sets

You can use the ERASE VSET command to erase erasable optical or magnetic tape volumes in a volume set. For optical volumes, the ERASE VSET command physically erases and initializes (relabels) the volumes. For magnetic tape volumes, the command initializes (relabels) the volumes to make the existing data inaccessible; subsequent writes of new data overwrite old data. Once erased, all space on the erased volumes is made available for allocation in the volume set (both sides of two-sided optical volumes). Erased volumes resemble volumes that have just been moved from the free pool into a volume set. Once data has been erased, it cannot be recovered. You cannot erase level F volume sets.

Before you can erase a volume set, all member volumes must be uncataloged. A volume is considered uncataloged when the StorHouse directories contain no file or file set information for the volume. You can use the UNCATALOG VSET command to uncatalog all volumes in a volume set.

The command sequence for erasing an entire volume set is:

1. UNCATALOG VSET
2. ERASE VSET

Figure 6-4 illustrates this sequence and the associated volume states. Although this figure shows optical volumes, the same sequence applies to tape volumes.

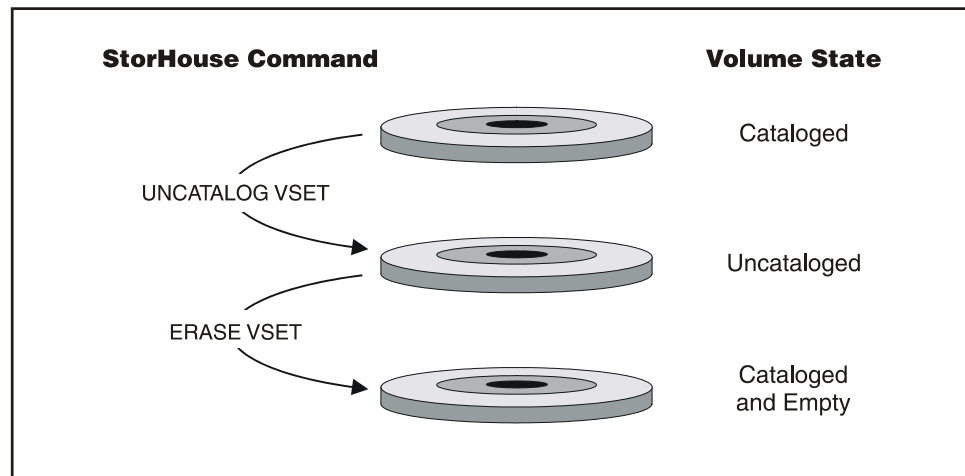


Figure 6-4: Volume States During Volume Set Erase Process

This section describes how to erase an entire volume set. See Chapter 8, “Managing Volumes,” for information about how to erase individual volumes.

Uncataloging a Volume Set

You prepare a volume set for erasing by uncataloging all volumes in the volume set with the UNCATALOG VSET command. This command removes directory information for all files and file sets on each volume in the specified volume set. UNCATALOG VSET requires ALLOCATION and SYSTEM privileges. The `vset_name` parameter is required. You can schedule the UNCATALOG VSET command.

See “Uncataloging a Volume Set” on page 6-15 for the modifiers you can use with UNCATALOG VSET and command examples.

Using the ERASE VSET Command

Once you have uncataloged all volumes in a volume set, you can use the ERASE VSET command to erase all member volumes. ERASE VSET requires ALLOCATION and SYSTEM privileges. The `vset_name` parameter is required.

The ERASE VSET command works as follows for each volume:

1. When ERASE VSET begins operation, it sets the state of the volume to ERASING.
2. Next, for an optical volume, it completely and permanently removes all files that resided on the erased volume and allocates all the space in the erased volume as free space.

For a tape volume, it initializes (relabels) the volume to make existing data inaccessible so that new data will overwrite old data.

3. If the command completes successfully, it automatically places the volume in the CATALOGED state and makes all space on the volume available for use.

If the erase command is interrupted by a system failure and one or more volumes are left in the ERASING state, you must re-enter the command.

You can schedule ERASE VSET using the SCHEDULE command. See “Scheduling a StorHouse Event” on page 12-12.

You can use the /CONFIRM and /REPORT modifiers with ERASE VSET. /CONFIRM controls whether StorHouse asks you to confirm the command. /REPORT controls the generation of special text responses for the completion of significant actions.

▼ To erase an entire volume set in a StorHouse system:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press Enter ↵:

6

Managing Volume Sets

Erasing Volume Sets

ERASE VSET vset_name modifiers

where vset_name is the name of the volume set to be erased and modifiers are other command modifiers you use to assign values other than the defaults. Below is an example:

- To erase all information on the uncataloged volumes in the ACCTS00 volume set, type:

? ERASE VSET ACCTS00

Managing File Sets

As system administrator, your primary task of controlling StorHouse resources includes the management of file sets. In Chapter 4, “Allocating Storage for User Files,” you learned how to create StorHouse file sets and allocate user files to a file set. This chapter explains how to manage file sets once they are created. Specifically, this chapter tells you how to:

- Display information on a file set
- Change a file set’s attributes or settings.

About File Sets

A StorHouse *file set* is an area of storage for user files within a StorHouse volume set. Every StorHouse file must be assigned to a file set. A file set may span volumes within a volume set; therefore, a file set consists of all or part of one or more volume sides in a volume set. A file set name is unique within a volume set. The part of a file set that is located on a single volume side is called a *partition*.

You manage StorHouse file sets using the following Command Language commands:

- SET FSET – Changes file set information
- SHOW FSET – Displays file set information
- SHOW PARTITION – Displays partition information

Figure 7-1 shows file sets within volumes in a volume set.

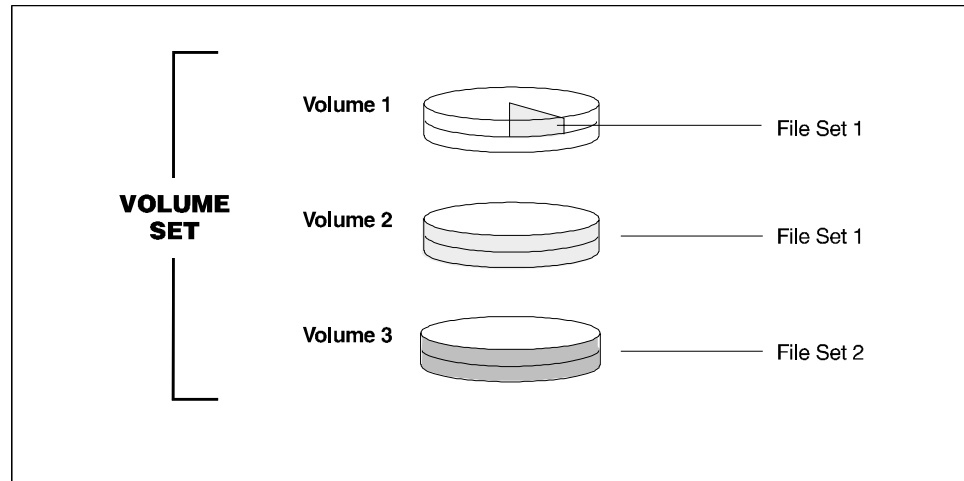


Figure 7-1: File Sets in Volume Sets

Displaying Information on File Sets

You can use the SHOW FSET command to display information about a StorHouse file. Using different modifiers, you can display information in several ways:

- A brief display using no modifiers lists the following information:
 - File set name
 - Volume set name
 - Name of the directory where the volume set resides
 - Total size of the file set
 - Number of bytes available for allocation to files
 - Number of bytes set aside for allocation to file updates
 - Whether the file set has the contiguous storage allocation attribute and/or the AUTO_STAGE attribute
 - Whether /FORCE_RETENTION is in effect on files in the file set
 - Replication class name for files in the file set
 - File set retention attribute value.
- A full display using the /FULL modifier lists all available information for a file set, which includes the information for the brief display plus the following:
 - Number of bytes allocated to files for general usage
 - Number of bytes and percentage of space allocated to file updates
 - Maximum size limit of the file set
 - Date and time the file set was created
 - Date and time the file set was last modified.

- By using the /VSET modifier, you can display all file sets located in the specified volume set.

SHOW FSET modifiers determine items of information to be displayed. The following table defines the modifiers you can use with the SHOW FSET command:

Modifier	Description	Default
/AUTO_STAGE	Selects file sets with the AUTO_STAGE attribute for display.	Displays only files sets with /NOAUTO_STAGE set.
/FULL	Displays all available information for the file set.	Brief display
/VSET=...	Displays file sets located in the specified volume set.	Default volume set

You must have SHOW, ALLOCATION, or SYSTEM privilege to use this command.

▼ **To display information about a StorHouse file set:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

SHOW FSET fset_name modifiers

where fset_name is the name of the file set for which information is to be displayed and modifiers are other parameter modifiers you use to assign values other than the defaults. Below are some examples:

- To display basic information for file set P in volume set P, enter:

```
? SHOW FSET P /VSET=P
```

```
FSET=P VSET=P DIRECTORY=PRIMARY SIZE=10444KB
GENERAL_FREE=10433KB UPDATE_FREE=0KB
STATE=(CONTIGUOUS, FORCE_RETENTION) RETENTION=365
RPL_CLASS=STANDARD
```

```
Total fsets displayed=1
```

- To show all information for file set P in volume set P, enter:

```
? SHOW FSET P /VSET=P /FULL
```

```
FSET=P VSET=P DIRECTORY=PRIMARY SIZE=10444KB
GENERAL_FREE=10433KB UPDATE_FREE=0KB
GENERAL_ALLOCATED=11KB UPDATE_ALLOCATED=0KB
```



```
UPDATE_PERCENT=00 LIMIT=0KB CREATED=26-MAR-2004:13:59:59
MODIFIED=26-MAR-2004:14:05:57 STATE=(CONTIGUOUS,
FORCE_RETENTION) RETENTION=365 RPL_CLASS=STANDARD
```

- To display all file sets in your default volume set with the AUTO_STAGE attribute:

```
? SHOW FSET * /AUTO_STAGE
```

The system displays the following information:

```
FSET=JAN00 VSET=ACCTS00 DIRECTORY=PRIMARY SIZE=1853KB
GENERAL_FREE=2KB UPDATE_FREE=0KB STATE=(AUTO_STAGE)
RETENTION=365 RPL_CLASS=STANDARD
```

Total fsets displayed=1

Displaying Information on Partitions

You can use the SHOW PARTITION command to display information about a partition. Using different modifiers, you can display information in several ways:

- A brief display using no modifiers lists the following information:
 - File set name
 - Volume set name
 - Name of the directory to which the volume set belongs
 - Volume identification code (vid) of the volume side on which the partition is located
 - Number of bytes in the partition
 - Number of bytes in the partition that are available for allocation to files
 - Number of bytes in the partition that are set aside for allocation to file updates.
- A full display using the /FULL modifier lists all available information for a partition, which includes the information for the brief display plus the following:
 - Number of bytes in the partition that are allocated to files for general usage
 - Number of bytes in the partition that are allocated to file updates
 - Date and time the partition was created
 - Date and time the partition was last modified.
- You can use the /VOLUME modifier to display the vid that identifies the partition and the /VSET modifier to display the volume sides located in the specified volume set.

SHOW PARTITION modifiers determine items of information to be displayed. The following table defines the modifiers you can use with the SHOW PARTITION command:

Modifier	Description	Default
/FULL	Displays all available information for the partition.	Brief display
/VOLUME=...	Specifies the volume identification code of the volume side that contains the partition.	If you omit /VOLUME, /VSET specifies the volumes to be used.
/VSET=...	Selects volume sides located in the specified volume set as the source of partition information for display.	If you omit /VSET and /VOLUME, the default is your current default volume set.

The /VOLUME and /VSET modifiers are mutually exclusive.

You must have SHOW, ALLOCATION, or SYSTEM privilege to use this command. If you do not specify a file set name, the command uses your default file set.

▼ **To display information about a file set partition:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

SHOW PARTITION <fset_name> modifiers

where <fset_name> is the optional name of the file set for which information is to be displayed and modifiers are other parameter modifiers you use to assign values other than the defaults. Below are some examples:

- To display information about all partitions in your default file set and volume set, type:

? SHOW PARTITION

The system returns the following information:

```
FSET=JAN00 VSET=ACCTS00 DIRECTORY=PRIMARY
VOLUME=OAD"242F38AD":A SIZE=1853KB GENERAL_FREE=2KB
UPDATE_FREE=0KB
```

Total partitions displayed=1

- To display all available information about all partitions in the file set JAN00 located in the volume set ACCTS00, type:

```
? SHOW PARTITION JAN00 /VSET=ACCTS00 /FULL
```

The system returns the following information:

```
FSET=JAN00 VSET=ACCTS00 DIRECTORY=PRIMARY
VOLUME=OAD"242F38AD":A SIZE=1853KB GENERAL_FREE=2KB
UPDATE_FREE=0KB GENERAL_ALLOCATED=1165KB
UPDATE_ALLOCATED=685KB CREATED=01-JAN-2000:07:54:09
MODIFIED=29-JAN-2000:19:07:14
```

Total partitions displayed=1

- To display information for all partitions located on side A of the volume OAD242F38AD, type:

```
? SHOW PARTITION * /VOLUME=OAD"242F38AD":A
```

The system returns the following information:

```
FSET=JAN00 VSET=ACCTS00 DIRECTORY=PRIMARY
VOLUME=OAD"242F38AD":A SIZE=1853KB GENERAL_FREE=2KB
UPDATE_FREE=0KB
```

Total partitions displayed=1

Modifying File Sets

You can use the SET FSET command to change attributes or other settings for a StorHouse file set. Changes become effective immediately and apply only to new files added to the file set. Attribute changes consist of the maximum file set size, the number of bytes in the file set, the percentage of the file set size reserved for VRAM file updates, the AUTO_STAGE attribute, retention attribute, and replication class name attribute. You can also use SET FSET to release all unused partitions of a contiguous file set, release all free storage from a noncontiguous file set, or force retention for all new files in the file set.

The following table defines the modifiers you can use with the SET FSET command:

Modifier	Description	Default
/AUTO_STAGE	Specifies whether StorHouse will automatically stage (copy) files in the specified file set from level L storage to the performance buffer for faster read access.	No change
/FORCE_RETENTION	Specifies whether the file set retention value overrides the file retention value explicitly supplied by an application at file create time.	No change
/LIMIT=...	Specifies the maximum number of bytes that the file set can contain.	-
/RELEASE	Indicates that StorHouse is to deallocate free storage from the file set. If no storage was used and StorHouse deallocates all storage allocated to the file set, StorHouse removes the file set.	-
/RETENTION=...	Specifies the file set retention attribute (retention period). This attribute applies only to new files (in the file set) that were created without a specified retention value, unless /FORCE_RETENTION is in effect on the file set.	-
/RPL_CLASS=...	Specifies the name of the replication class for new files written to this file set.	-
/REPORT	Controls the generation of special text responses for the completion of significant actions.	/NOREPORT
/SIZE=...	Specifies the number of bytes in the file set after the command completes.	-
/UPDATE=...	Specifies the percentage of the file set size that is to be set aside for VRAM file updates.	-
/VSET=...	Specifies the volume set that contains the file set.	Default VSET name from your account

With the exception of the /VSET modifier, all the modifiers on this command are mutually exclusive. You can specify only one modifier in each command.

You must have ALLOCATION and SYSTEM privilege to use this command. The fset_name parameter is required.

▼ **To change or set attributes for a StorHouse file set:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

SET FSET fset_name modifiers

where `fset_name` is the name of the file set to be changed and `modifiers` are other command and parameter modifiers you use to assign values other than the defaults. Below are some examples:

- Assume that JAN00 is a contiguous file set with a current allocation of one entire side (3500 MB). It has a limit of zero and belongs to the volume set ACCTS00. This volume set has a current allocation of three additional empty sides (3500 MB per side). To instruct StorHouse to allocate an additional volume side to JAN00, type:

```
? SET FSET JAN00 /VSET=ACCTS00 /SIZE=4000MB
```

Note that when you specify a size of 4000 MB, the system allocates a total of 7000 MB of space because the file set is contiguous.

- To release all unused partitions of file set JAN00, type:

```
? SET FSET JAN00 /RELEASE
```

- To set the AUTO_STAGE attribute for file set JAN00, type:

```
? SET FSET JAN00 /AUTO_STAGE
```

- To set the retention period to 365 days for all files to be added to file set JAN00, type:

```
? SET FSET JAN00 /RETENTION=365
```


Managing Volumes

As system administrator, you must manage the volumes in the StorHouse system. This chapter explains how to:

- Display information about a volume
- Change a volume's attributes or values
- Disable or enable a volume
- Writelock or unwritelock a volume
- Specify a memo for a volume
- Migrate blank volumes into a library device
- Move a volume within StorHouse
- Export or import a volume
- Customize volume labels
- Erase a volume
- Retire a volume
- Validate a volume.

Recovering a volume is discussed in Chapter 11, "Recovering Volumes."

About Volumes

A *volume* is a unit of media where data can be recorded and read. All StorHouse volumes must be members of a volume set.

Volume Attributes

StorHouse volumes have user-assigned characteristics, or *attributes*, assigned to them. Attributes for volumes include the following:

- CYCLE, DEACTIVATE, and EXPIRE – Settings for cycle, deactivate, and expire timers (for definitions of these attributes, see Table 4-3 on page 4-5).
- HOLD – Value of the HOLD attribute for the volume (see page 4-5 for the definition of the HOLD attribute).

Volume Side States

Volume sides can exist in states. A *state* is the condition of a volume side as the result of a user or StorHouse action. The following table lists the states for volume sides:

Table 8-1: Volume Side States

State	Definition
ACTIVE	The volume is currently in use (has active requests, such as transfers or remove extent requests). In-process and queued requests are both considered active requests.
BLANK	StorHouse has not initialized the volume.
CATALOGED	The volume is available for normal use.
CATALOGING	The volume is currently being cataloged.
DEACTIVATED	StorHouse does not permit additional storage allocations on the volume. You can read but not write data on a DEACTIVATED volume side.
DISABLED	The volume is unusable. Typically, a volume side(s) is marked DISABLED if it is missing, physically damaged, or has excessive I/O errors.
ERASING	The volume is not available for use. It can only be erased or is currently being erased.
EXPIRED	StorHouse marked the volume side as expired (the files are ready to be removed from the system). Additional storage allocations are not allowed. You can read but not write data on an EXPIRED volume side.
INITIALIZED	StorHouse already wrote a volume label record on the volume side.
NEEDS_CLEANING	The volume side should be cleaned.
PERM_LOCKED	Due to the condition of the media, the volume side is permanently write-locked. You can read but not write data on a PERM_LOCKED volume side.
RETIRE	Due to the condition of the media, the volume should no longer be used. Additional storage allocations are not allowed. You may not be able to read data on a volume side in the RETIRE state.

Table 8-1: Volume Side States

State	Definition
UNCATALOGED	The volume is not available for use. It can only be cataloged, exported, or erased.
UNCATALOGING	The volume is not available for use. It can only be uncataloged or it is currently being uncataloged.
WRITELOCKED	Additional storage allocations are not allowed unless the volume side is unwritelocked. You can read but not write data on a WRITELOCKED volume side.
?	The state of the volume side is unknown.

Commands for Managing StorHouse Volumes

You can manage StorHouse volumes using the following StorHouse Command Language commands:

Command	Description
ERASE VOLUME	Erases an erasable optical or magnetic tape volume.
EXPORT /DIVIDE	Removes a volume from a StorHouse volume set and exports it from the system.
IMPORT /MERGE	Adds volume information to StorHouse directories.
MIGRATE /BLANKS	Migrates blank volumes into a library device.
MOVE VOLUME	Moves a volume to a specified location within StorHouse.
RETIRE VOLUME	Deactivates one or more volumes, moves all file extents off the specified volumes, uncatalogs the volumes, and either exports or erases the volumes.
SET VOLUME	Changes volume attributes and other characteristics.
SHOW FILE * /VOLUME	Displays files contained on a volume.
SHOW VOLUME	Displays volume information.
UNCATALOG VOLUME	Removes directory information for files and file sets on a volume.

The commands in the preceding table apply only to removable volumes.

Displaying Information on a StorHouse Volume

You can use the `SHOW VOLUME` command to display information about a StorHouse removeable volume. Using different modifiers, you can display information in several ways:

- A brief display using no modifiers or using the `/BRIEF` modifier lists the following information:
 - Volume identifier
 - Name of the volume set that contains the volume
 - Number of file extents on the volume side
 - Amount of writable space on the volume side, in 1000-byte units.
- A full display using the `/FULL` modifier lists all available information for a volume, which includes the information for the brief display plus the following:
 - Directory where the volume resides
 - Library or shelf location for the volume
 - State of the volume side
 - Date and time the state of the volume side was last changed
 - System identifier for the volume
 - Site identifier for the volume
 - Date and time the volume was initialized
 - Date and time the volume was last dismounted
 - Date and time the volume was added to the volume set
 - Date and time the volume was last modified
 - Date and time of the first space allocation on the volume side
 - Date and time of the last space allocation on the volume side
 - Value of the `CYCLE` attribute for the volume
 - Value of the `DEACTIVATE` attribute for the volume
 - Value of the `EXPIRE` attribute for the volume
 - Number of mount/dismount cycles for the volume side
 - Percentage of writable space available on a volume side
 - Number of bytes available for allocation to file sets
 - Number of bytes allocated to file sets for general usage
 - User-specified comment (memo) about the volume
 - Value of the `HOLD` attribute for the volume.
- A selected display using one or more modifiers (except `/BRIEF` or `/FULL`), which displays specific information about the volume.

SHOW VOLUME modifiers determine items of information to be displayed. The following table defines the modifiers you can use with SHOW VOLUME:

Modifier	Selects and/or Displays
/ACTIVE	Volume sides in the ACTIVE state.
/BRIEF	Volume identifier, name of the volume set that contains the volume, number of file extents on the volume side, and available space on the volume.
/DATE	Dates and times the volume side was initialized and last dismounted.
/DEACTIVATED	Volume sides that are marked deactivated.
/DIRECTORY=...	Volumes in the specified directory.
/DISABLED	Volume sides that are marked disabled.
/ENABLED	Volume sides that are not marked disabled.
/EXPIRED	Volume sides that are marked expired.
/EXTENTS	Number of file extents on the volume side.
/FREE_POOL=...	Volumes in the specified free pool of empty volumes in a library device.
/FULL	All available information for a volume.
/LOCATION=...	Volumes in the specified location.
/MEMO=...	Comment that a user added to the StorHouse system files (with the MOVE VOLUME, SET VOLUME, MOVE VSET, or SET VSET command) or all volumes with a specific comment.
/MOUNTS	Number of mount-dismount cycles for a volume side.
/NEEDS_CLEANING	Volume sides in the NEEDS_CLEANING state.
/PERM_LOCKED	Volume sides in the PERM_LOCKED state.
/PHYSICAL	Physical volumes rather than logical volumes (volume sides).
/RETIRE	Volume sides that should be retired, either because they are in the RETIRE state or the volume mount count is exceeded.
/SITE_ID	Site identifier recorded in the volume label record on the volume.
/SPACE	Amount of writable space on a volume side.
/STATE	State of the volume side and the date the volume's state was last changed.
/SYSTEM_ID	System identifier recorded in the volume label record on the volume.
/VSET=...	Volumes that make up the specified volume set.
/WRITELOCKED	Volume sides with the writelocked attribute.

You must have SHOW, ALLOCATION, or SYSTEM privilege to use SHOW VOLUME. The vid parameter is required.

▼ To display information on a StorHouse volume:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press Enter ↵:

SHOW VOLUME vid modifiers

where vid is the name of the volume(s) and modifiers are other parameter modifiers you use to assign values other than the defaults. Below are some examples:

- To display basic information for side A of volume OAD242F38AD, enter:

? SHOW VOLUME OAD242F38AD:A

The system displays the following information:

OAD“242F38AD”:A VSET=ACCTS00 EXTENTS=3
WRITABLE_SPACE=10224KB

- To display information for volumes in the free pool in library device 0 for media and recording type OAD, enter:

? SHOW VOLUME * /FREE_POOL=L00OAD

The system displays the following information:

OAD“244A351B”:A VSET=.L00OAD EXTENTS=0 WRITABLE_SPACE=3504900KB
OAD“244A351B”:B VSET=.L00OAD EXTENTS=0 WRITABLE_SPACE=3504900KB

OAD“25684712”:A VSET=.L00OAD EXTENTS=0 WRITABLE_SPACE=3504900KB
OAD“25684712”:B VSET=.L00OAD EXTENTS=0 WRITABLE_SPACE=3504900KB

OAD“2E3268C1”:A VSET=.L00OAD EXTENTS=0 WRITABLE_SPACE=3504900KB
OAD“2E3268C1”:B VSET=.L00OAD EXTENTS=0 WRITABLE_SPACE=3504900KB

Total volume sides displayed=6

- To display the number of mount-dismount cycles for side A of volume OAD242F38AD, enter:

? SHOW VOLUME OAD242F38AD:A /NOBRIEF /MOUNTS

The system displays the following information:

OAD“242F38AD”:A MOUNTS=0

- To display the memo for the volume OAD242F38AD, enter:

```
? SHOW VOLUME OAD242F38AD:A /MEMO
```

The system displays the memo for this volume:

```
OAD"242F38AD":A VSET=MAR00 EXTENTS=0
WRITABLE_SPACE=10229KB MEMO="Rack 3 Slot 11"
```

- To display all available information for the volumes in volume set ACCTS00, enter:

```
? SHOW VOLUME * /VSET=ACCTS00 /FULL
```

The system displays the following information:

```
OAD"242F38AD":A VSET=ACCTS00 LOCATION=L00
STATE=(INITIALIZED) STATE_CHANGED=28-JAN-2000:08:04:29
SYSTEM_ID=123456 SITE_ID=FILETEK INITIALIZED=01-JAN-
2000:07:48:19 LAST_DISMOUNT=31-JAN-2000:00:00:00
CREATED=01-JAN-2000:07:54:07 MODIFIED=29-JAN-2000:19:07:14
FIRST=01-JAN-2000:07:54:27 LAST=29-JAN-2000:19:03:26 CYCLE=0
DEACTIVATE=0 EXPIRE=0 EXTENTS=3 MOUNTS=2
WRITABLE_SPACE=10224KB GENERAL_FREE=8375KB
GENERAL_ALLOCATED=1854KB MEMO="Rack 3 Slot 11"
HOLD=NOHOLD
```

```
OAD"242F38AD":B VSET=ACCTS00 LOCATION=L00
STATE=(INITIALIZED) STATE_CHANGED=28-JAN-2000:07:48:23
SYSTEM_ID=123456 SITE_ID=FILETEK INITIALIZED=01-JAN-
2000:07:48:23 LAST_DISMOUNT=28-JAN-2000:08:04:29
CREATED=01-JAN-2000:07:54:08 MODIFIED=28-JAN-2000:07:54:08
FIRST=01-JAN-2000:00:00:00 LAST=31-JAN-2000:00:00:00 CYCLE=0
DEACTIVATE=0 EXPIRE=0 EXTENTS=0 MOUNTS=1
WRITABLE_SPACE=10229KB GENERAL_FREE=10229KB
GENERAL_ALLOCATED=0KB MEMO="Rack 3 Slot 11"
HOLD=NOHOLD
```

Total volume sides displayed=2

- To display all volumes that need to be loaded from shelf to satisfy pending requests, enter:

```
? SHOW VOLUME * /PHYSICAL /NOBRIEF /ACTIVE /LOCATION=S
```

The system displays:

```
OAB"C0000002"
```

```
OAB"C0000006"
```

Total physical volumes displayed=2

Displaying All Files on a StorHouse Volume

You can use the `SHOW FILE /VOLUME` command to display all the files that reside on a StorHouse volume. You must have `SHOW` or `FILE` privilege to use this command.

▼ To display all files on a StorHouse volume:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press Enter ↵:

```
SHOW FILE * /VOLUME={media_type}{recording_type}{volume_label}:{side}  
/GROUP=* /VERSION=*
```

where * means all files located on the specified volume side. An example follows:

- To display all the files on volume OAD2DE4D630:A, type:

```
? SHOW FILE * /VOLUME=OAD2DE4D630:A /GROUP=* /VERSION=*
```

The system returns the following information:

```
FILE="ROLB500X.D940711" GROUP=TEST VERSION=0 FID=4444.150381
```

```
FILE="ROLS804.D940711" GROUP=TEST VERSION=0 FID=4444.150374
```

```
FILE="TEST10" GROUP=TEST VERSION=0 FID=4444.150663
```

Total files displayed=3

Modifying Volumes

You can use the SET VOLUME command to change the attributes or other values for a StorHouse removeable volume. Attributes include the following:

- CYCLE, DEACTIVATE, and EXPIRE – Setting for a volume's cycle, deactivate, and expire timers
- HOLD – Value of the HOLD attribute for the volume.

You can also use SET VOLUME to:

- Specify that a volume side(s) has been cleaned
- Change the memo for a volume
- Disable or enable a volume
- Writelock or unwritelock a volume.

You can also specify a directory or volume set from which volumes are selected. All changes take effect immediately.

The following table defines the modifiers you can use with SET VOLUME:

Modifier	Description
/CLEANED	Specifies that an optical volume side has been cleaned.
/CONFIRM	Controls whether StorHouse asks you to confirm the command.
/CYCLE=...	Specifies a number of days after the last allocation of file space on the first side of a volume that the system will deactivate that side and activate the second side of the volume.
/DEACTIVATE=...	Specifies a number of days after the first allocation of file space on a volume side that the system will deactivate the side; that is, the system will no longer allocate space for files on that side.
/DIRECTORY=...	Indicates that the command will consider for selection only volumes in the specified directory.
/DISABLE	Sets the status of the specified volume side to DISABLED, which prevents the system from selecting it for normal read and write operations.
/ENABLE	Removes the DISABLED status for the specified volume side, which allows the system to select it for normal read and write operations.
/EXPIRE=...	Specifies the number of days after the last allocation of file space on a volume side that the system will mark the side as deactivated and expired.
/HOLD	Specifies the volume's HOLD attribute value. /HOLD sets the value to HOLD; /NOHOLD sets the value to NOHOLD.
/MEMO=...	Specifies up to 32 characters of descriptive text to replace the current memo text, if any.

Modifier	Description
/REPORT	Controls the generation of special text responses for the completion of significant actions.
/UNWRITELOCK	Removes the WRITELOCKED status for the specified volume side, which allows the system to select it for normal read and write operations.
/VSET=...	Indicates that the command will select only volumes in the specified volume set.
/WRITELOCK	Sets the status of the specified volume side to WRITELOCKED, which prevents the system from writing additional files to the volume.

The vid parameter is required. You do not need any privileges to use the SET VOLUME command; however, you need privileges to use the following command modifiers:

- OPERATOR privilege for /CLEANED, /DISABLE, /ENABLE, /UNWRITELOCK, and /WRITELOCK
- ALLOCATION privilege for /CYCLE, /DEACTIVATE, /EXPIRE, and /HOLD.

You can schedule the SET VOLUME command.

▼ **To change or set attributes or other values for a StorHouse volume:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

SET VOLUME vid modifiers

where vid is the name of the volume to be changed and modifiers are other command and parameter modifiers you use to assign values other than the defaults. Some examples follow:

- To change the CYCLE attribute of volume OAD2345C123 to 10 days, at which time StorHouse will deactivate side A and activate side B, enter:

? SET VOLUME OAD2345C123:A /CYCLE=10

If volume OAD2345C123 has already cycled, this command reactivates side A and makes side B unavailable for use until 10 days (the new cycle time) have elapsed.

- To change the CYCLE attribute of volume OAD2345C123 to 0, which means that StorHouse does not deactivate the second side when a volume is added to a volume set, enter:

```
? SET VOLUME OAD2345C123:A /CYCLE=0
```

- To change the HOLD attribute of volume OAD2345C123 to NOHOLD, enter:


```
? SET VOLUME OAD2345C123:A /NOHOLD
```

Disabling Volumes

A *disabled* volume is a volume that you or the system operator marked as disabled using the SET VOLUME /DISABLE command, or that StorHouse automatically disabled due to media errors. You might manually disable a volume because it is broken, unreadable, or misplaced. Should you find a misplaced volume that you disabled, you can enable it again using the SET VOLUME /ENABLE command.

StorHouse disables one side of a volume at a time. To disable a two-sided volume, enter an asterisk (*) for the volume side in the vid in the SET VOLUME /DISABLE command. If you specify a wild card for the entire vid parameter, you must also specify /DIRECTORY or /VSET. However, if you specify a wild card for the volume side portion of the vid parameter only, you do not need to specify /DIRECTORY or /VSET. Or, you can issue the command twice (once for each volume side).

▼ To disable a StorHouse volume:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

```
SET VOLUME vid /DISABLE
```

where vid is the volume identification code of the volume(s) to be disabled. Some examples follow:

- To disable the one-sided tape volume TBB1234A1, type:

```
? SET VOLUME TBB1234A1:A /DISABLE
```

- To disable the two-sided optical volume OAD2345C123, type:


```
? SET VOLUME OAD2345C123:* /DISABLE
```


- To disable side B of the two-sided optical volume OAD2345C123, type:
`? SET VOLUME OAD2345C123:B /DISABLE`
- To disable all volumes in volume set MAR00, type:
`? SET VOLUME * /DISABLE /VSET=MAR00`

Enabling Volumes

Every StorHouse volume is enabled unless you mark it as *disabled* using the Command Language SET VOLUME /DISABLE command, or StorHouse automatically disables it due to media errors. You can enable a disabled volume using the SET VOLUME /ENABLE command.

▼ To enable a disabled volume:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

`SET VOLUME vid /ENABLE`

where vid is the volume identification code of the volume to be enabled. An example follows:

- For example, to enable all volumes in volume set MAR00, type:
`? SET VOLUME * /ENABLE /VSET=MAR00`

Writelocking Volumes

You can use the SET VOLUME /WRITELOCK command to manually writelock one or more volume sides. *Writelocking* prevents any more files from being written to the volume side. StorHouse can still read files on a writelocked volume. For example, you can writelock volumes if you want to move partially full volumes offsite and you do not want StorHouse to attempt to write any more information to those volumes.

StorHouse automatically writelocks volume sides that contain excessive media errors. StorHouse also writelocks tape volumes when it encounters the end of a magnetic tape before it was expected. A premature end-of-tape may be caused by an unusually short tape, excessive media errors, or an extremely large number of very small files.

You must have OPERATOR privilege to use SET VOLUME /WRITELOCK. The vid parameter is also required.

▼ **To writelock one or more StorHouse volume sides:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

SET VOLUME vid /WRITELOCK

where vid is the unique volume name. Below is an example:

- To writelock tape TBB1234A1:A, enter:

? SET VOLUME TBB1234A1:A /WRITELOCK

Unwritelocking Volumes

You can use the SET VOLUME /UNWRITELOCK command to unwritelock one or more writelocked volume sides. Once a volume side is unwritelocked, StorHouse can write files to the volume side (if unused space remains).

You must have OPERATOR privilege to use SET VOLUME /UNWRITELOCK. The vid parameter is also required.

▼ **To unwritelock one or more StorHouse volume sides:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

SET VOLUME vid /UNWRITELOCK

where vid is the unique volume name. Below is an example:

- To unwritelock tape TBB1234A1:A, enter:

? SET VOLUME TBB1234A1:A /UNWRITELOCK

Migrating Volumes

Volume migration is the movement of removeable volumes between a library device (level L storage) and shelf storage (level S) or between library devices (within level L). It also refers to the movement of blank volumes into a library device. When you migrate a volume between storage levels or between libraries, the files on the volume also migrate.

This section describes the types of volume migration and explains how to:

- Set up the system to automatically initiate blank volume migration
- Migrate volumes between library devices or between library devices and shelf storage
- Migrate blank volumes into the system.

There are two types of volume migration: automatic and manual. *Automatic volume migration* is the movement of volumes between a library device and shelf storage based on a user request for a shelf volume. When this occurs, StorHouse sends an operator message to load the requested shelf volume into a library. If the library is already full, StorHouse must migrate, or move, a volume from the library to shelf before it can satisfy the user request.

Automatic volume migration also occurs when the number of volumes in a library device free pool falls below the value of the FREE_POOL_didmmr system parameter. In this case, StorHouse automatically requests the operator to load one or more blank volumes into the library device. You can regulate the number of volumes in a library device free pool by setting the value of the FREE_POOL_didmmr system parameter.

Manual migration is the movement of a volume as the result of a user-specified StorHouse Command Language command. You can use the MOVE VOLUME command to move volumes (or the MOVE VSET command to move volume sets) between library devices or between library devices and shelf storage. You can use the MIGRATE /BLANKS command to move blank volumes into a library device free pool. These commands notify StorHouse to send the appropriate load/unload volume messages. Figure 8-1 illustrates the migration processes for optical volumes. The same processes apply to tape volumes.

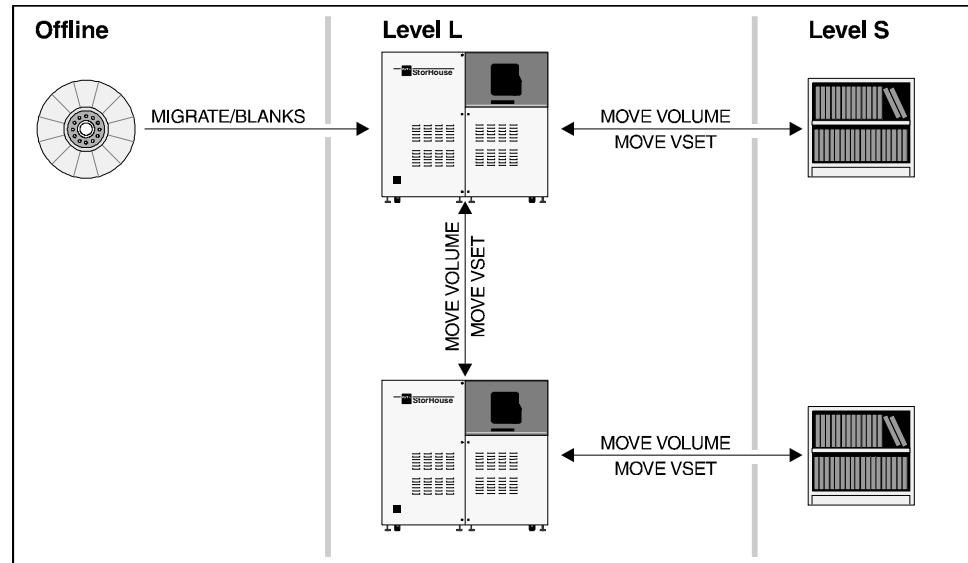


Figure 8-1: Volume Migration

Migrating Volumes Between and Within Storage Levels

This section describes automatic volume migration between storage levels and manual volume migration between and within storage levels.

Automatic Volume Migration Between Storage Levels

StorHouse selects a volume for migration out of a library device if the volume:

- Is not in use
- Has the oldest access time
- Preferably has a HOLD attribute value of NOHOLD.

StorHouse also attempts to retain free pool volumes in a library device and always retains checkpoint volumes (volumes that contain checkpointed system files).

You do not need to take any action to set up automatic volume migration between storage levels. However, you must set the HOLD attribute for selected volumes if you want StorHouse to try to keep those volumes in the library device.

The HOLD Attribute and the Order of Volume Migration. You can keep volumes with the most heavily accessed data in a library device by setting the HOLD attribute of those volumes or a volume set to HOLD. This attribute helps determine the order in which volumes are migrated from a library device to shelf storage. When StorHouse has to migrate a volume out of a library device, it selects volumes with the NOHOLD value before it selects volumes with the HOLD value. You initially set this attribute using the CREATE VSET command. You can change the value using the SET VOLUME or SET VSET command. If you do not set this value in the CREATE VSET or SET VSET commands, StorHouse uses the default value you set for the VSET_HOLD system parameter. For more information about the SET VOLUME command, see “Modifying Volumes” on page 8-9 and for more information about the SET VSET command, see “Modifying Volume Sets” on page 6-6. For more information about the HOLD attribute, refer to the *StorHouse Concepts and Facilities Manual*.

Manual Volume Migration Between and Within Storage Levels Using the MOVE VOLUME Command

You use the MOVE VOLUME (or MOVE VSET) command to manually move specific volumes between library devices or between a library device and shelf storage. These commands update the last access time for the volumes that you move. For example, you might manually move volumes containing backup files from a library device to shelf storage. (For instructions on moving volumes in volume sets with the MOVE VSET command, see Chapter 6, “Managing Volume Sets.”)

Each library device has a corresponding shelf storage. For example, the shelf storage for library device L00 is S00. The shelf storage for L01 is S01. If you do not specify a unit number for the destination device in the command when moving volumes or volume sets between library devices and shelf devices, StorHouse matches the unit number of the volume’s current device to the unit number of the destination device.

The MOVE VOLUME command requires that you specify a volume identification code (vid) for the volume being moved and a device identification code (did) for the destination device. (You can specify wildcards in the vid parameter.) Optionally, you can add or update a memo for the volume.

The following table defines the modifiers you can use with MOVE VOLUME:


Modifier	Description
/CONFIRM	Controls whether StorHouse asks you to confirm the command.
/DIRECTORY=...	Specifies the directory from which volumes are to be selected.
/DUPLEXED	Selects a volume if every file extent on the volume has a duplex copy and the duplex copy is on a volume that does not have a disabled side.
/FIRST_ALLOCATION=...	Specifies the time period from which volumes are to be selected, based on their first allocation dates. For two-sided volumes, the first allocation dates for both sides must be within the time period.

Modifier	Description
/LAST_ALLOCATION=...	Specifies the time period from which volumes are to be selected, based on their last allocation dates. For two-sided volumes, the last allocation dates for both sides must be within the time period.
/LOCATION=...	Specifies the location (that is, the source device) from which volumes are to be selected.
/MEMO=...	Specifies up to 32 characters of descriptive text to be added to the StorHouse system files for each volume being moved.
/NEEDS_CLEANING	Selects volumes that need cleaning.
/REPORT	Controls the generation of special text responses for the completion of significant actions.
/UNUSED=...	Selects volumes that have no more than a specified percentage or amount of their writable space remaining. For two-sided volumes, the unused space for each side must be within the percentage or amount.
/VSET=...	Specifies the volume set from which volumes are to be selected.
/WRITELOCK	Indicates that the command will writelock each volume selected to be moved.

/DIRECTORY and /VSET are mutually exclusive modifiers.

You must have OPERATOR privilege to use this command. FileTek recommends that you use the SCHEDULE command with MOVE VOLUME. See Chapter 12, “Controlling and Scheduling System Activity,” for more information on the SCHEDULE command.

▼ **To move a StorHouse volume from one location to another:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command to move a StorHouse volume and press **Enter** :

MOVE VOLUME vid did modifiers

where vid is the unique volume identifier, did is the device identification code for the destination device, and modifiers are other command and parameter modifiers you use to assign values other than the defaults. Below are some examples.

- To move volume OAD27529BC5 from library device L00 to shelf storage, enter:

? MOVE VOLUME OAD27529BC5 S

- To move all volumes that need cleaning to shelf storage, enter:

```
? MOVE VOLUME * S /LOCATION=L /NEEDS_CLEANING
```

Migrating Blank Volumes into StorHouse

This section describes automatic and manual migration of blank volumes.

Automatic Migration of Blank Volumes

The system parameter `FREE_POOL_didmmr` specifies the minimum number of empty volumes that should reside in a library device free pool volume set. In this parameter:


- `did` is the device identification code
- `mm` is the media type
- `r` the recording type.

If the number of empty volumes drops below this minimum value, StorHouse automatically sends a message to console-enabled terminals requesting the loading of one or more blank volumes to the library device.

You can control the minimum number of empty volumes in each library device free pool by changing the value of `FREE_POOL_didmmr` using the `SET SYSTEM` command. The default value at installation for `FREE_POOL_didmmr` is 2 for tape cleaning cartridges and 4 for all other media/recording types.

You can use the `/CONFIRM` and `/REPORT` modifiers with the `SET SYSTEM` command. `/CONFIRM` controls whether StorHouse asks you to confirm the command. `/REPORT` controls the generation of special text responses for the completion of significant actions. You must have `SYSTEM` privilege to use this command.

▼ To set the minimum number of empty volumes for a library device free pool:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

```
SET SYSTEM FREE_POOL_didmmr <value>
```

where `did` is the device identification code for the library, `mm` is the media type, `r` is the recording type, and `value` is the minimum number of empty volumes desired for the library device. An example follows:

- To set the minimum number of empty volumes to 8 for library device 0 (L00), media and recording type OEB, enter:

```
? SET SYSTEM FREE_POOL_L00OEB 8
```

Manual Migration of Blank Volumes

You can add blank volumes to a library device anytime using the MIGRATE /BLANKS command. While migrating blank volumes, you can optionally write new internal label for non-StorHouse/SM, non-blank tape or erasable optical volumes (in other words, volumes that were previously used by other applications). You must have SYSTEM privilege to use the MIGRATE command.

▼ To migrate one or more blank volumes into StorHouse:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command to migrate blank volumes into the system and press **Enter** (↵):

```
MIGRATE did /BLANKS=number /MEDIA=mmr
```

where *did* is the device identification code of the destination library device, *number* is the number of blank volumes to be migrated, and *mmr* is the media type (mm) and recording type (r) of each volume. (The /MEDIA modifier is optional.) Below is an example:

- To initiate the migration of two blank volumes into the free pool containing media OED (5.25-inch, 4X erasable optical media) into library device L00, enter:

```
? MIGRATE L00 /BLANKS=2 /MEDIA=OED
```

StorHouse requests the operator to label the blank volumes and load them into the library device exchange station.

- To write new internal labels for five non-StorHouse/SM, non-blank volumes in library device L00, enter:

```
? MIGRATE L00 /BLANKS=5 /BYPASS_LABEL
```


Using Memos for Volumes

You can use the SET VOLUME /MEMO command or the MOVE VOLUME /MEMO to specify a comment for a volume. For example, you can specify information about the volume's contents or the location of a volume that has been moved to shelf storage. The SHOW VOLUME command displays the /MEMO comment for the volume.

The information you specify on the /MEMO parameter modifier is written to the StorHouse system files, but is not written to the optical or tape volume. The memo text also displays in selected operator messages.


Adding a Memo

You can use the SET VOLUME /MEMO command or the MOVE VOLUME /MEMO command to add a memo for a volume. SET VOLUME /MEMO allows you to add a memo for a volume anytime. MOVE VOLUME /MEMO allows you to add a memo for a volume while moving the volume.

You do not need any privileges for SET VOLUME /MEMO. However, the vid parameter is required. You can schedule the SET VOLUME command.

You must have OPERATOR privilege to use MOVE VOLUME. The vid and did parameters are also required. You can schedule the MOVE VOLUME command.

▼ **To add a memo for a StorHouse volume anytime:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

```
SET VOLUME vid /MEMO=value
```

where vid is the name of the volume and value is the memo text. An example follows:

- To add the memo “Rack 3 Slot 10” to designate the location for optical volume OAD2345C123, enter:

```
? SET VOLUME OAD2345C123:A /MEMO=“Rack 3 Slot 10”
```


▼ To add a memo for a StorHouse volume while moving the volume:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

MOVE VOLUME vid did /MEMO=value

where vid is the name of the volume to be moved, did is the destination device for the volume, and value is the memo text. An example follows:

- To add the memo “Rack 3 Slot 10” to designate the location for volume OAD12C68147 while moving it to level S, type:

? MOVE VOLUME OAD12C68147 S /MEMO=“Rack 3 Slot 10”

Changing a Memo

You can use the SET VOLUME /MEMO command or the MOVE VOLUME /MEMO command to change a memo for a volume. SET VOLUME /MEMO allows you to change a memo for a volume anytime. MOVE VOLUME /MEMO allows you to change a memo for a volume while moving the volume.

Note If you change the memo for the first volume in a volume set, you change the memo for the entire volume set. StorHouse uses the memo on the first volume in a volume set as the memo for the entire volume set.

You do not need any privileges for SET VOLUME /MEMO. However, the vid parameter is required. You can schedule the SET VOLUME command.

You must have OPERATOR privilege to use MOVE VOLUME. The vid and did parameters are also required. You can schedule the MOVE VOLUME command.

▼ To change a memo for a StorHouse volume anytime:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

SET VOLUME vid /MEMO=value

where vid is the name of the volume and value is the memo text. An example follows:

- To change the memo for optical volume OAD2345C123 to indicate that the volume has been moved to slot 11 in rack 3, enter:

```
? SET VOLUME OAD2345C123:A /MEMO="Rack 3 Slot 11"
```

▼ **To change a memo for a StorHouse volume while moving the volume:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

```
MOVE VOLUME vid did /MEMO=value
```

where vid is the name of the volume to be moved, did is the destination device for the volume, and value is the memo text. An example follows:

- To change the memo “Rack 3 Slot 10” to “Rack 3 Slot 11” for the new location of volume OAD12C68147 while moving it to level S, type:

```
? MOVE VOLUME OAD12C68147 S /MEMO="Rack 3 Slot 11"
```

Displaying a Memo

You can use the SHOW VOLUME /MEMO command to display a memo for a volume. You must have SHOW privilege to use the SHOW VOLUME command. The vid parameter is also required.

▼ **To display a memo for a StorHouse volume:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

```
SHOW VOLUME vid /MEMO
```

where vid is the name of the volume to be displayed. An example follows:

- To display the memo for the volume OAD242F38AD, enter:

```
? SHOW VOLUME OAD242F38AD:A /MEMO
```

The system displays the memo for this volume:


```
OAD"242F38AD":A VSET=ACCTS00 EXTENTS=0
WRITABLE_SPACE=10229KB MEMO="Rack 3 Slot 11"
```


Listing All Volumes With a Specific Memo

You can use the SHOW VOLUME /MEMO command to list all volumes with a specific memo or that contain specific words in their memos. You must have SHOW privilege to use the SHOW VOLUME command. The vid parameter is required.

The value can contain one or more wildcards. You must enclose the memo value in quotes if the memo contains special characters or you do not want to have lowercase characters translated to uppercase characters.

▼ To list all volumes that have a specific memo:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

```
SHOW VOLUME vid /MEMO=value
```

where vid is the name of the volume to be displayed and value is the user-specified comment about the volume. An example follows:

- To list all volumes that have the words “Rack 3” in the memo, enter:

```
? SHOW VOLUME * /MEMO=“*Rack 3”
```

The system displays the list of volumes:

```
OAD“2DC11832”:A VSET=MAR00 EXTENTS=2559
WRITABLE_SPACE=14302KB MEMO=“Rack 3 Slot 11”
OAD“2DC11832”:B VSET=MAR00 EXTENTS=1811
WRITABLE_SPACE=37097KB MEMO=“Rack 3 Slot 11”
```

```
OAD“2DE4D5C5”:A VSET=MAR00 EXTENTS=1154
WRITABLE_SPACE=34319KB MEMO=“Room 2 Rack 3 Slot 14”
OAD“2DE4D5C5”:B VSET=MAR00 EXTENTS=1126
WRITABLE_SPACE=34063KB MEMO=“Room 2 Rack 3 Slot 14”
```

```
OAD“2DE4D630”:A VSET=MAR00 EXTENTS=4055
WRITABLE_SPACE=40402KB MEMO=“Rack 3 Slot 20”
OAD“2DE4D630”:B VSET=MAR00 EXTENTS=1369
WRITABLE_SPACE=35339KB MEMO=“Rack 3 Slot 20”
```

```
Total volume sides displayed=6
```


Exporting Volumes

You can use the EXPORT /DIVIDE command to *export*, or remove, individual volumes (part of a volume set) from a StorHouse system. The EXPORT command deletes volume information for removable volumes from StorHouse directories. Once a volume is exported, StorHouse no longer has any knowledge of the volume. All exported volumes are considered offline. EXPORT releases all empty volumes from a volume set to the free pool so that it does not export empty volumes as part of a user volume set.

Before you can export a volume, it must be uncataloged. A volume is considered uncataloged when the StorHouse directories contain no file or file set information for the volume. You use the UNCATALOG VOLUME command to uncatalog one or more volumes in a volume set.

The command sequence for exporting one or more volumes from a volume set is:

1. UNCATALOG VOLUME
2. EXPORT /DIVIDE

Figure 8-2 illustrates this sequence and the associated volume states. Although this figure shows optical disk volumes, the same sequence applies to tape volumes. StorHouse processes only one EXPORT command at a time.

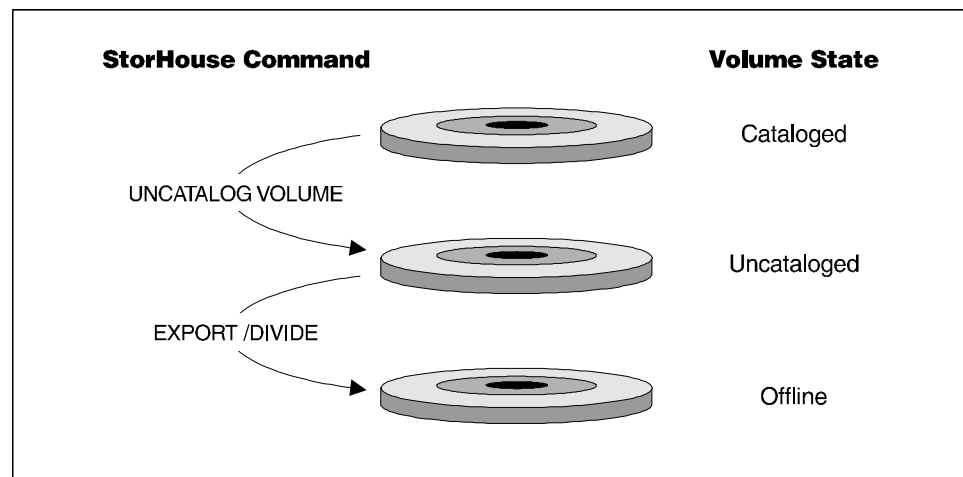


Figure 8-2: Volume States During Volume Export Process

You can import, or add, an exported volume to any StorHouse system or store the exported volume offline as required. See “Using the IMPORT /MERGE Command” on page 8-28 for a discussion of the IMPORT /MERGE command.

This section describes how to export one or more volumes from a volume set. See Chapter 6, “Managing Volume Sets,” for information about how to export an entire volume set.

Uncataloging a Volume


You prepare a removeable volume for export by uncataloging it with the UNCATALOG VOLUME command. This command removes directory information for all files and file sets on a volume. UNCATALOG VOLUME requires ALLOCATION and SYSTEM privileges. The vid parameter is also required.

The following table defines the modifiers you can use with UNCATALOG VOLUME:

Modifier	Description
/CONFIRM	Controls whether StorHouse asks you to confirm the command.
/NOARCHIVED	Clears the archive flag in the primary directory for every file on an archive volume that you uncatalog. By clearing the archive flag, a file appears as though it is not archived.
/NOREMOVE	Prevents StorHouse from removing directory information for any extents on the volume. StorHouse skips the volume for uncataloging and it remains in the cataloged state.
/REPORT	Controls the generation of special text responses for the completion of significant actions.
/WAIT	Instructs StorHouse to wait for a locked file to be unlocked before attempting to use it in the command execution.

You can schedule the UNCATALOG VOLUME command. See “Scheduling a StorHouse Event” on page 12-12.

▼ To uncatalog a volume:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** :

UNCATALOG VOLUME vid modifiers

where vid is the volume identifier and modifiers are other command modifiers you use to assign values other than the defaults. Examples follow:

- To remove directory information for volume OABC0000168, but skip the volume for uncataloging if any surface of that volume is not empty, enter:

? UNCATALOG VOLUME OABC0000168 /NOREMOVE

- To remove directory information for all file extents on archive volume OEBC0000242, reduce associated space allocations, and clear the archive flag in the primary directory for every file on the volume, enter:

? UNCATALOG VOLUME OEBC0000242 /NOARCHIVED

Using the EXPORT /DIVIDE Command

Once you have uncataloged one or more volumes, you can use the EXPORT /DIVIDE command to remove a specified volume or all uncataloged volumes from a StorHouse volume set. The EXPORT command requires ALLOCATION and SYSTEM privileges. The vset_name parameter is also required.

Note the following on the EXPORT command:

- EXPORT without /DIVIDE removes the *entire* volume set from the directory.
- Even if you export the last volume in the set, EXPORT with /DIVIDE does not remove the volume set from the directory.

FileTek recommends that you schedule the EXPORT /DIVIDE command. See Chapter 12, “Controlling and Scheduling System Activity,” for more information on the SCHEDULE command.

▼ To export all uncataloged volumes in a StorHouse volume set:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press Enter ↵:

```
EXPORT vset_name /DIVIDE
```

where vset_name is the name of the volume set. An example follows:

- To export all the uncataloged volumes in volume set ACCTS00, enter:

```
? EXPORT ACCTS00 /DIVIDE
```

▼ To export one volume in a StorHouse volume set:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press Enter ↵:

```
EXPORT /DIVIDE=vid
```

where vid is the volume identification code of the volume to be exported. An example follows:

- To export the uncataloged volume OADC1234567, enter:

```
? EXPORT /DIVIDE=OADC1234567
```


Effect of Retention on UNCATALOG and EXPORT

Retention affects the operation of the UNCATALOG command. Therefore, customers who currently use UNCATALOG and EXPORT to remove archive volumes and volume sets from StorHouse may want to rethink this strategy if they also plan to use the StorHouse retention feature.

StorHouse cannot uncatalog a volume that contains retained files because those files cannot be deleted until their retention period expires. When StorHouse attempts to uncatalog such a volume, it ignores the retained files, deletes and removes all non-retained files on the volume, and leaves the volume in the UNCATALOGING state. A volume in the UNCATALOGING state cannot be exported. To circumvent this restriction, FileTek recommends that instead of using UNCATALOG and EXPORT to remove archive volumes from StorHouse, you simply write lock the volumes to be exported and use the MOVE VOLUME command to transfer them from level L to shelf storage.

Importing Volumes

You can use the IMPORT /MERGE command to *import*, or add, a previously recorded, offline, removeable volume into an existing StorHouse volume set. For example, you can export a volume from one StorHouse system and subsequently import it into a different StorHouse system. The IMPORT command adds volume information to the StorHouse directories. Once a volume is imported, it is in the uncataloged state.

After you import a volume, it must be cataloged. A volume is considered cataloged when the StorHouse directories contain file and file set information for the volume. You can use the CATALOG VSET command to catalog an imported volume or volumes in an existing volume set.

As a precaution, you should run a REMOVE FILE command after IMPORT /MERGE and prior to CATALOG VSET. REMOVE FILE removes all files in the DELETED file directory. This prevents a potential conflict between files that you are about to catalog and instances of the same file versions that may still reside in the DELETED directory.

This section explains how to import a volume. The command sequence for importing a volume is:

1. IMPORT /MERGE
2. REMOVE FILE
3. CATALOG VSET

Figure 8-3 illustrates the command sequence and the associated volume states. Although this figure shows optical volumes, the same sequence applies to tape volumes. StorHouse processes only one IMPORT command at a time.

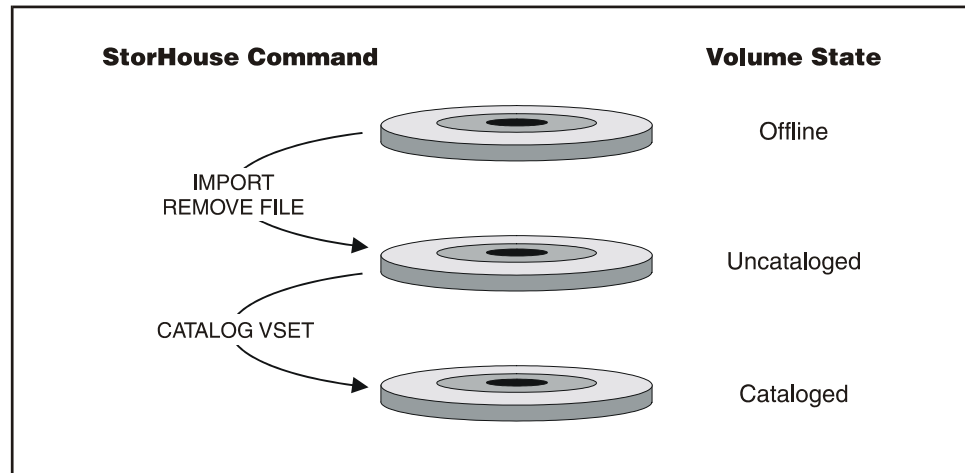


Figure 8-3: Volume States During Volume Import Process

See Chapter 6, “Managing Volume Sets,” for information about how to import an entire volume set.

Using the IMPORT /MERGE Command

You can use the IMPORT /MERGE command to add a previously recorded volume(s) to an existing volume set in a StorHouse system. (The volumes being imported must have the same volume set name in their volume labels as the volume set into which you are importing the volumes.) You can also use this command to import a volume from one free pool into another existing free pool. Empty volumes imported into existing free pools are available for allocation to other volume sets immediately (they are marked as cataloged). IMPORT requires ALLOCATION and SYSTEM privileges. The vset_name parameter is also required.

During import, StorHouse instructs the operator to load an unspecified volume and continues to request volumes until the operator indicates that there are no more volumes to load.

You cannot use the /MEDIA or /DIRECTORY modifiers with the /MERGE modifier.

FileTek recommends that you schedule the IMPORT /MERGE command. See Chapter 12, “Controlling and Scheduling System Activity,” for more information on the SCHEDULE command.

▼ To import one or more volumes into an existing StorHouse volume set:

1. Sign on to StorHouse.

2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

```
IMPORT vset_name /MERGE
```

where vset_name is the volume set name. Below is an example:

- To import one or more uncataloged volumes into volume set ACCTS00, enter:

```
? IMPORT ACCTS00 /MERGE
```

3. Run a REMOVE FILE command as explained in “Running REMOVE FILE After IMPORT” on page 8-29.

▼ **To import one or more free pool volumes into an existing StorHouse free pool volume set:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

```
IMPORT vset_name /MERGE
```

where vset_name is the free pool volume set name. An example follows:

- To import one or more free pool volumes into free pool volume set .L00OAD, enter:

```
? IMPORT .L00OAD /MERGE
```


Running REMOVE FILE After IMPORT

REMOVE FILE removes all files from the DELETED file directory. This command requires SYSTEM privilege. Run REMOVE FILE after you import and before you catalog a volume set.

You can use the /CONFIRM and /REPORT modifiers with REMOVE FILE. /CONFIRM controls whether StorHouse asks you to confirm the command. /REPORT controls the generation of special text responses for the completion of significant actions.

You can schedule the REMOVE FILE command.

▼ **To remove files from the DELETED directory:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

REMOVE FILE

Running CATALOG VSET After REMOVE FILE


CATALOG VSET adds file and file set information to the StorHouse directories for a volume set that contains recently imported volumes (in other words, uncataloged volumes). CATALOG VSET requires ALLOCATION and SYSTEM privileges. The vset_name parameter is also required.

The following table defines the modifiers you can use with CATALOG VSET:

Modifier	Description
/CONFIRM	Controls whether StorHouse asks you to confirm the command.
/REPORT	Controls the generation of special text responses for the completion of significant actions.
/WAIT	Instructs StorHouse to wait for a locked file to be unlocked before attempting to use it in the command execution.

You can schedule the CATALOG VSET command.

▼ To catalog a volume set:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

CATALOG VSET vset_name modifiers

where vset_name is the volume set name and modifiers are other command modifiers you use to assign values other than the defaults. An example follows:

- To catalog the volume set ACCTS00, enter:

? CATALOG VSET ACCTS00

Customizing Volume Labels

A *volume label* is a component of the StorHouse volume identification code (vid). The volume label makes a vid unique for every volume of a specific media and recording type. The format of the vid is shown as follows:

```
{media_type}{recording_type}{volume_label}:{side}
```

A sample vid for an erasable optical volume is OEB1234A123:A, where OE is the media type, B is the recording type, 1234A123 is the volume label, and A is the volume side indicator.

StorHouse generates volume labels for removeable volumes automatically. StorHouse assigns labels for these removable volumes according to customized formats you specify or according to the default time method. The default time method uses an algorithm to generate labels based on the time StorHouse initializes a volume.

Note Custom volume labeling is not available for media used with library devices that have bar code readers, such as tape libraries.

Understanding Custom Volume Labels

Before implementing custom volume labels, analyze your site's volume labeling requirements. You can begin by listing the current media and recording types in your system and the media and recording types you plan to add. Then determine why you want custom volume labels. Some reasons might be to:

- Identify which volumes belong to individual StorHouse systems
- Conform to the labeling standards at your data center
- Match StorHouse-generated volume labels to pre-printed external labels, such as bar codes
- Implement unique label sequence numbers for different media/recording types.

Once you define your requirements, you can choose the appropriate labeling method that best suits your needs. FileTek can assist you in the planning process.

System Parameters That Control Custom Volume Labeling

Four system parameters control how StorHouse generates volume labels. These parameters are:

Table 8-2: System Parameters That Control Custom Volume Labeling

System Parameter	Defines the:
LABEL	Last character of the volume label for the next blank volume added to the system. You specify this only when LABEL_ALG=2. If LABEL_ALG=3, LABEL must be paired with the LABEL_MASK system parameter.
LABEL_ALG	Method StorHouse uses to generate volume labels.
LABEL_MASK_media	Format (mask) of the custom volume labels.
LABEL_media	Custom volume label to assign to the next blank volume.

StorHouse is installed with LABEL_ALG set to 3, which indicates the user-defined mask method. LABEL and LABEL_MASK are available on your system, but they label all your media in one sequence beginning with 00000001 by default. If you want to implement more restrictive custom volume labeling (for example, you want different labeling sequences for 12-inch optical disks and 5.25-inch optical disks), you must ask your FileTek customer support representative to add the appropriate system parameters to your StorHouse system(s).

Custom Labeling Methods

FileTek provides two custom volume labeling methods:

- *Time with last character constant* uses the default time method to generate volume labels but replaces the last character of every label with a user-specified constant.
- *User-defined mask* generates volume labels according to user-specified format(s) and lets you specify the value of the next label to be assigned.

Time Method With Last Character Constant. The time method with last character constant allows you to customize only the last character in your volume labels. This constant must be a hexadecimal character. You might use this method to distinguish between volumes initialized in different StorHouse systems (for example,

volumes initialized in a headquarters system, an eastern region system, or a development system). In this case, you could distinguish volumes by using the constant A for headquarters volumes, E for eastern region volumes, and D for development volumes.

To use the time method with last character constant, you must set the LABEL_ALG system parameter to 2.

User-defined Mask. The user-defined mask method allows you to customize every character in a volume label and specify the value of the next label to be assigned. You can use this method to generate different label formats for different media, match StorHouse-generated volume labels with pre-printed labels (such as bar codes), conform to media labeling standards at your site, or distinguish between volumes initialized in different StorHouse systems.

You can use the user-defined mask method to define one labeling sequence for all your media. The necessary system parameters (LABEL_ALG, LABEL, and LABEL_MASK) are available on your system. However, if you want to implement more restrictive custom volume labeling (for example, you want different labeling sequences for 12-inch optical disks and 5.25-inch optical disks), you must ask your FileTek customer support representative to add the appropriate system parameters to your StorHouse system(s). FileTek must add these parameters as one or more parameter pairs with matching media variables.

These media variables can be configured as mmr to denote a specific media and recording type, mm to denote a specific media type, or m to denote a general media type (the first character of the media type). In addition, you can omit the mmr characters and the last underscore to denote all media. Some examples follow.

- LABEL_MASK_mmr
LABEL_mmr
- LABEL_MASK_mm
LABEL_mm
- LABEL_MASK_m
LABEL_m
- LABEL_MASK
LABEL

You must set the LABEL_ALG system parameter to 3.

System Parameter Configuration Example. You have 12-inch second generation WORM (OAD), 5.25-inch WORM (OEA), and 5.25-inch erasable (OEB) optical media at your site. To select the user-defined mask method of custom volume labeling, you set the LABEL_ALG system parameter to 3. Before you can implement custom labels, FileTek must configure the LABEL_MASK_media and LABEL_media parameters to suit your needs. For example:

- If you want labels for 12-inch WORM optical media to have a different format or different numbering sequence from labels for 5.25-inch media, FileTek must configure two sets of system parameter pairs:

LABEL_MASK_OA and LABEL_OA for 12-inch WORM optical
 LABEL_MASK_OE and LABEL_OE for 5.25-inch WORM and erasable optical

- If you want labels for all optical media to have different formats or numbering sequences, FileTek must configure three sets of system parameter pairs:

LABEL_MASK_OA and LABEL_OA for 12-inch WORM optical
 LABEL_MASK_OEA and LABEL_OEA for 5.25-inch WORM optical
 LABEL_MASK_OEB and LABEL_OEB for 5.25-inch erasable optical

- If you want labels for all your optical media to have the same format and numbering sequence, then FileTek must configure only one parameter pair:

LABEL_MASK_O and LABEL_O for all optical

Setting System Parameters for Custom Volume Labeling

This section explains the tasks you must perform to configure your StorHouse system for custom volume labeling. Task steps tell you how to set values for the LABEL_ALG, LABEL_MASK_media, and LABEL_media system parameters, which are defined in the following table:

Table 8-3: System Parameter Settings for Custom Volume Labeling

System Parameter	Description
LABEL	Specifies the last (hexadecimal) character of the volume label for the next blank volume added to the system. This parameter has this definition only when the LABEL_ALG system parameter is set to 2.
LABEL_ALG	Specifies the method StorHouse uses to generate volume labels. Valid values are: <ul style="list-style-type: none"> 0 Default time method 1 FileTek test method (reserved) 2 Time method with last character constant 3 User-defined mask method The default is 3.

Table 8-3: System Parameter Settings for Custom Volume Labeling

System Parameter	Description
LABEL_MASK_media (only used when LABEL_ALG=3)	<p>Specifies the label format for custom labeling if the LABEL_ALG system parameter is 3. The value must be 1 to 8 characters, where each character can be one of the following:</p> <ul style="list-style-type: none"> An uppercase alphabetic character (A-Z), a number (0-9), or a special character is used as a constant. A lowercase d is a place holder for a decimal digit (0-9). A lowercase h is a place holder for a hexadecimal character (0-F). A lowercase a is a place holder for an alphanumeric character (0-9, A-Z). A lowercase u is a place holder for an alphabetic character (A-Z). <p>The default is dddddddd. Note: When using a lowercase place holder, you must enclose the value of the LABEL_MASK_media system parameter in quotes. Otherwise, the system translates all lowercase alphabetic characters to uppercase and the place holders will be interpreted as constants in the mask.</p>
LABEL_media (only used when LABEL_ALG=3)	<p>Specifies the next custom label to use for a medium. The range can be up to 8 characters, as defined by the value of the corresponding LABEL_MASK_media system parameter. The default is 00000001.</p>

How StorHouse Assigns Labels

When LABEL_ALG is set to 3, StorHouse uses the LABEL_MASK_media and LABEL_media system parameters to assign volume labels. LABEL_MASK_media specifies the label format you want to use. You can specify a mixture of constant uppercase alphabetic characters, numbers, or special characters, and variable decimal, hexadecimal, alphanumeric, and/or alphabetic characters. You can assign the largest range of labels by using all alphanumeric characters.

LABEL_media specifies the value of the next label to be assigned. After assigning this label to a volume, StorHouse increments the rightmost variable character position of the current value and carries any overflow to the next variable character on the left. It keeps any constant characters but ignores them in the calculation. It then saves the new value as the value of the LABEL_media system parameter. If the leftmost variable character overflows, the system issues the following error message to the operator:

XRVLORFLOW, VOLUME LABEL RANGE OVERFLOW

Example. A LABEL_MASK_OA value of AhhhhhhB indicates that volume labels for 12-inch WORM optical media will begin with the constant “A”, followed by six hexadecimal characters, followed by the constant “B”. Assume that the current value of LABEL_OA is A00000FB. When a volume is added to the system, StorHouse assigns the current value of LABEL_OA to the volume. Then, it uses the label format and the current value of LABEL_OA to generate the label for the next volume added to the system, which is A000010B. StorHouse stores the label for the next volume in

LABEL_OA. Subsequent labels generated will be A000011B, followed by A000012B, etc.

Selecting the Time Method With Last Character Constant

The time method with last character constant tells StorHouse to use the default time method to generate volume labels, but to replace the last character of every label with a hexadecimal constant specified by the LABEL system parameter. You can use this method to identify the volumes initialized in a particular StorHouse system. To implement this method, you'll set:

- LABEL_ALG = 2
- LABEL = the constant character to be used

▼ To use the time method with last character constant to generate volume labels:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), set the value of the LABEL_ALG system parameter to 2:

```
SET SYSTEM LABEL_ALG 2
```

3. At the StorHouse prompt (?), set the value of the LABEL system parameter to indicate the hexadecimal character to be used for the constant. For example:
 - To set the value of the LABEL system parameter to A to represent the StorHouse system at the headquarters site, enter:

```
? SET SYSTEM LABEL A
```

- To set the value of the LABEL system parameter to D to distinguish volumes generated by a development StorHouse system from volumes generated by a test system at the same site, enter:

```
? SET SYSTEM LABEL D
```

Selecting the User-Defined Format Method

The user-defined format method tells StorHouse to use the format(s) you specify to generate volume labels. It also tells StorHouse the value to use for the next volume label. You can use this method to set up different label formats or numbering sequences for different media. To implement this method, you'll set:

- LABEL_ALG = 3
- LABEL_MASK_media = the format mask you want to use
- LABEL_media = the value of the label to be assigned to the next volume

When you specify the format mask you want to use, be sure to enclose the value of the LABEL_MASK_media system parameter in quotes when specifying any lowercase masking characters. Otherwise, the system will translate them to uppercase and those characters will be interpreted as constants in the mask.

Note If you want one labeling sequence for all your media, the system parameters you need are already included in your system. If you want different labeling sequences for different media types or recording types, a FileTek customer support representative must have added the appropriate LABEL_MASK_media and LABEL_media system parameter pairs to your system.

▼ **To assign user-defined custom labels:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), set the value of the LABEL_ALG system parameter to 3:

```
SET SYSTEM LABEL_ALG 3
```

3. At the StorHouse prompt (?), set the values for the LABEL_MASK_media and LABEL_media system parameter pairs configured for your site. For example:
 - To assign numeric labels for 5.25-inch erasable optical volumes and to assign the number 100 (label 00000100) to the next 5.25-inch erasable optical volume to be added to the system, enter:


```
? SET SYSTEM LABEL_MASK_OEB "ddddddd"
```

```
? SET SYSTEM LABEL_OEB 00000100
```
 - To assign an 8-character label consisting of seven digits followed by the alphabetic constant E (to denote eastern region) to 5.25-inch erasable optical volumes, and to assign the number 100 (label 0000100E) to the next 5.25-inch erasable optical volume to be added to the system, enter:


```
? SET SYSTEM LABEL_MASK_OEB "dddddddE"
```

```
? SET SYSTEM LABEL_OEB 0000100E
```
 - To assign hexadecimal labels for 5.25-inch WORM optical volumes, and to assign the label 0000AAAA to the next 5.25-inch volume to be added to the system, enter:


```
? SET SYSTEM LABEL_MASK_OEA "hhhhhhhh"
```

```
? SET SYSTEM LABEL_OEA 0000AAAA
```
 - To assign different numeric labels for 5.25-inch optical and 12-inch optical volumes, to assign the label 00000000 to the next 5.25-inch volume to be added to the system, and to assign the label 10000000 to the next 12-inch volume to be added to the system, enter:


```
? SET SYSTEM LABEL_MASK_OE "dddddddd"
? SET SYSTEM LABEL_OE 00000000

? SET SYSTEM LABEL_MASK_OA "dddddddd"
? SET SYSTEM LABEL_OA 10000000
```

Monitoring Volume Label Assignments

When using the user-defined format method, you or the StorHouse system operator may need to monitor volume label assignments periodically, depending on your volume labeling strategy. You can monitor volume label assignments for your media using the SHOW SYSTEM command to display the value of the corresponding LABEL_media system parameter. This parameter specifies the value of the next volume label to be assigned.

Example

Suppose you order pre-printed bar code labels in numeric sequences of 1000 for your 5.25-inch WORM optical media (OEA). The first group of labels that you order ranges from 00000000 to 00000999. Initially you set the value of LABEL_OEA to 00000000, which tells StorHouse to assign the number 00000000 to the first OEA volume. As StorHouse fills platters and initializes additional volumes, you'll need to monitor volume label assignments. As the value of LABEL_OEA approaches 00000999, you'll need to order the next group of pre-printed labels (00001000 to 00001999).

You might want to monitor label assignments to see how close StorHouse is to assigning the highest label based on your format mask (such as 99999999 for numeric labels or ZZZZZZZZ for alphanumeric labels). The system will not issue duplicate labels, but may reissue a label that belonged to a volume that was exported.

▼ To check the value of the next volume label assigned for a specific media type:

1. Sign on to StorHouse.
2. At the command prompt (?), submit the appropriate SHOW SYSTEM LABEL_media command. For example:
 - To display the value of the next label to be assigned to 5.25-inch optical media (all recording types), enter:


```
? SHOW SYSTEM LABEL_OE
```
 - To display the value of the next label to be assigned to second generation, 12-inch optical media, enter:


```
? SHOW SYSTEM LABEL_OAD
```


Changing the Value of the Next Label

When using the user-defined format method, you can change the value of the next volume label to be assigned at any time by changing the value of the appropriate LABEL_media system parameter. You may want to change the value of the next label to be assigned if you are adding different media types to your system or if you change your volume labeling strategy.

Example

Suppose your StorHouse system was originally installed with 12-inch optical media. At that time, you set the value of LABEL_OA to 00000000 to assign the number 00000000 to the next initialized 12-inch volume. Now, when you issue SHOW SYSTEM LABEL_OA, the current value of LABEL_OA is 00000998, indicating that 00000998 is the value of the next label to be assigned.

In the near future, you plan to add a 5.25-inch library device to your system, and you want volume labels for your 5.25-inch media to begin with label number 00001000. You also want the value of the next label assigned to your 12-inch media to be 00003000 instead of 00000998. To implement this change, you need to reset the current value of LABEL_OA before StorHouse initializes the next 12-inch volume.

▼ **To change the value of the next label to be assigned to a volume:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), submit the appropriate SET SYSTEM LABEL_media command. For example:
 - To change the value of the label assigned to the next initialized 12-inch, second generation optical volume from its current value to 00003000, enter:

```
? SET SYSTEM LABEL_OAD 00003000
```

- To change the value of the label assigned to the next initialized 5.25-inch optical volume (all recording types) from its current value to 00001000, enter:

```
? SET SYSTEM LABEL_OE 00001000
```


Erasing Volumes

You can use the ERASE VOLUME command to erase erasable optical or magnetic tape volumes. For optical volumes, the ERASE VOLUME command physically erases and initializes (relabels) the volumes. For magnetic tape volumes, the command initializes (relabels) the volumes to make the existing data inaccessible; subsequent writes of new data will overwrite the old data. Once erased, all space on the erased volumes is made available for allocation in the volume set (both sides of two-sided optical volumes). Erased volumes resemble volumes that have just been moved from the free pool into the volume set. Once data has been erased, you might not be able to recover it.

Before you can erase a volume, it must be uncataloged. A volume is considered uncataloged when the StorHouse directories contain no file or file set information for the volume. You can use the UNCATALOG VOLUME command to uncatalog one or more volumes.

The command sequence for erasing a volume is:

1. UNCATALOG VOLUME
2. ERASE VOLUME

Figure 8-4 illustrates this sequence and the associated volume states. Although this figure shows optical volumes, the same sequence applies to tape volumes.

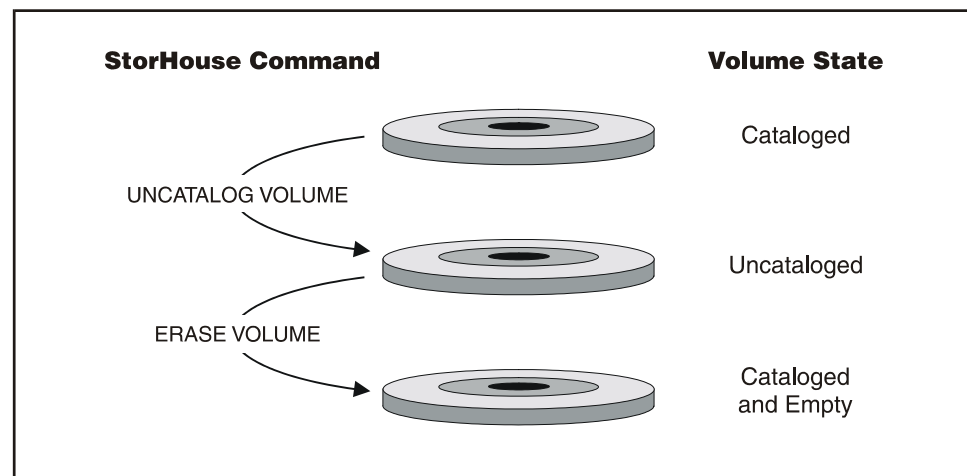


Figure 8-4: Volume States During Volume Erase Process

This section describes how to erase one or more volumes. See Chapter 6, “Managing Volume Sets,” for information about how to erase entire volume sets.

Uncataloging a Volume

You prepare a volume for erasing by uncataloging it with the `UNCATALOG VOLUME` command. This command removes directory information for all files and file sets on the specified volume. `UNCATALOG VOLUME` requires `ALLOCATION` and `SYSTEM` privileges. The `vid` parameter is required.

See “Uncataloging a Volume” on page 8-25 for the modifiers you can use with `UNCATALOG VOLUME` and command examples.

Using the `ERASE VOLUME` Command

Once you have uncataloged a volume, you can use the `ERASE VOLUME` command to erase it. `ERASE VOLUME` requires `ALLOCATION` and `SYSTEM` privileges. The `vid` parameter is also required.

The `ERASE VOLUME` command works as follows:

1. When `ERASE VOLUME` begins operation, it sets the state of the volume to `ERASING`.
2. Next, for an optical volume, it completely and permanently removes all files that resided on the erased volume and allocates all the space in the erased volume as free space.

For a tape volume, it initializes (relabels) the volume to make existing data inaccessible so that new data will overwrite the old data.

3. If the command completes successfully, it automatically places the volume in the `CATALOGED` state and makes all space on the volume available for use.

If the erase command is interrupted by a system failure and a volume is left in the `ERASING` state, you must enter the command again.

You can schedule `ERASE VOLUME` using the `SCHEDULE` command. See “Scheduling a StorHouse Event” on page 12-12.

You can use the `/CONFIRM` and `/REPORT` modifiers with `ERASE VOLUME`. `/CONFIRM` controls whether StorHouse asks you to confirm the command. `/REPORT` controls the generation of special text responses for the completion of significant actions.

To erase a StorHouse volume:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

ERASE VOLUME vid modifiers

where *vid* is the name of the volume to be erased and *modifiers* are other command modifiers you use to assign values other than the defaults. Below is an example:

- To erase all information on both sides of the uncataloged erasable volume OEBC0000168, type:

? ERASE VOLUME OEBC0000168

Retiring Volumes

You can use the RETIRE VOLUME command in two ways:

- To manually retire removable volumes that are damaged, degraded, or have reached their lifecycle limit. This command is typically used for magnetic tape volumes, which degrade with use.
- With the /ERASE modifier, to reinitialize and reuse erasable, removable volumes. This command is typically used for erasable optical volumes.

Normally, StorHouse automatically retires removable volumes that have reached their lifecycle limit (if you have scheduled the RETIRE VOLUME command). It uses a mount limit for each media and recording type combination in the system and a mount count for each volume in the system to determine lifecycle limits.

- The *mount limit* indicates the average number of mounts that a volume of the media can undergo before it might encounter unrecoverable errors due to media degradation. The mount limit is zero for all optical media (in other words, this limit does not apply to optical volumes) and non-zero for magnetic tape media.
- The *mount count* is the number of times a volume side has been used (mounted and dismounted).

The mount limit and mount count are recommended by the media manufacturer and initially set at installation for each media type and recording type combination configured in the system.

The following table defines the modifiers you can use with RETIRE VOLUME:

Modifier	Description	Default
/CONFIRM	Controls whether StorHouse asks you to confirm the command.	-
/DEADLINE=...	Specifies the date and time after the RETIRE VOLUME command is invoked when the command can start moving extents off selected volumes.	No start-time limit
/ERASE	Indicates that the command is to erase each volume instead of exporting it after moving all extents off the volume and uncataloging it.	If not specified, the command exports volumes instead of erasing them.
/REPORT	Controls the generation of special text responses for the completion of significant actions.	-
/WAIT	Instructs StorHouse to wait for a locked file to be unlocked before attempting to use it in the command execution.	-
/LIMIT=...	Specifies the maximum number of volumes to be selected by the command.	/LIMIT=1
/MAX_ERRORS	Controls the maximum number of errors StorHouse allows when it finds file extents that are not accessible on a volume. If the number of errors reaches this limit, StorHouse stops processing the current volume.	/NOMAX_ERRORS
/MOUNTS=...	Controls whether volumes with a mount count greater than or equal to the number indicated by /MOUNTS are to be selected by the command.	/MOUNTS
/VSET=...	Indicates that the command will consider for selection only volumes in the volume set specified by this modifier.	-

You must have ALLOCATION and SYSTEM privileges to use RETIRE VOLUME. The vid parameter is also required. You can schedule the RETIRE VOLUME command. See “Scheduling a StorHouse Event” on page 12-12.

▼ **To retire a removable volume:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

RETIRE VOLUME vid modifiers

where vid is the unique volume name and modifiers are other command and parameter modifiers you use to assign values other than the defaults. Below is an example:

- To retire the volume OEBC0000168 regardless of its mount count and to limit the number of possible errors to 5, enter:

```
? RETIRE VOLUME OEBC0000168 /NOMOUNTS /MAX_ERRORS=5
```

- To retire and export no more than ten volumes (/LIMIT=10) from a pool of volumes that have a media type of TB (DLT magnetic tape) and any recording type, and to instruct the command to start processing a volume only if no more than four hours have elapsed since the command was invoked (/DEADLINE=D4), enter:

```
? RETIRE VOLUME /DEADLINE=D4 TB* /LIMIT=10
```


Erasing and Reusing a Volume

You can use RETIRE VOLUME with the /ERASE modifier to reinitialize and reuse erasable, removable volumes for efficient storage management. This command creates an empty volume in the current volume set, rather than exporting the volume. The /ERASE modifier differs from the ERASE VOLUME or ERASE VSET commands because it copies any data on the source volume to another volume in the volume set before it erases the source volume.

For example, if you have eight tape volumes that are half full, you can run RETIRE VOLUME /ERASE to move the information from those eight volumes to four new volumes and erase the original eight volumes for reuse.

You must have ALLOCATION and SYSTEM privileges to use RETIRE VOLUME. The vid parameter is also required. You can schedule the RETIRE VOLUME command.

▼ To move files from one volume to another volume in the same volume set, and then erase the source volume:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

```
RETIRE VOLUME vid /ERASE
```

where vid is the volume name. Below is an example:

- To erase and reuse the volume OEBC0000168, enter:

```
? RETIRE VOLUME OEBC0000168 /ERASE /NOMOUNTS
```


Validating Volumes

You can use the `VALIDATE VOLUME` command to verify that all file extents on a volume can be read. The volume to be validated must be in the `CATALOGED` state. This command will not validate extents that belong to deleted files. If any volume cannot be validated, contact your FileTek customer support representative.

The following table defines the modifiers you can use with `VALIDATE VOLUME`:

Modifier	Description	Default
<code>/CONFIRM</code>	Controls whether StorHouse asks you to confirm the command.	-
<code>/MAX_ERRORS</code>	Controls the maximum number of errors StorHouse allows when it finds file extents that cannot be read on a volume. If the number of errors reaches this limit, StorHouse stops processing the current volume.	<code>/NOMAX_ERRORS</code>
<code>/REPORT</code>	Controls the generation of special text responses for the completion of significant actions.	-

You must have `SYSTEM` privilege to use the `VALIDATE VOLUME` command. You can schedule `VALIDATE VOLUME` using the StorHouse Command Language `SCHEDULE` command.

▼ To validate a volume:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press `Enter` (↵):

`VALIDATE VOLUME vid modifiers`

where `vid` is the volume identifier and `modifiers` are other command modifiers you use to assign values other than the defaults. An example follows:

- To validate side A of volume `OED34A38DAE` and limit the number of possible errors to 5, enter::

```
? VALIDATE VOLUME OED34A38DAE:A /MAX_ERRORS=5
```


8

Managing Volumes

Validating Volumes

Protecting User and System Files

You protect user and system files by making copies of them on a regular basis and by storing those copies on various types of media, depending on your access needs and data recovery strategy. By setting system parameters and scheduling commands, you can automate the process of protecting your user and system files.

This chapter explains how to:

- Protect user files
- Use backup and archive copies of user files for duplexing
- Protect system files.

Protecting User Files

You can back up your user files at two different levels on the StorHouse storage hierarchy:

- Write-back all files from the performance buffer (level F) to their primary, or resident, file set (level L) using the BACKUP command.
- Back up individual files from a primary file set to a backup and/or archive file set(s) in a separate backup and/or archive directory using the CREATE BACKUP or ARCHIVE command.

You should consult your FileTek customer support representative to jointly develop a backup strategy for your data. This strategy should address how often to perform backups and archives, as well as general and disaster recovery issues. FileTek has published a separate document called *StorHouse Recovery Strategies*, publication number 900117, that discusses different types of data recovery. Ask your account representative for a copy.

This section defines write-back and backup and presents the purpose and advantages of each method. In addition, it discusses:

- System parameters that control write-back and backup
- Considerations for developing a backup strategy
- How to write-back files from the performance buffer to their primary file sets
- How to back up primary copies of user files to backup volume sets
- How to archive primary copies of user files to archive volume sets.

About Write-back and Backup

A *write-back* is an operation that copies new file extents from the performance buffer to their primary file sets. Write-back ensures that the primary copy of a new or revised file version is complete. StorHouse no longer considers a file extent to be new when there is a copy of the extent in its primary file set.

A *backup* is an operation that copies files from a primary volume set to either a backup or archive volume set. The primary copy remains intact. In this book, *backup* refers to copying a primary file to a backup volume set and *archive* refers to copying a primary file to an archive volume set. StorHouse distinguishes between these operations because the two types of volume sets typically serve different purposes and users often handle them differently. For example, some users store backup file copies on site to implement data duplexing. Alternatively, some users store archive file copies at a secure, offsite location should disaster recovery be necessary.

These processes are explained in the following sections. Figure 9-1 illustrates how user files are backed up.

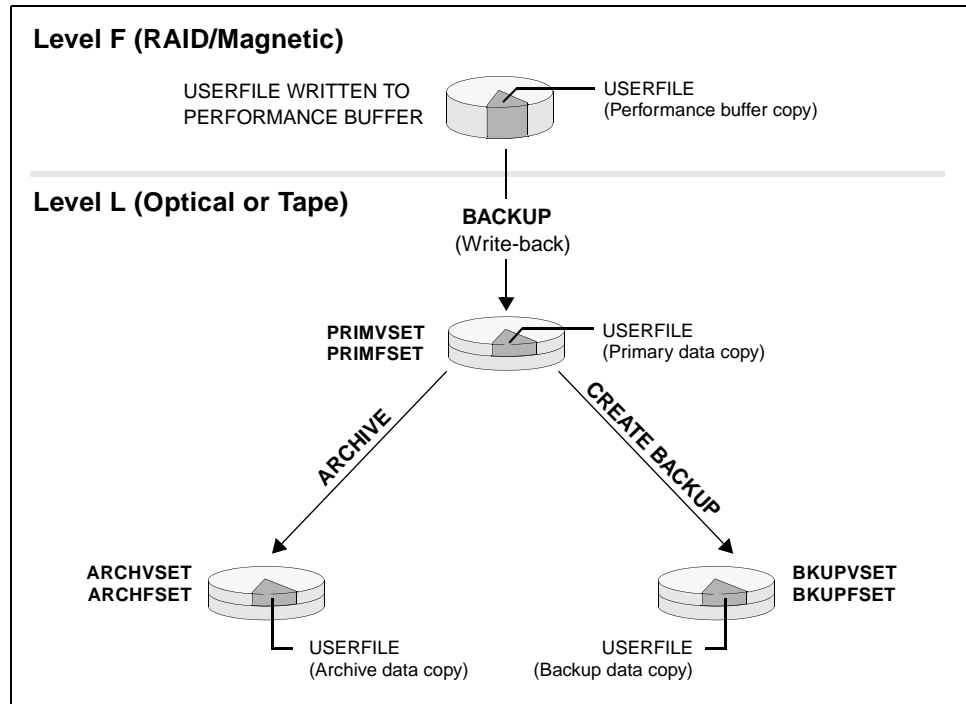


Figure 9-1: Backing Up User Files in StorHouse

System Parameters That Control User File Write-back and Backup

StorHouse uses the following system parameters to control the user file write-back and backup processes:

Parameter	Specifies
ARCHIVE_INDEX	Whether an internal StorHouse index file is used to track user files to be archived.
ATF	Value for the file's access time factor (ATF) attribute, which helps control when StorHouse migrates the file from the performance buffer.
BACKUP	Whether new file versions will be selected for backup or archive (BACKUP attribute).
BACKUP_INDEX	Whether an internal StorHouse index file is used to track user files to be backed up.
BKUP_MAX_LOAD	The maximum number of data transfers to be queued, per drive, at one time for write-back operations.
VTF	Value for the vulnerability time factor (VTF) attribute, which helps controls when StorHouse backs up the file from the performance buffer.

The default values and value ranges for these parameters are listed in Appendix A, “System Parameter Descriptions.” As system administrator, you can set new default values using the SET SYSTEM command to suit your site requirements. See “Setting System Parameters” on page A-3.

Users with the proper authority can change the attributes for a specific file or files using the SET FILE command. In such a case, the user-assigned value would apply to the attribute, rather than the system parameter value for that attribute. For information on setting attributes and other values for a file, see “Modifying User File Attributes and Values” on page 5-8.

Writing Back Files From the Performance Buffer to Their Primary File Sets

You can use the BACKUP command to write-back each new file extent in the performance buffer. You can submit BACKUP while the system is available for normal operations. However, you should schedule BACKUP using the SCHEDULE command to run periodically (for example, every day at midnight). See Chapter 12, “Controlling and Scheduling System Activity,” for more information on the SCHEDULE command.

Write-back processing times vary depending on the number of files written to StorHouse since the last write-back.

StorHouse does not write back files that have been deleted but not yet removed. You should submit the REMOVE FILE command on a regular basis to remove any deleted files that may be in the performance buffer. See “Using the REMOVE FILE Command” on page 5-34. Also, StorHouse does not immediately write back files that are software-disabled. However, you can use the /ALL modifier with the BACKUP command to write back all non-deleted files, including software-disabled files.

The following table defines the modifiers you can use with the BACKUP command:

Modifier	Description
/ALL	Specifies that all non-deleted file extents, including software-disabled extents, will be written back from the performance buffer to their primary file sets.
/DRIVES=...	Specifies the number or percentage of available drives in each library to use in the write-back process. This modifier allows you to limit the impact of the write-back process on available library resources.

You must have SYSTEM privilege to use the BACKUP command.

▼ **To write-back user files immediately and limit the number of drives used in each library for writebacks to 50%:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

BACKUP /DRIVES=50P

The command returns the StorHouse question mark (?) prompt after initiating the write-back operation. The return of the prompt does not mean that the actual write-back procedure has completed. Rather, it means that StorHouse has accepted the submitted command.

▼ **To write-back all non-deleted file extents to their primary file sets, including those that are software-disabled:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

BACKUP /ALL

▼ **To schedule user files for write-back on a regular basis:**

In this example, schedule user files for write-back every day at 11:00 pm starting January 1, 2000.

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

SCHEDULE /START=01-JAN-2000:23:00:00 /SCHEDULE=DAILY !BACKUP

Backing Up Primary Copies of User Files to Backup and Archive Volume Sets

As system administrator, it is your responsibility to create optional backup and/or archive copies of primary files. It is also your responsibility to create backup and/or archive volume sets for those files (see “Creating StorHouse Volume Sets” on page 4-4). The StorHouse directory organization, system parameters, and the Command Language features make these tasks easy for you.

Note For tape-only systems, FileTek recommends that you back up or archive your data *twice* (make two separate tape copies) before deleting data from the performance buffer.

Backing Up User Files to Backup Volume Sets


You use the CREATE BACKUP command to back up primary versions of user files to a backup volume set in a separate BACKUP directory. The command marks the primary file copy as BACKED UP in the primary directory and leaves it intact. StorHouse automatically selects new file versions for backup if you have scheduled the CREATE BACKUP command and the BACKUP system parameter is set to TRUE.

The CREATE BACKUP command performs incremental backups unless you specify /NOINCREMENTAL. An *incremental* backup is a backup copy of any missing or new file extents. A *full* backup is a whole new backup copy of the file version. You can schedule the CREATE BACKUP command. You must have SYSTEM privilege to use the CREATE BACKUP command and SETGROUP privilege to use the /GROUP modifier.

The following table defines the modifiers you can use with CREATE BACKUP:

Modifier	Description	Default
/CONFIRM	Controls whether StorHouse asks you to confirm the command.	-
/FSET=...	Specifies the file set in the primary volume set from which files are to be backed up.	/FSET=*
/GROUP=...	Specifies the file access group name from which files are to be backed up.	/GROUP=*
/INCREMENTAL	Specifies the type of file backups to perform.	/INCREMENTAL
/REPORT	Controls the generation of special text responses for the completion of significant actions.	-
/TO_FSET=...	Specifies the backup file set(s) to which primary files are to be copied.	BKPFSET
/TO_VSET=...	Specifies the volume set in the backup directory to which primary files are to be copied.	BKPVSET
/VERSION=...	Specifies the relative file version(s) of the files to be backed up.	/VERSION=*
/VSET=...	Specifies the primary volume set from which files are to be backed up.	/VSET= *
/WAIT	Instructs StorHouse to wait for a locked file to be unlocked before attempting to use it in the command execution.	-

▼ To back up primary copies of user files:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

CREATE BACKUP filename modifiers

where filename is the name of the file to be backed up to a backup file set and modifiers are other command and parameter modifiers you use to assign values other than the defaults. Below are some examples.

- To create an incremental copy of the current version (version 0) of primary file USERFILE (which resides in group USERGP) to the file set BKUPFSET in the volume set BKUPVSET, enter:

```
? CREATE BACKUP USERFILE /TO_FSET=BKUPFSET  
/TO_VSET=BKUPVSET /GROUP=USERGP /VERSION=0
```

- To create complete new backups of all files that are not marked as already having a current backup or as NOBACKUP to BKUPFSET in BKUPVSET:

```
? CREATE BACKUP * /TO_FSET=BKUPFSET /TO_VSET=BKUPVSET  
/NOINCREMENTAL
```

Archiving User Files to Archive Volume Sets

You use the ARCHIVE command to make an archive copy of a primary file in an archive volume set. The command marks the primary file copy as ARCHIVED in the primary directory and leaves it intact. StorHouse automatically selects new file versions for archive if you have scheduled the ARCHIVE command and the BACKUP system parameter is set to TRUE.

The ARCHIVE command performs incremental archiving unless you specify /NOINCREMENTAL. An *incremental* archive is an archive copy of any missing or new file extents. A *full* archive is a whole new archive copy of the file version. You must have SYSTEM privilege to use the ARCHIVE command and SETGROUP privilege to use the /GROUP modifier.

You may want to schedule the ARCHIVE command. See Chapter 12, “Controlling and Scheduling System Activity,” for more information on the SCHEDULE command.

The following table defines the modifiers you can use with ARCHIVE:

Modifier	Description	Default
/CONFIRM	Controls whether StorHouse asks you to confirm the command.	-
/FSET=...	Specifies the file set in the primary volume set from which files are to be archived.	/FSET=*
/GROUP=...	Specifies the file access group name from which files are to be archived.	/GROUP=*
/INCREMENTAL	Specifies the type of file archiving to perform.	/INCREMENTAL
/RECORD	Indicates whether the command is to change the archive flag in the primary directory when it archives a file version.	/RECORD
/REPORT	Controls the generation of special text responses for the completion of significant actions.	-
/TO_FSET=...	Specifies the archive file set(s) to which primary files are to be copied.	ARCFSET
/TO_VSET=...	Specifies the volume set in the archive directory to which primary files are to be copied.	ARCVSET
/VERSION=...	Specifies the relative file version(s) of the files to be archived.	/VERSION=*
/VSET=...	Specifies the primary volume set from which files are to be archived.	/VSET= *
/WAIT	Instructs StorHouse to wait for a locked file to be unlocked before attempting to use it in the command execution.	-

▼ **To archive primary copies of user files:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

ARCHIVE filename modifiers

where filename is the name of the file to be copied to an archive file set and modifiers are other command and parameter modifiers you use to assign values other than the defaults. Below are some examples.

- To create an incremental copy of the current version (version 0) of primary file USERFILE (which resides in group USERGP) to the file set ARCFSET in the volume set ARCVSET, enter:


```
? ARCHIVE USERFILE /TO_FSET=ARCHFSET  
/TO_VSET=ARCHVSET /GROUP=USERGP /VERSION=0
```

- To create complete new archives of all files that are not marked as already having a current archive or as NOBACKUP to ARCHFSET in ARCHVSET:

```
? ARCHIVE * /TO_FSET=ARCHFSET /TO_VSET=ARCHVSET  
/NOINCREMENTAL
```

Using Backup and Archive Copies of User Files for Duplexing

File duplexing allows StorHouse to read the duplex copy of a file extent when the primary copy is unavailable or for load balancing. The *duplex copy* can be either the backup or the archive copy of the file. You choose which one StorHouse should use. File replicas cannot be used for duplexing.

A primary copy is unavailable when it resides on a disabled volume or on a volume in an offline library. A *disabled volume* is a volume that you have marked as disabled using the StorHouse Command Language SET VOLUME /DISABLED command or that StorHouse disabled due to media errors. You might disable a volume because it is broken, unreadable, or misplaced. The ability to automatically read a duplex copy when the primary copy is unavailable expedites data recovery should the need arise and increases the StorHouse system's ability to read your data at any time.

StorHouse can also read a duplex copy of a file instead of the primary copy for *load balancing*, which distributes processing more evenly across multiple libraries. The ability to read the duplex copy even when the primary copy remains accessible can provide better overall system performance.

For information on how to disable a volume, see the section “Disabling Volumes” on page 8-11.

Developing a Duplex Strategy

You are responsible for setting up StorHouse for duplexing and for maintaining and monitoring StorHouse operations as they relate to the duplex feature. Setup involves creating duplex copies and then configuring several StorHouse system parameters. Once you have completed the setup, duplexing operations are transparent to StorHouse users.

Creating Duplex Copies

Before StorHouse can implement duplexing, you must have either backup or archive copies of your files. You tell StorHouse which type of copy to use for duplexing by setting the StorHouse DUPLEX_DIRECTORY system parameter to BACKUP or ARCHIVE.

To ensure that you have duplex copies available, you should schedule either the CREATE BACKUP or the ARCHIVE command to run at regular intervals. If you choose the BACKUP directory for duplexing, you should schedule the CREATE BACKUP command. If you choose the ARCHIVE directory, you should schedule the ARCHIVE command. This should be a system-wide decision for all files you want to duplex. In other words, don't create backup copies for some files and archive copies for others.

You should schedule backups or archives to run often enough to minimize the time that files exist without backup or archive copies. The frequency of these operations is site-dependent. Your FileTek customer support representative can help you determine the best schedule for your site.

Considerations. The rules for creating backup and archive copies are the same.

- The CREATE BACKUP and ARCHIVE commands can perform either full or incremental backups or archives.
- CREATE BACKUP automatically writes files to the backup directory. ARCHIVE automatically writes files to the ARCHIVE directory.
- You may select files to be processed by CREATE BACKUP or ARCHIVE by file name, group name, version number, volume set name, and/or file set name.
- Only files with the BACKUP attribute set to TRUE and that are not marked as having a current backup or archive copy are eligible to be backed up or archived.
- The system-wide BACKUP attribute is initially set by the BACKUP system parameter. You can customize this attribute for a particular file with the SET FILE command.

For more information about the CREATE BACKUP, ARCHIVE, and SCHEDULE commands, see the *Command Language Reference Manual*. For more information about the BACKUP system parameter, see Appendix A, "System Parameter Descriptions."

Selecting a Duplex Level

In addition to choosing a duplex directory and creating duplex copies, you need to select a duplex level for your site. Duplex levels indicate when StorHouse can access the duplex copy for reading.

StorHouse duplex levels are:

- **DISABLED** – Access the duplex copy only when the primary copy resides on a disabled volume.
- **OFFLINE** – Access the duplex copy when the primary copy resides either on a volume in an offline library or on a disabled volume.
- **ALL** – Access the duplex copy for load balancing, or when the primary copy resides either on a volume in an offline library or on a disabled volume.

A selection of OFFLINE includes DISABLED. A selection of ALL includes OFFLINE and DISABLED.

Typically, your StorHouse system will have at least two libraries to support a duplex level of OFFLINE or ALL. To support these levels, you can configure your system so that the primary and duplex file copies reside in different libraries. Or, you can use one library to support a duplex level of OFFLINE or ALL, which can be useful with tape libraries.

Configuring Your StorHouse System for Duplexing

This section explains the tasks you must perform to disable or configure duplexing on your StorHouse system. Task steps tell you how to set values for the DUPLEX_DIRECTORY, DUPLEX_ENABLE, and DUPLEX_BALANCE system parameters, which are defined in Table 9-1.

Table 9-1: System Parameters That Control File Duplexing

System Parameter	Description
DUPLEX_DIRECTORY	Specifies the directory to be used for duplexing operations. Valid values are BACKUP or ARCHIVE.
DUPLEX_ENABLE	Specifies the level of duplexing to be implemented. Valid values are: NONE Disable duplexing DISABLED Access the duplex copy only when the primary copy resides on a disabled volume OFFLINE Access the duplex copy when the primary copy resides on a volume in an offline library or on a disabled volume ALL Access the duplex copy for load balancing, or when the primary copy resides either on a volume in an offline library or on a disabled volume
DUPLEX_BALANCE	Specifies the required degree of similarity between media used for load balancing. You must specify a value for DUPLEX_BALANCE whenever you set DUPLEX_ENABLE to ALL. Valid values are: 0 Allow the use of any two media for load balancing (for example, OEB and TBB) 1 Restrict load balancing to media with the same first character in their media type codes (for example, OAD and OEB) 2 Restrict load balancing to media with the same two-character media type code (for example, OAB and OAD) 3 Restrict load balancing to media with the same media type code and recording type code (for example, TBB and TBB)

Enabling Duplexing

The following procedure explains how to enable duplexing. With duplexing enabled, StorHouse can read primary and duplex file copies. To enable duplexing, you must specify a duplex directory and choose a duplex level. For duplex levels of ALL, you must also select the degree of similarity (DUPLEX_BALANCE) between media used for load balancing.

▼ To set up your StorHouse system to use the duplex feature:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), set the value of the StorHouse DUPLEX_DIRECTORY system parameter to BACKUP or ARCHIVE.
 - To use a backup copy of your primary files as the duplex copy, enter:
`SET SYSTEM DUPLEX_DIRECTORY BACKUP`
 - To use an archive copy of your primary files as the duplex copy, enter:
`SET SYSTEM DUPLEX_DIRECTORY ARCHIVE`
3. At the StorHouse command prompt (?), set the value of the StorHouse DUPLEX_ENABLE system parameter to the duplex level you want to use. You have three choices:
 - To access the duplex copy of a file only when the primary copy resides on a disabled volume, enter:
`SET SYSTEM DUPLEX_ENABLE DISABLED`
 - To access the duplex copy of a file when the primary copy resides on a volume in an offline library or on a disabled volume, enter:
`SET SYSTEM DUPLEX_ENABLE OFFLINE`
 - To access the duplex copy of a file when you want StorHouse to load balance, or when the primary copy resides either on a volume in an offline library or on a disabled volume, enter:
`SET SYSTEM DUPLEX_ENABLE ALL`

Note: If you are duplexing primary files that reside on tape, set DUPLEX_ENABLE to ALL so StorHouse will always use the duplex copy of a file that resides on tape when the primary copy is unavailable or busy.
4. Complete this step only if you set DUPLEX_ENABLE to ALL.

At the StorHouse command prompt (?), set the value of the StorHouse DUPLEX_BALANCE system parameter to the degree of similarity you require between the media used for load balancing. You have four choices:

- To allow any two media to be used for load balancing (for example, OEB and TBB), enter:

`SET SYSTEM DUPLEX_BALANCE 0`

The value of 0 is the least restrictive setting.

- To restrict load balancing to media with the same first character in their media type codes (for example, OAD and OEB), enter:

```
SET SYSTEM DUPLEX_BALANCE 1
```

- To restrict load balancing to media with the same two-character media type codes (for example, OAB and OAD), enter:

```
SET SYSTEM DUPLEX_BALANCE 2
```

- To restrict load balancing to media with the same media and recording type codes (for example, TBB and TBB), enter:

```
SET SYSTEM DUPLEX_BALANCE 3
```

The value of 3 is the most restrictive setting.

Disabling Duplexing

The following procedure explains how to disable duplexing. With duplexing disabled, StorHouse can read primary file copies only. To disable duplexing, you need to configure only the DUPLEX_ENABLE system parameter.

▼ To disable duplexing on your StorHouse system:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), set the value of the StorHouse DUPLEX_ENABLE system parameter to NONE, as follows:

```
SET SYSTEM DUPLEX_ENABLE NONE
```

Protecting System Files

System files are StorHouse operating system files that contain StorHouse account information, directory information, system parameters, and other data used to control the system. StorHouse supports several features to protect system files:

- Maintaining *shadow*, or duplicate, copies of all StorHouse system files (including directory files) on an alternate magnetic disk(s) or RAID. StorHouse automatically updates the duplicate copy when it updates the primary file.
- Recording directory information on removable volumes. StorHouse automatically records this information whenever it writes a file to a volume in a StorHouse volume set.
- Checkpointing system files using the CHECKPOINT command.

- Copying directory information to directory extraction files using the EXTRACT DIRECTORY command.

Figure 9-2 illustrates how system files are backed up on StorHouse.

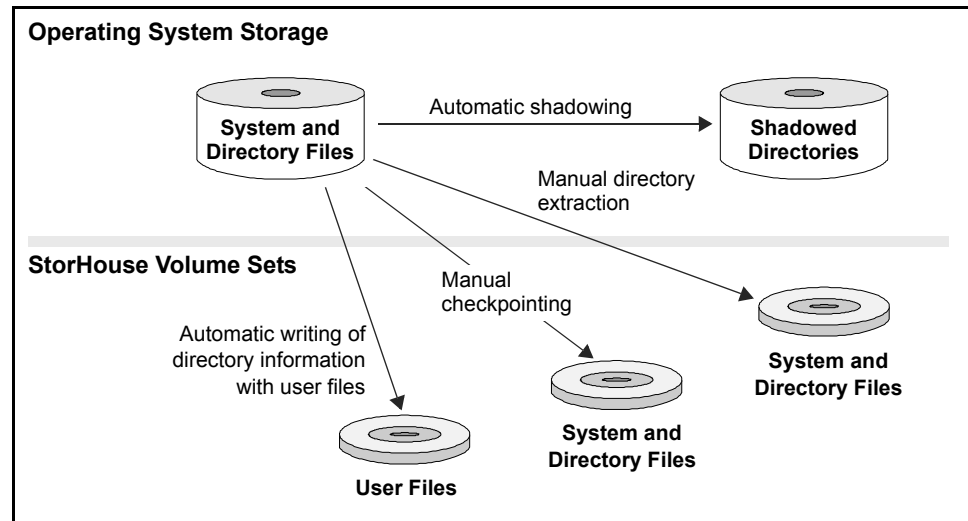


Figure 9-2: Backing Up System Files in StorHouse

You do not need to take any action to maintain shadow copies of system files or record directory information on removable volumes. StorHouse performs these procedures automatically. However, you need to set up your system for checkpointing and directory file extraction.

About Checkpointing

The *checkpoint* feature lets you take a snapshot of StorHouse system files by writing them to a StorHouse volume set. In the unlikely event that one or more system files becomes corrupted and normal recovery cannot restore them, a FileTek customer support representative will assist you in recovering your data using checkpointed information. The checkpoint feature greatly increases the speed of data recovery should the need arise.

System Parameters That Control Checkpointing

You set the system parameters listed in Table 9-2 to tune checkpoint operation to your site requirements.

Table 9-2: Checkpoint System Parameters

Parameter	Description
CHKP_ACCOUNT	Specifies the StorHouse account that will be used to write checkpoint information.
CHKP_FSET	Specifies the checkpoint file set.
CHKP_GROUP	Specifies the file access group that will be used for checkpoint files.
CHKP_LIMIT	Specifies the maximum number of checkpoints to maintain on the checkpoint volume set.
CHKP_ON	Enables or disables the system's ability to perform a checkpoint.
CHKP_TAKEN	Specifies the date and time of the last checkpoint.
CHKP_UPD_NOW	Specifies whether StorHouse will write any changed account or group information directly to the checkpoint volume set as it is updated.
CHKP_VSET	Specifies the checkpoint volume set.

For more information on these system parameters, see Appendix A, “System Parameter Descriptions.”

Using the CHECKPOINT Command


You use the CHECKPOINT command to initiate a checkpoint operation, which takes a snapshot of system files and writes them to a checkpoint volume set. You can enable or disable the checkpoint capability by setting the system parameter CHKP_ON to TRUE or FALSE. If CHKP_ON is set to TRUE and you issue the CHECKPOINT command, information will be written about system files. If CHKP_ON is set to FALSE and you issue the command, the system returns an error indicating that a checkpoint cannot be taken. Normal user operations can continue during a checkpoint.

StorHouse keeps the latest checkpoint volume or volumes (individual checkpoint operations may span volumes) in a library device and not on shelf storage because system checkpoint files may need to be written at any time. Therefore, do not use the MOVE VOLUME or MOVE VSET command to move checkpoint volumes out of a library device (unless you are replacing them with new volumes).

You can use the /CONFIRM and /REPORT modifiers with CHECKPOINT. /CONFIRM controls whether StorHouse asks you to confirm the command. /REPORT controls the generation of special text responses for the completion of significant actions.

You can schedule the CHECKPOINT command. You must have SYSTEM privilege to use the CHECKPOINT command.

▼ **To checkpoint system files:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

CHECKPOINT

Below is an example.


- To initiate a checkpoint and request a text response, enter:

? CHECKPOINT /REPORT

The system responds with the following message, which specifies the date (20000126) and time (140201) of the checkpoint, and the vid of the volume on which the checkpoint is located:

Successful checkpoint 20000126140201 is located on volume(s):
OAD"2E2F59A5":A


▼ **To see the date and time of the last checkpoint:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

? SHOW SYSTEM CHKP_TAKEN

Systems that have not taken any checkpoints will return a "NOT TAKEN" response.

▼ **To show the location of the last checkpoint (version 0 of all files in the CHKPOINT group, including file extent information):**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

? SHOW FILE * /GROUP=CHKPOINT /EXTENT

About Directory File Extraction

The StorHouse directory extraction feature supports the recovery of files on levels L and S. You implement directory extraction with the EXTRACT DIRECTORY command. EXTRACT DIRECTORY copies volume set, file set, volume, file access group, file version, file extent, and account information from StorHouse directories to *extraction files* that can subsequently be used to restore directory information.

Each successful directory extraction creates one *extraction control file* and one *extraction volume table of contents (VTOC) file* for each volume side for which file information is extracted. The contents of the control file include the groups, volume sets, file sets, volumes, accounts, and the names of all VTOC files associated with the extraction. The VTOC file identifies the file extents stored on the volume and their associated file version, group, file set, and volume set information.

StorHouse supports full and incremental directory extractions. A *full extraction*, which is the default, saves account, group, file set, volume set, removable volume, and removable volume file extent information for all volume sides. An *incremental extraction* adds to the information saved by previous full extractions by creating additional extraction files with significant changes (for example, new or newly removed extents) since the last extraction. (A modification to a file's last access date and time is an example of a change included in a full extraction but not in an incremental extraction.)

The EXTRACT DIRECTORY command is used with the RESTORE DIRECTORY command to implement directory recovery from extraction files. FileTek must perform this type of recovery for you. For more information on restoring directory information from extraction files, see "Directory Recovery From Extraction Files" on page 10-6.

Using the EXTRACT DIRECTORY Command

The EXTRACT DIRECTORY command copies directory information from your StorHouse system to directory extraction files. You can specify command modifiers to select the volume set (/TO_VSET) and file set (/TO_FSET) that will contain the extraction files, assign a VTF value to the extraction files (/VTF), and specify the file access group for the extraction files (/GROUP).

The following table defines all the modifiers you can use with EXTRACT DIRECTORY:

Modifier	Description	Default
/CONFIRM	Controls whether StorHouse asks you to confirm the command.	-
/GROUP=...	Specifies the name of the file access group in which the command will create extraction files.	Current default
/INCREMENTAL	Specifies whether the command will perform an incremental directory extraction.	-
/REPORT	Controls the generation of special text responses for the completion of significant actions.	-
/TO_FSET=...	Specifies the file set in which the extraction files will be created.	Current default
/TO_VSET=...	Specifies the volume set in which the extraction files will be created.	Current default
/VTF	Specifies the Vulnerability Time Factor (VTF) attribute of the extraction files to be created.	VTF system parameter

You can schedule the EXTRACT DIRECTORY command.

You must have SYSTEM privilege to use the EXTRACT DIRECTORY command, SETGROUP privilege to use the /GROUP modifier, and VTF privilege to use the /VTF modifier.

Note Before you issue the EXTRACT DIRECTORY command, issue the BACKUP command to write back all file extents in the performance buffer to their primary file sets. (You cannot restore extents that reside only on level F storage at the time of the extraction.)

▼ **To extract directory files:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

EXTRACT DIRECTORY modifiers

where **modifiers** are other command modifiers you use to assign values other than the defaults.

Below are some examples.

- To initiate a directory extraction that saves all current information in StorHouse files in group SMDIR1 directly in volume set SMDIR1 and file set

SMDIR1 (bypassing the performance buffer) and to request text responses, enter:

```
? EXTRACT DIRECTORY /VTF=DIRECT /REPORT /GROUP=SMDIR1
/TO_VSET=SMDIR1 /TO_FSET=SMDIR1
```

The command responds with the following message, which specifies the date (20000130, which equals January 30, 2000) and time (140201, which equals 2:02:01 pm) of the extraction:

Extract Directory, ID = 20000130140201, created 30-JAN-2000:14:02:01

The command also displays a report that lists each volume set, file set, file access group, volume, and account processed, as well as a set of summary statistics.

- To initiate an incremental directory extraction that saves all information changed since the previous directory extraction in StorHouse files in your default group, volume set, and file set using the default VTF (the value of system parameter VTF) and to request text responses, enter:

```
? EXTRACT DIRECTORY /INCREMENTAL /REPORT
```

The command responds with the following message, which specifies the date (20000202, which equals February 2, 2000) and time (140402, which equals 2:04:02 pm) of the directory extraction:

Extract Directory, ID = 20000202140402, created 02-FEB-2000:14:04:02

The command also displays a report for each volume set, file set, file access group, volume, and account processed, as well as a set of summary statistics.

Checkpoint or Extract Directory - Which Method Should You Use?

Both EXTRACT DIRECTORY and CHECKPOINT back up directory information for level L and level S files. FileTek generally recommends using EXTRACT DIRECTORY because of its flexibility, ease of use, and safety, but CHECKPOINT also has some advantages. Table 9-3 compares the two commands for completeness, flexibility, execution time, recovery time, impact on system operation, and ease of use.

Table 9-3: Command Comparison

Completeness	
EXTRACT DIRECTORY	Provides account, group, file set, volume set, removable volume, and removable volume file extent information. Does not save information for level F files.
CHECKPOINT	Provides more information than EXTRACT DIRECTORY as long as the latest log file is available. Does not save information for level F files.
Flexibility	
EXTRACT DIRECTORY	Offers an INCREMENTAL option that adds to the information saved by a previous EXTRACT DIRECTORY command. Enables recovery of more than one StorHouse system on a single backup system.
CHECKPOINT	Offers no INCREMENTAL option. Offers no option to recover multiple StorHouse systems on one backup system.
Execution Time	
EXTRACT DIRECTORY	Takes longer than CHECKPOINT when used with /FULL and there are many files and file extents. Takes less time than CHECKPOINT when used with /INCREMENTAL.
CHECKPOINT	Takes approximately the same amount of time whenever it is run.
Recovery Time	
EXTRACT DIRECTORY	Increases recovery time as the number of files and file extents increases. Takes less time than CHECKPOINT to recover on a system with a different device configuration or a newer StorHouse software release.
CHECKPOINT	Does not change recovery time significantly as directories grow in size. Takes longer than EXTRACT DIRECTORY to recover on a system with a different device configuration or a new StorHouse release.
Impact on System Operation	
EXTRACT DIRECTORY	Does not change normal system operation, so no significant recovery is required if the system crashes while EXTRACT DIRECTORY is running.
CHECKPOINT	Changes normal system operation so if the system crashes while CHECKPOINT is running, StorHouse must recover during restart.

Table 9-3: Command Comparison (continued)

Ease of Use	
EXTRACT DIRECTORY	Easier to use and change command options than CHECKPOINT. Can be scheduled.
CHECKPOINT	Requires a restart of StorHouse to change options. Can be scheduled.

Which command is best for you? The bottom line is to use whichever one best meets the needs of your installation.

Recovering User and System Files

StorHouse attempts to recover from error conditions automatically. However, there are some error conditions that require assistance to recover. FileTek provides the commands and procedures necessary to recover files should the need arise. How you recover data depends on the circumstances and extent of the loss.

This chapter discusses methods for recovering both user files and system files. You can recover user files yourself using StorHouse commands. However, FileTek must assist you to recover system and/or directory files.

About User File Recovery

Normally, user file read and write errors only affect the user's current command and the status of a file copy. Often, you or the user can recover an unreadable primary file by accessing (reading or writing) the file again. On rare occasion, you might not be able to read a file, possibly due to media problems such as a dirty or damaged media surface.

To recover one or more user files, you must delete and remove the unreadable primary files, and then create new primary files from their backup or archive copies. You use the StorHouse Command Language DELETE, REMOVE FILE, and CREATE PRIMARY commands to accomplish these tasks.

Note If a backup or archive copy is not available but an older version of the primary file exists, it may be possible to update the older version to rebuild the unreadable file.

Figure 10-1 illustrates the user file recovery process.

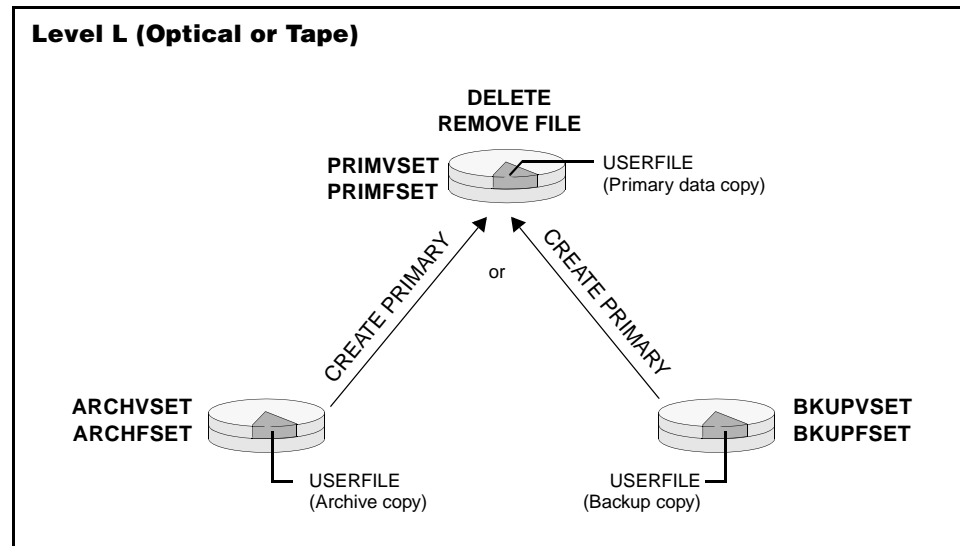


Figure 10-1: User File Recovery

Recovering User Files

Before you recover user file(s), you must have the following:

- A backup or archive copy of the primary file(s) you want to recover
- SETGROUP privilege to use the /GROUP parameter modifier in the DELETE and CREATE PRIMARY commands
- SYSTEM privilege to use the REMOVE FILE command
- COPY privilege to use the CREATE PRIMARY command
- FILE privilege to use the SET FILE command
- Read and write access to the file(s) you are recovering to bypass specifying file and group passwords.

▼ To recover one or more unreadable user files from a backup or archive copy:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command to delete the primary copies of the files you want to recover, and press **Enter**:

DELETE filename modifiers

where filename is the name of the file you want to delete (you can use a wild card as the last or only character to specify more than one filename) and modifiers are

the command and parameter modifiers you use to assign required values and values other than the defaults. For example:

- To delete the latest file version of the file USERFILE in your default file access group, type:

```
? DELETE USERFILE /VERSION=0
```

- To delete all file versions of the file STMT0200 in the file access group ACCTGRP, type:

```
? DELETE STMT0200 /VERSION=* /GROUP=ACCTGRP
```

3. At the StorHouse command prompt (?), type the following command to remove all files in the DELETED directory, and press **[Enter ↵]**:

```
REMOVE FILE
```

4. At the StorHouse command prompt (?), type the following command to create a new primary copy or copies of the file(s) you previously deleted and removed, and press **[Enter ↵]**:

CREATE PRIMARY filespec modifiers

where **filespec** is the name or the file identifier of the file you want to re-create (you can use a wild card as the last or only character to specify more than one file) and **modifiers** are the command and parameter modifiers you use to assign required values and values other than the defaults. Some examples follow:

- To create a primary copy of the latest version of the backup file USERFILE and write the new primary copy to your default file access group, default volume set, and the file set with the same name as the source file's file set (the file set must already exist in the destination volume set), type:

```
? CREATE PRIMARY USERFILE
```

- To create new primary copies of the latest version of all archive files in the volume set ARCVSET, the file set ARCFSET, and the group ACCTGRP, and place those files in the volume set ACCTVSET and the file set ACCTFSET, type:

```
? CREATE PRIMARY * /DIRECTORY=ARCHIVE /VSET=ARCVSET  
/FSET=ARCFSET /GROUP=ACCTGRP /TO_VSET=ACCTVSET  
/TO_FSET=ACCTFSET
```

5. At the StorHouse command prompt (?), type the following command to check the ARCHIVE directory for copies of the specified file versions and mark the file versions in the PRIMARY directory as archived, and press **[Enter ↵]**:

```
SET FILE * /RELINK=ARCHIVE
```


About System File Recovery

StorHouse system files contain programs, directories, system parameters, accounts, and other data used to control the system. StorHouse supports two types of system file recovery:

- Normal
- Extended

The following sections explain normal and extended recovery in more detail.

Normal Recovery

A *normal recovery* occurs when a StorHouse system goes down in an uncontrolled manner but no directory information is lost. In a normal recovery, StorHouse automatically restarts and recovers on its own.

All critical system files that may be updated during normal StorHouse operation, such as directory files, have shadow (duplicate) copies on a separate magnetic disk(s) or RAID from those containing the primary system files. If a system file becomes corrupted or destroyed, StorHouse attempts to log an error message and display it at the system console before shutting down. The operator must restart the system to initiate recovery. If the corrupted system file has a shadow copy, the system attempts to use the shadow copy to recover during the next startup. If there is no shadow copy, or the system is unable to recover, StorHouse attempts to log an error message and display it at the system console before shutting down. If you experience these types of system problems, call your FileTek customer support representative for assistance.

Extended Recovery

Extended recovery restores one or more system files that were not recovered during normal recovery. It can be used to restore directory information (*directory recovery*) at a site that is otherwise operational (media, data, and hardware are intact) or to restore a site that was completely destroyed or made inaccessible because of a disaster (*disaster recovery*).

StorHouse supports four extended recovery methods as shown in Table 10-1. FileTek must assist you with each of these methods.

Table 10-1: Extended Recovery Methods

Method	Recovers Information	For files on
Checkpoint recovery	From checkpoint files on a StorHouse volume set	Levels L and S
Directory recovery from extraction files	From extraction files on a StorHouse volume set	Levels L and S
Directory recovery from physical volumes	From the volume table of contents (VTOC) on level L and level S volumes	Levels L and S
Device scan recovery	By scanning the Centera device to be recovered	Level F

FileTek recommends that you create an extended recovery plan that best meets the needs of your organization. This plan will detail how you prepare for recovery, including which type(s) of recovery you will perform, which commands you will execute to take a snapshot of system files, how frequently you will execute them, and where you will store your checkpointed or extracted information. FileTek is available to help you develop this recovery plan.

A related document called *StorHouse Recovery Strategies*, publication number 900117, explains how to checkpoint, extract, and restore directory information. It also discusses recovery strategies for different StorHouse configurations. You can use this document as a guide to writing your own recovery plan. Ask your FileTek customer support representative for a copy.

The following sections describe StorHouse extended recovery methods in more detail. Refer to Table 9-3 on page 9-21 for a comparison of the CHECKPOINT and EXTRACT DIRECTORY commands in terms of completeness, flexibility, execution time, recovery time, impact on system operation, and ease of use.

Checkpoint Recovery

Checkpoint recovery uses “checkpoint” files that you created with the CHECKPOINT command prior to the data loss to recover one or more system files that were not restored during normal recovery. To perform checkpoint recovery, you must have enabled the checkpoint capability on your system and issued CHECKPOINT commands at regular intervals. See the section “About Checkpointing” on page 9-15 for information on how to set up your system for checkpointing and how to checkpoint your StorHouse system files.

Figure 10-2 illustrates the checkpoint recovery process.

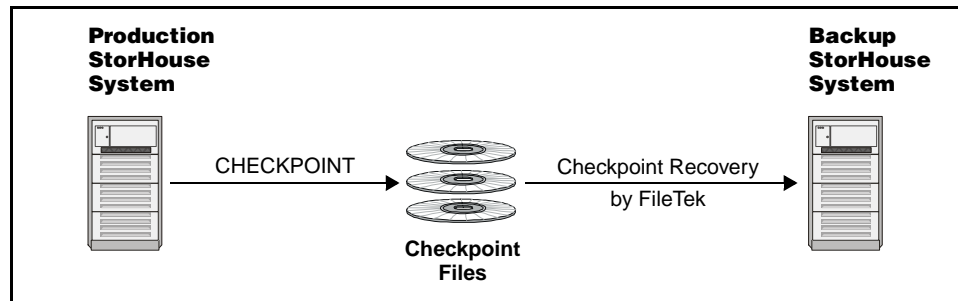


Figure 10-2: Checkpoint Recovery

Directory Recovery From Extraction Files

Directory recovery from extraction files restores StorHouse directory information from extraction files that you created prior to the loss. *Extraction files* contain volume set, file set, volume, file access group, file version, file extent, and account information from the directories of each source StorHouse system. You create extraction files by periodically issuing the EXTRACT DIRECTORY command on one or more StorHouse systems. Should the need arise, FileTek will execute the RESTORE DIRECTORY command, which uses information in the directory extraction files to restore lost directories from one or more source StorHouse systems to a backup StorHouse system.

Figure 10-3 illustrates the process of recovering directory information from extraction files.

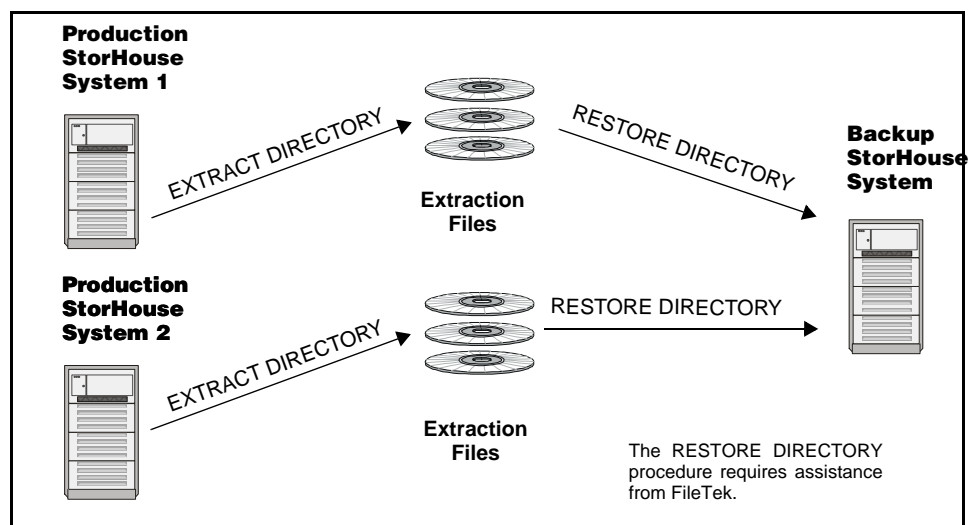


Figure 10-3: Directory Recovery from Extraction Files

Should you need to restore directory information, you need to restore only the volumes containing the extraction files. You do not need to subsequently import and catalog other primary volumes or backup or archive copies of all the volumes that were in the affected system. Because extraction files contain any changes made to the directories after the data volumes were written, they may provide more up-to-date information than the directory information that would be recovered from physical volumes.

Directory Recovery From Physical Volumes

Directory recovery from physical volumes restores directory information for level L and/or level S volumes from the volume table of contents (VTOCs) of your removable volumes. This recovery procedure is typically used only in the rare event that directory files cannot be recovered using any other method.

It is not necessary to recover the contents of all optical or tape volumes in the system (level L and level S) at one time. You can regain operational use of the StorHouse system by recovering and cataloging the volumes you need to access first. The remaining volumes can be added to the system as necessary to complete the total recovery.

During this type of recovery, FileTek customer support personnel reinitialize (clear all files from) the magnetic disks or RAID containing system files. If any of your user files on magnetic disks were not backed up from the performance buffer to their resident file sets, they cannot be recovered. Once the magnetic disks are reinitialized, FileTek personnel rebuild system files and set up empty directories.

Directory Recovery From Volumes in a Library Device. You can use the RECOVER DEVICE command to locate all volumes in the specified library device and restore volume directories based on information written in the VTOCs. The library device must be online to run this command, and the command can only be executed for one level L library device at a time. However, StorHouse can accept and process user requests for one device while it is recovering another device. After a RECOVER DEVICE command, volumes that were recovered are in the uncataloged state. You can then recover the volumes that you need immediately by cataloging their volume sets using the CATALOG VSET command. You must execute this command before files on the volumes can be accessed. The CATALOG VSET command adds file and file set information into the StorHouse directory from uncataloged volumes in a volume set.

Before you recover system files from volumes in a library device, you must have the following:

- SYSTEM privilege to use the RECOVER DEVICE command
- ALLOCATION and SYSTEM privileges to use the CATALOG VSET command.

You may want to schedule the CATALOG VSET command. See Chapter 12, “Controlling and Scheduling System Activity,” for more information on the SCHEDULE command.

▼ To recover system files from volumes in a library device:

1. Ask your FileTek customer support representative to set up your system for this type of extended recovery.
2. Start up StorHouse.
3. When StorHouse startup is complete, sign on to StorHouse using the operating system operator account and the StorHouse SYSTEM account.
4. At the StorHouse command prompt (?), type the following command to recover all volumes in a specified library device and press **[Enter↵]**:

RECOVER DEVICE did

where did is the library device to be recovered.

For example, to recover library device L01, type:

? RECOVER DEVICE L01

5. At the StorHouse command prompt (?), type the following command for each volume set to add directory information to the StorHouse system for the files and file sets in the recovered volumes and press **[Enter↵]**:

CATALOG VSET vset_name

where vset_name is the volume set containing the volumes whose files and file sets are to be cataloged.

For example, to catalog file and file set information from the recovered volumes in the volume set MAR00, type:

? CATALOG VSET MAR00

Directory Recovery From Volumes on Shelf. After the volumes in the library device are recovered and as time permits, you can recover volumes that are on shelf (level S) by importing them and cataloging the volume sets using the IMPORT and CATALOG VSET commands, respectively. The IMPORT command imports a volume or volume set into the StorHouse system. Unless you specify a directory, IMPORT creates an entry for the specified volume or volume set in the directory recorded in the volume labels or in the primary directory if the labels do not contain a directory specification. If you want to import volumes into an existing volume set, specify /MERGE. StorHouse requests the operator to load volumes until the operator indicates that there are no more volumes to be imported. For more information on importing volumes, see “Importing Volumes” on page 8-27.

Before you recover system files from volumes on shelf (level S), you must have ALLOCATION and SYSTEM privileges to use the IMPORT and CATALOG VSET commands. You may want to schedule the IMPORT command.

▼ To recover system files from shelf volumes and volume sets:

1. At the StorHouse command prompt (?), type the following command for each volume set to import the volumes and volume sets you want to recover and press **Enter** (↵):

IMPORT vset_name modifiers

where **vset_name** is the volume set to be imported or the existing volume set into which one or more volumes are to be merged and **modifiers** are other command and parameter modifiers you use to assign required values and values other than the defaults. Below are some examples.

- To import the volume set MAR00 of OEB media into library device L01, type:

? IMPORT MAR00 /LIBRARY=L01 /MEDIA=OEB

- To import volumes into an existing volume set, type:

? IMPORT MAR00 /MERGE

2. At the StorHouse command prompt (?), type the following command for each volume set to add directory information to the StorHouse system for the files and file sets in the imported volumes and press **Enter** (↵):

CATALOG VSET vset_name

where **vset_name** is the volume set containing the volumes whose files and file sets are to be cataloged.

For example, to catalog file and file set information from the recovered volumes in the volume set MAR00, type:

? CATALOG VSET MAR00

Device Scan Recovery

Device scan recovery supports directory recovery of Centera devices. It scans the level F device to be recovered to obtain information about the StorHouse files, extents, and file sets on the device. Then it catalogs those files, extents, and file sets. FileTek must assist customers with device scan recovery, which is initiated with the CATALOG DEVICE command.

Using Device Scan Recovery for Disaster Recovery. To prepare for disaster recovery of a level F device, the device at the primary site must replicate data to a similar device at the backup site. This requires a network connection of sufficient bandwidth. Because level F devices that support replication write files to a backup site almost continuously, device scan recovery restores files almost to the point of the disaster.

Device scan recovery is independent of existing disaster recovery procedures for level L optical and tape volumes. StorHouse systems with level F and level L devices must perform disaster recovery procedures for both storage levels. If checkpoint recovery is used to recover level L, it must be completed before level F device scan recovery begins.

Recovering Volumes

Volume recovery is the process of creating a replacement volume for one or more removeable volumes. You can implement volume recovery by using the RECOVER VOLUME command. Although you can recover enabled or disabled volumes, the primary purpose of volume recovery is to create a replacement volume for a volume you cannot access, such as a broken or misplaced volume. For example, an operator accidentally drops an optical platter and it shatters or cracks, or a volume on shelf storage gets misplaced and you cannot locate it. In this case, you must first disable the unreadable volume using the SET VOLUME /DISABLE command and then use the RECOVER VOLUME command to create the replacement volume. Also, you must have copies of the files on the volumes you want to replace. This type of volume recovery is called *disabled volume recovery* and is the subject of this chapter.

About Volume Recovery

Before recovering a volume, you need to know the following:

- The requirements for recovering disabled volumes
- How the RECOVER VOLUME command works
- The two ways you can use the command.

Requirements for Recovering Disabled Volumes

Before you can recover a disabled volume, you must have created copies of the files on the volume(s) you want to recover. Otherwise, no data exists for StorHouse to copy to the replacement volumes. For more information on creating backup and archive file copies for primary volumes, see “Backing Up Primary Copies of User Files to Backup and Archive Volume Sets” on page 9-5 or “Creating Duplex Copies” on page 9-10.

After the volume is disabled, you must do the following:

- If you are recovering primary volumes, set the DUPLEX_DIRECTORY system parameter to BACKUP or ARCHIVE. (If you are recovering a backup or archive volume, the system accesses the primary volume so the parameter is not used.)
- Issue a SET VOLUME /DISABLE command for each volume that you want to recover.

The /DISABLE parameter modifier tells StorHouse that the volume state is DISABLED. Also, the DISABLED state is a volume selection criteria for the RECOVER VOLUME command. See “Disabling Volumes” on page 8-11 for the procedure to disable a volume(s).

Command Processing

The RECOVER VOLUME command performs the following steps when it recovers a selected volume:

1. Allocates an empty replacement volume in the same volume set.
2. Sets the state of the replacement volume to CATALOGING.
3. Allocates space for file sets on the replacement volume, as needed.
4. For each extent on the original volume, it writes a new copy on the replacement volume from the original (if readable) or other (such as backup or archive) copy, and changes the directory entry for each original extent to point to the replacement volume.
5. Sets the extent allocation times on the replacement volume to match those on the original volume.
6. Uncatalogs and exports the original volume.
7. Sets the state of the replacement volume to CATALOGED.

If the command is unable to write all file extents to the replacement volume, it returns an error condition for the selected volume and proceeds to the next selected volume. In this case, the command will not uncatalog and export the selected volume on which the error condition occurred. If the command failure is correctable (such as lack of available space on the replacement volume), you can issue another RECOVER VOLUME command that selects the original volume, moves any remaining extents to a new replacement volume, and uncatalogs and exports the original volume.

If the original volume is uncataloged, the command skips the volume and notifies the user with a message.

Volume Selection Criteria

There are two ways to submit the RECOVER VOLUME command:

- Preview mode

You can identify the volumes needed to restore the selected (disabled) volume and display information about them without performing the recovery operation by using the /PREVIEW command modifier. The copies of the files on the selected volume may be located on a number of volumes. These volumes may be stored offsite or on shelves. This modifier displays information on the selected volume and on each volume needed to recover the selected volume.

- Execution mode

You can perform the actual recovery operation by using the RECOVER VOLUME command without the /PREVIEW command modifier.

You can select specific volumes to be recovered using several RECOVER VOLUME command and parameter modifiers. The following table defines the modifiers that affect volume selection.

Modifier	Description	Default
/DEADLINE	Limits the length of time the command runs.	No limit
/DIRECTORY=...	Indicates that the command will consider for selection only volumes in the directory specified by this modifier.	-
/DISABLED	Determines whether the command uses the volume state DISABLED to select volumes.	/DISABLED
/LAST_ALLOCATION	Limits the selected volumes to those with a last allocation date and time in the specified range.	-
/LIMIT	Limits the number of volumes to be selected.	/LIMIT=1

Modifier	Description	Default
/MAX_ERRORS	Controls the maximum number of errors StorHouse allows when it finds file extents that are not accessible on a volume. If the number of errors reaches this limit, StorHouse stops processing the current volume	/NOMAX_ERRORS
/ORDER	Processes selected volumes in the specified order: <ul style="list-style-type: none"> • ANY – In whatever order is quickest for selecting volumes. • NATURAL – In chronological order by last allocation date, starting with the volume with the oldest last allocation date. • REVERSE – In reverse chronological order by last allocation date, starting with the volume with the most recent last allocation date. 	/ORDER=NATURAL
/SET	Limits the selected volumes to one particular volume set.	-

Previewing Disabled Volumes for Recovery

You can use the /PREVIEW modifier on the RECOVER VOLUME command to identify the volumes that are needed to recover one or more disabled volumes. This modifier allows you to prepare for a recovery. It selects the volumes needed and displays the following information:

- Volume identification code (vid) of the selected volume
- Volume set name of the selected volume
- Vid of each volume needed to restore the selected volume
- Volume set name of each volume needed to restore the selected volume
- State of each volume needed to restore the selected volume
- Location of each volume needed to restore the selected volume
- Memo for each volume needed to restore the selected volume.

Because the RECOVER VOLUME command selects disabled volumes by default, you do not need to specify /DISABLED in the command.

You must have ALLOCATION and SYSTEM privileges to use the RECOVER VOLUME command.

▼ To preview which volumes are required to recover one or more disabled volumes:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

RECOVER VOLUME /PREVIEW vid modifiers

where *vid* is the volume identification code of the volume to be recovered (you can use a wild card to specify more than one volume) and *modifiers* are other command and parameter modifiers you use to assign values other than the defaults. Some examples follow.

- To preview which volumes are needed to recover the disabled volume OEB01234567, enter:

? RECOVER VOLUME /PREVIEW OEB01234567
- To preview which volumes are needed to recover no more than 20 disabled volumes in the volume set MAR00, enter:

? RECOVER VOLUME /PREVIEW * /VSET=MAR00 /LIMIT=20

Recovering Disabled Volumes

You can recover one or more disabled volumes by using the RECOVER VOLUME command. This command selects volumes, creates a replacement volume for each selected volume, and uncatalogs and exports the volumes that have been replaced.

You must have ALLOCATION and SYSTEM privileges to use the RECOVER VOLUME command.

▼ To recover one or more disabled volumes:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press Enter ↵:

RECOVER VOLUME *vid modifiers*

where *vid* is the volume identification code of the volume to be recovered (you can use a wild card to specify more than one volume) and *modifiers* are other command and parameter modifiers you use to assign values other than the defaults. Below are some examples.

- To recover the disabled volume OEB01234567, type:

? RECOVER VOLUME OEB01234567
- To recover no more than 10 disabled volumes in volume set MAR00, type:

? RECOVER VOLUME * /VSET=MAR00 /LIMIT=10

- To recover no more than five disabled volumes in the PRIMARY directory on which space was last allocated between January 1, 2000 and March 31, 2000, processing the most recently allocated volume first, type:

```
? RECOVER VOLUME * /LAST_ALLOCATION=(01-JAN-2000, 31-MAR-2000) /ORDER=REVERSE /LIMIT=5 /DIRECTORY=PRIMARY
```

- To recover no more than two disabled primary volumes and instruct the command to start processing a volume only if no more than four hours have elapsed since the command was invoked, type:

```
? RECOVER VOLUME /DEADLINE=D4 * /LIMIT=2  
/DIRECTORY=PRIMARY
```

- To recover all disabled backup volumes and limit the number of possible errors to 5, type:

```
? RECOVER VOLUME * /REPORT /DIRECTORY=BACKUP /LIMIT=n  
/MAX_ERRORS=5
```

The command recovers (copies) backup or archive files from their primary copies, if necessary.

Controlling and Scheduling System Activity

StorHouse manages resources by allocating devices to specific activities and queuing work requests. As system administrator, you can also manage StorHouse resources through the use of system parameters and scheduled commands.

This chapter discusses how to:

- Control internal system activity
- Control system activity
- Control operator activity
- Improve performance for library devices
- Control log files
- Schedule activities
- Monitor system performance and activity.

Controlling Internal System Activity

StorHouse provides system parameters that control various types of activity within the system. With assistance from your FileTek customer support representative, you can tune these parameters for your site's needs. Appendix A, "System Parameter Descriptions," defines all available StorHouse system parameters and lists their default values. This appendix also contains a section called "Setting System Parameters," which explains how to change a system parameter value.

Data Transfer Paths

The XFR_COUNT system parameter determines the maximum number of concurrent file transfers allowed for a StorHouse system. Your FileTek customer support representative can change the value of the parameter while the StorHouse software is shut down. The value can range from 1 through 64. The default installation value is 24.

The larger the value of this parameter, the more concurrent file transfers users can perform. However, the more concurrent transfers there are, the more contention there will be for processor time and devices. As a result, the system throughput may suffer, and user requests may be delayed.

The actual number of transfers that can take place at any one time depends upon the volumes and devices required and the types of transfers:

- Users can access only one side of an optical volume of type OA or OE at one time, so requests for different sides of the same volume must be processed sequentially rather than concurrently.
- Only one user can write to an optical or tape volume at a time. Requests to write to a tape or the same side of an optical volume must be processed sequentially rather than concurrently.
- Only one user can read a tape at a time; however, many users can read from an optical volume while a single user is writing to it (media types OA, OC, and OE).
- The number of optical disk or tape volumes users can access at one time is equal to the number of optical or tape drives available.

Queue Control

The system manages its work queues and controls activity to avoid overloading its resources. The MIG_MAX_LOAD system parameter allows you to adjust this control for migration operations, and the BKUP_MAX_LOAD system parameter allows you to adjust it for write-back operations.

MIG_MAX_LOAD specifies the maximum number of file transfers to be queued at one time for a migration operation. Similarly, BKUP_MAX_LOAD specifies the maximum number of file transfers to be queued at one time for a write-back operation. These parameter values help determine what impact a file migration or write-back operation has on other system activities and how long the operation will take.

If the value is low compared to the total number of data transfer paths, a write-back or migration has little impact on other system activities, but it may take a long time to complete. If the value is high, a migration or write-back may monopolize the available resources and cause user file transfers to wait; however, the migration or write-back completes faster.

You can change the value of MIG_MAX_LOAD or BKUP_MAX_LOAD, if necessary. The default installation value for both parameters is 25. The value for both can range from 0 through 25.

VRAM Process Control

StorHouse uses the following system parameters to control VRAM processes.

Table 12-1: System Parameters That Control VRAM Processes

Parameter	Specifies
PRIO_READ_REC	The priority of record read operations for use in allocating drive resources.
PRIO_READ_SEQ	The priority of sequential read operations for use in allocating drive resources.
VRAM_CACHE_MAX	The maximum number of bytes of cache for records read from a VRAM file.
VRAM_FILE_CACHE	The maximum number of VRAM FPT (frame pointer table) frames contained in the magnetic layer frame pool.
VRAM_FILE_OPEN	Whether StorHouse is to keep data extents open between record read or update operations for a VRAM file.
VRAM_KEYED	Whether VRAM KEYED files can be created by users.
VRAM_KEYS_PN	The minimum capacity of nodes in VRAM K extents in terms of number of keys.
VRAM_MEM_CACHE	The maximum number of VRAM FPT frames cached in local memory.
VRAM_NUM_KC	Maximum number of concurrent VRAM copy processes that can be created to copy file extents between VRAM scratch space and user file space (KC processes).
VRAM_NUM_KS	Maximum number of concurrent VRAM read processes that can be created to process sequential reads (KS processes).
VRAM_NUM_KU	Maximum number of concurrent VRAM update processes that can be created to process updates (KU processes).
VRAM_NUM_KW	Maximum number of VRAM write processes that can be created to process writes, also known as appends (KW processes).
VRAM_RELEASE	The release number of the current VRAM software.
VRAM_UPDATE	Which method of updating VRAM files StorHouse must use for new files and files that have not been updated before.

During StorHouse startup, the system starts one KC, KS, KU, and KW process. The system may create additional processes, up to the specified maximum values listed in Appendix A, as required to process user requests.

VRAM File Extent Control

The VRAM_FILE_OPEN system parameter controls whether StorHouse keeps a VRAM file extent open between record read or update operations. TRUE tells StorHouse to keep the extent open. FALSE tells StorHouse to close the extent. You can change the parameter with assistance from your FileTek customer support representative while the StorHouse software is down. The default installation value is FALSE.

Keeping the extent open can provide better performance for random record access, but it keeps the volume in a drive until the file is closed or until another extent is needed. Also, if your VRAM files tend to have many extents (applications do many appends), there is minimal performance gain.

Controlling System Activity

StorHouse provides various commands to help control system activity. These commands include RESERVE SYSTEM, SHUTDOWN, and MESSAGE.


Reserving the System for Maintenance

RESERVE SYSTEM reserves the StorHouse system for use by one account, typically for maintenance. StorHouse does not terminate the sessions of users who are already signed on when you execute the command. You can enter an optional text message to send to users who attempt to sign on with another account when the system is reserved.

You can cancel the reservation of the system and allow users of other accounts to sign on using the /CANCEL modifier. As with the RESERVE SYSTEM command, the RESERVE SYSTEM /CANCEL command does not affect the sessions of users who are already signed on.

You must have OPERATOR or SYSTEM privilege to use RESERVE SYSTEM.

▼ **To reserve the StorHouse system for your account:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** :


RESERVE SYSTEM <"text">

where text is optional message text. An example follows:

- To reserve the StorHouse system for your account and enter the text message “StorHouse is reserved for maintenance,” enter:

? RESERVE SYSTEM “StorHouse is reserved for maintenance”

▼ To cancel the reservation of the StorHouse system for your account:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

RESERVE SYSTEM /CANCEL

Shutting Down the System

SHUTDOWN shuts down the StorHouse software. As it initiates the shutdown, the command notifies users that the system is shutting down and stops the StorHouse software in a controlled manner.

In a controlled shutdown, StorHouse allows all existing user commands and scheduled events to complete before the shutdown begins. It allows background functions, such as backup and migration functions, to complete their current file transfer or similar activity, but it does not allow them to initiate new activities. It allows users to sign off, but does not allow users (other than the initiator of the SHUTDOWN command) to enter new commands. After all commands and events have completed, the system software performs housekeeping tasks and then stops.


The following table defines the modifiers you can use with SHUTDOWN:

Modifier	Description	Default
/CANCEL	Terminates a delayed shutdown (if you specified /DELAY with a time) that was previously initiated.	-
/CONFIRM	Controls whether StorHouse asks you to confirm the command.	/CONFIRM
/DELAY=...	Specifies the amount of time (in minutes) that the system will wait before starting the shutdown procedure.	/DELAY=0
/NOW	Terminates all activity immediately.	-
/TIMEOUT=...	Specifies the maximum number of minutes the system will wait, after any /DELAY has expired, for all user activity to complete before aborting any remaining transactions.	/TIMEOUT=1440

Note The SHUTDOWN /CANCEL command does *not* terminate the shutdown if you issued SHUTDOWN without a /DELAY period, or if the delay period has expired.

You must have OPERATOR privilege to use the SHUTDOWN command.

▼ **To shut down the StorHouse system:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

SHUTDOWN <"message"> modifiers

where **message** is an optional message to notify users of the shutdown and **modifiers** are other command modifiers you use to assign values other than the defaults. Examples follow:

- To shut down StorHouse immediately, enter:

? SHUTDOWN /NOW

- To notify all users that StorHouse will shut down, delay the shutdown 10 minutes, and enter a timeout period of 30 minutes, enter:

? SHUTDOWN "StorHouse is shutting down" /DELAY=10 /TIMEOUT=30

- To cancel the StorHouse SHUTDOWN at any time during the delay period, enter:

? SHUTDOWN /CANCEL

Sending User Messages

MESSAGE sends a message to a user, the operator at the StorHouse console, or the administration log. In addition, it adds or removes text from the system welcome message.

The following table defines the modifiers you can use with MESSAGE:

Modifier	Description
/BELL	Indicates that the bell on the receiving terminal will ring when the terminal receives the message.
/CANCEL	Instructs the system to remove text from the StorHouse welcome message that was previously added using /SYSTEM.
/LOG	Instructs the system to record the text in the StorHouse administration log.
/OPERATOR	Instructs the system to display the text on the StorHouse operator's console and in the message queue of all console-enabled terminals. /OPERATOR is the default if you do not use another modifier to specify a destination.

Modifier	Description
/SYSTEM	Instructs the system to replace the text in the StorHouse welcome message.
/UID=...	Specifies the user identification code(s) of the user(s) who will receive the message.

You must have MESSAGE privilege to use the MESSAGE command.

▼ **To send a message to the StorHouse operator console, the administration log, or to another user:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

MESSAGE "text" modifiers

where text is the contents of the message and modifiers are other command modifiers you use to assign values other than the defaults. Some examples follow:

- To replace the text "StorHouse will be down this weekend" to the system welcome message, enter:

? MESSAGE /SYSTEM "StorHouse will be down this weekend"

- To delete the text from the welcome message, enter:

? MESSAGE /CANCEL

- To send the message "Shut down the system at 4 pm" to the message queues of all console-enabled terminals and to the user with a uid of 3, sound the bell at terminals receiving the message, and enter the message in the administration log, enter:

? MESSAGE /UID=3 /OPERATOR /LOG /BELL "Shut down the system at 4 pm"

- To send the message "The system will be shut down for 15 minutes at 5 pm today" to all interactive users currently signed on, enter:

? MESSAGE /UID=* "The system will be shut down for 15 minutes at 5 pm today"

Controlling Operator Activity

The OPERATOR system parameter informs StorHouse when an operator is on duty. During installation, the parameter is set to TRUE, which indicates that an operator is present. FALSE indicates that an operator is not available to handle load/unload requests.

If OPERATOR is FALSE:

- EXPORT and IMPORT commands are rejected unless they are already in progress when the parameter is set to FALSE.
- Requests to load or unload volumes at library device exchange stations are rejected, and the system returns an error for any related command.
- If an operation requires a blank volume and no blank volumes are available on-line, the system rejects the operation; however, requests for blank volumes are still sent to the operator console.

If you want requests to wait for an operator to process them, whether or not an operator is present, set OPERATOR to TRUE.

Improving Performance for Library Devices

StorHouse supports the following performance enhancements:

- Improved performance for volume operations in library devices that cannot exchange volumes at the drive, either because they have only one accessor (gripper) or because only one accessor is available.
- Ability to minimize volume mounts within a library device.
- Ability to unload idle volumes.

You control how these enhancements work by setting values for specific StorHouse system parameters.

Improving Performance for Volume Operations

To improve volume operations for library devices that cannot exchange volumes at a drive, you can set the TMD_DISMNT_DELAY system parameter to delay a volume dismount in case another request for the volume is expected to arrive momentarily. When you set this parameter, StorHouse will automatically dismount a volume from one drive and move it to a slot if no other drives in the library device are empty and the volume in that drive has not been accessed for a period of time (in other words,

the drive has been idle). This action allows one drive to remain free at all times for the next volume that has to be mounted. This capability is transparent to users.

Minimizing Volume Mounts

You can minimize volume mounts within a library device to improve system performance by setting two system parameters: TMD_HOLD_HIGH and TMD_HOLD_LOW. These parameters allow you to specify the number of seconds the system is to hold a volume in a drive following completion of a high- or low-priority transfer, respectively, if another volume requires the drive.

Unloading Idle Volumes

You can direct StorHouse to dismount volumes that have been idle for a period of time you specify by setting the TMD_UNLOAD_IDLE system parameter. Once the time period has expired, the system will dismount and unload the volume, and store it in a slot. This action prevents unnecessary wear on the drives.

Controlling Log Files

Controlling log files is an important system housekeeping activity that you must manage to ensure the most efficient operation of your StorHouse system. You control log files using selected system parameters and the NEWLOG command.

FileTek's StorHouse/Performance Monitor™ product provides the most efficient way to access information in the user log. See your FileTek account representative to find out more about this product.

System Parameters for Log File Control

Table 12-2 lists the system parameters that control log file generation. For more information about these parameters, refer to Appendix A, "System Parameter Descriptions."

Table 12-2: System Parameters That Control Log Files

System Parameter	Description
ADMINLOG	Specifies the number of versions of the system administration log to be retained by the system.
LOG_ACCOUNT	Specifies the account that writes user logs to StorHouse.

Table 12-2: System Parameters That Control Log Files (continued)

System Parameter	Description
LOG_COMMAND	Enables or disables logging of command execution information records into the user log.
LOG_COPY	Enables or disables logging of file copy records into the user log.
LOG_DEVICE	Enables or disables logging of device information records into the user log.
LOG_FILE	Enables or disables logging of file open and close records into the user log.
LOG_FSET	Specifies the file set that contains StorHouse user logs.
LOG_GROUP	Specifies the file access group for StorHouse user logs.
LOG_HEART	Enables or disables logging of system heartbeat information records into the user log.
LOG_INTERVAL	Specifies the time between automatic writes of interval log records into the StorHouse user log.
LOG_MAX	Specifies the number of user logs to maintain.
LOG_OPERATOR	Enables or disables logging of operator console message records into the user log.
LOG_POLL	Enables or disables logging of polled (interval) records into the user logs.
LOG_SECURITY	Enables or disables logging of security violation attempt information records for StorHouse/SM and StorHouse/RM into the user log.
LOG_SERVER	Enables or disables logging of user log records for use by the real-time user log server.
LOG_SIGN	Enables or disables logging of signon and signoff information records for StorHouse/SM, and connect and disconnect records for StorHouse/RM, into the user log.
LOG_SQL_STMT	Enables or disables logging of a user's SQL statement into the user log.
LOG_SQL_TRANS	Enables or disables logging of transaction statistics records upon the completion of a transaction into the user log.
LOG_SYSTAT	Enables or disables logging of system startup and shutdown information records into the user log.
LOG_VOLUME	Enables or disables logging of volume mount/dismount/movement information records into the user log.
LOG_VSET	Specifies the volume set that contains StorHouse user logs.
LOG_XFER	Enables or disables logging of extent transfer records into the user log.

Closing Current Logs and Opening New Logs

You can use the NEWLOG command to close the current administration and user logs and open new ones. NEWLOG also causes StorHouse to write the old version of the user log to a StorHouse file in a specific volume set and file set as determined by the values of the LOG_FSET and LOG_VSET system parameters. End-users can access the user log for report generation purposes. FileTek schedules NEWLOG to run daily using the default modifiers.

The following table defines the modifiers you can use with NEWLOG:

Modifier	Description	Default
/ADMINISTRATION	Specifies that the current system administration log is to be closed and a new version opened.	/ADMINISTRATION
/REPORT	Controls the generation of special text responses for the completion of significant actions.	-
/USER	Specifies that the current user (management information) log is to be closed and written to a StorHouse file, and a new version is to be opened.	/USER

You must have SYSTEM privilege to use NEWLOG.

▼ To close current logs and open new ones:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

NEWLOG modifiers

where modifiers are other command modifiers you use to assign values other than the defaults. Below are some examples:

- To close the current system administration and user logs and open new versions of both, type:
? NEWLOG
- To close the current system administration log and open a new version, type:
? NEWLOG /ADMINISTRATION
- To close the current user log and open a new version, type:
? NEWLOG /USER

Scheduling Activities

StorHouse provides several commands that let you schedule management functions for specific times of day or for periodic execution, display information about scheduled events, and remove scheduled events from the queue. StorHouse also provides a system parameter that limits the number of events that can run concurrently.

Limiting the Number of Scheduled Events That Can Run Concurrently

You can control the number of scheduled events that can run concurrently by setting the SSPNO system parameter. The default installation value is 10. The minimum value is 1. The maximum value is 10.

Scheduling a StorHouse Event

The SCHEDULE command schedules an event, where an event is the execution of one of the following Command Language commands:

- ARCHIVE
- BACKUP
- CATALOG VSET
- CHECKPOINT
- CREATE BACKUP
- DOWN DEVICE
- ERASE VOLUME
- ERASE VSET
- EXPORT
- EXTRACT DIRECTORY
- IMPORT
- INITIALIZE DEVICE
- MESSAGE
- MIGRATE
- MOVE VOLUME
- MOVE VSET
- NEWLOG
- PURGE
- RECOVER VOLUME
- RELOCATE
- REMOVE FILE
- REPLICATE
- RESTORE DIRECTORY
- RETIRE VOLUME
- RUN
- SERVICE
- SET DEVICE
- SET FILE
- SET SYSTEM
- SET VOLUME
- SHUTDOWN
- STAGE
- UNCATALOG VOLUME
- UNCATALOG VSET
- UP DEVICE
- VALIDATE VOLUME

FileTek suggests you schedule commands that generate operator messages. Commands like MOVE VOLUME, MOVE VSET, EXPORT, and IMPORT tie up your user session until the operator responds to volume load and unload requests. In contrast, when you schedule these commands, the SCHEDULE command starts a separate user session for command execution and operator response. This way, your terminal remains open so that you can continue working.

The following table defines the modifiers you can use with SCHEDULE:

Modifier	Description
/ACCOUNT	Specifies an account for which an event is to be scheduled. If omitted, StorHouse schedules the event under the account of the user who submits the SCHEDULE command.
/PASSWORD	Specifies the password for the account specified by /ACCOUNT.
/REPORT	Reports the scheduling of the event (in other words, the completion of the SCHEDULE command). It does not report the completion of the event.
/SCHEDULE	<p>Specifies how often the command is to be executed (rate) using a frequency and optional multiplier. After each run, StorHouse reschedules the command to run again according to the specified schedule. The frequency must be one of the following:</p> <ul style="list-style-type: none"> • HOURLY (60 minutes) • DAILY (24 hours) • WEEKDAYS (Monday, Tuesday, Wednesday, Thursday, and Friday) • SATSUN (Saturday and Sunday only) • MONTHLY (28 to 31 days depending on the actual month) • EOM (end of month—last day) <p>You can specify the multiplier for the HOURLY, DAILY, and MONTHLY frequencies.</p>
/START	Specifies an absolute time (a calendar date and clock time) or delta time (an amount of time since or before an event) at which the command is to start.

You must have SCHEDULE privilege to use the SCHEDULE command. If you use command modifiers, the command being scheduled must be the last item in the command line. For IBM MVS hosts, you must use a solid vertical bar (!) in place of an exclamation point in the command syntax.

▼ **To schedule a StorHouse event:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

SCHEDULE ! modifiers command_line

where modifiers are other command modifiers you use to assign values other than the defaults and command_line is the command to be scheduled. Some examples follow:

- To schedule the MOVE VOLUME command to run immediately and move volume OAD2173C123 to shelf, enter:

? SCHEDULE !MOVE VOLUME OAD2173C123 S00

- To schedule a weekly backup (DAILY:7 indicates once every 7 days), where StorHouse will run the backup under your account (because you are scheduling it) and StorHouse will run the first backup at 3:00 a.m. on January 1, 2000, enter:

```
? SCHEDULE /START=01-JAN-2000:03:00:00 /SCHEDULE=DAILY:7
!BACKUP
```

Displaying Information About Scheduled Events

You can use the SHOW SCHEDULE command to display events (commands) that are in the queue of scheduled events.

The following table defines the modifiers you can use with SHOW SCHEDULE:

Modifier	Description	Default
/ACCOUNT	Specifies an account for which a scheduled event is to be displayed.	/ACCOUNT
/COMMAND	Displays scheduled commands.	/COMMAND
/ID	Displays scheduled event identifiers or a specific scheduled event.	/ID
/SCHEDULE	Displays command schedules.	/SCHEDULE
/START	Displays command start times in absolute time.	/START

You must have SHOW or SCHEDULE privilege to use the SHOW SCHEDULE command.

▼ To display information about scheduled events:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

SHOW SCHEDULE modifiers

where modifiers are other command modifiers you use to assign values other than the defaults. Some examples follow:

- To display information about all commands in the queue of scheduled events, enter:

```
? SHOW SCHEDULE
```


The system displays the following information:

```
ACCOUNT=USER1 ID=256D6DC9 SCHEDULE=DAILY:1  
START=29-MAR-2000:21:00:00 COMMAND=MIGRATE
```

```
ACCOUNT=USER1 ID=256E6DCB SCHEDULE=DAILY:1  
START=30-MAR-2000:03:00:00 COMMAND=BACKUP
```

- To display the schedules and start times for all scheduled BACKUP commands but not display account identification codes, enter:

```
? SHOW SCHEDULE /COMMAND=BACKUP /NOACCOUNT
```

The system displays the following information:

```
ID=256D6DC9 SCHEDULE=DAILY:1 START=30-MAR-2000:03:00:00  
COMMAND=BACKUP
```

```
ID=256E6DCB SCHEDULE=DAILY:1 START=30-MAR-2000:19:00:00  
COMMAND=BACKUP
```

- To display all commands, with their event identifiers, that have been scheduled by the account USER1, enter:

```
? SHOW SCHEDULE /ACCOUNT=USER1
```

The system displays the following information:

```
ACCOUNT=USER1 ID=256D6DC9 SCHEDULE=DAILY:1  
START=30-MAR-2000:07:30:00 COMMAND=NEWLOG
```

```
ACCOUNT=USER1 ID=256E6DCB SCHEDULE=DAILY:7  
Start=01-APR-2000:07:00:00 COMMAND=REMOVE FILE
```

Removing a Scheduled Event

You can use the REMOVE SCHEDULE command to remove an event from the queue of scheduled events. You can use the SHOW SCHEDULE command explained in the previous section to obtain a scheduled event's identifier.

You can use two modifiers on the REMOVE SCHEDULE command: /CONFIRM and /REPORT. /CONFIRM controls whether StorHouse asks you to confirm the command. /REPORT controls the generation of special text responses for the completion of significant actions.

You must have SCHEDULE privilege to use the REMOVE SCHEDULE command.

▼ To remove a scheduled event:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press **Enter** (↵):

REMOVE SCHEDULE identifier modifiers

where *identifier* is the identifier of the event to be removed and *modifiers* are other command modifiers you use to assign values other than the defaults. An example follows:

- To remove the scheduled event whose identifier is 25628CC9, enter:

? REMOVE SCHEDULE 25628CC9

Performance and Activity Monitoring

As the system administrator, you can monitor the performance and activity of the StorHouse system using the MONITOR and SHOW USER commands.

Monitoring System Performance

You can use the MONITOR command to monitor system performance. With MONITOR, you can display current system command, drive, library, network, performance, storage, usage, and volume statistics. Times are given in seconds and sizes in 1000-byte units, unless otherwise specified. If you do not specify any modifier on the MONITOR command, performance statistics display by default.

The following table defines the modifiers you can use with the MONITOR command:

Modifier	Description	Default
/ALL	Displays all current statistics.	-
/COMMAND	Displays statistics for commands that have been entered in addition to any other selected statistics. Also displays whether a BACKUP or MIGRATE operation is in progress.	-
/CONTINUOUS=...	Displays continuous updates of statistics.	-
/DRIVE	Displays statistics for each library device drive.	-

Modifier	Description	Default
/INTERVAL=...	Displays each selected set of statistics for the number of seconds specified by the /INTERVAL modifier's display_interval.	Displays each set of statistics for 10 seconds
/LIBRARY	Displays statistics for each library device.	-
/NETWORK	Displays network statistics for each active StorHouse network connection.	-
/PERFORMANCE	Displays performance statistics for major commands, such as the GET and PUT commands.	Displays if no other selection modifiers are specified.
/RESET	Initializes the statistics data base.	-
/STORAGE	Displays storage statistics for levels of storage in addition to any other selected statistics.	-
/USAGE	Displays system usage statistics including CPU usage, library and drive usage, volume usage, and directory usage, in addition to any other selected statistics.	-
/VOLUME	Displays volume-related statistics.	-

You must have SHOW privilege to use the MONITOR command and SYSTEM privilege to use the /RESET modifier.

▼ **To display current StorHouse statistics:**

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

MONITOR modifiers

where modifiers are other command modifiers you use to assign values other than the defaults. Below are some examples:

- To display sets of all current StorHouse command, drive, library, network, performance, storage, system usage, and volume statistics, type:

? MONITOR /ALL /INTERVAL=0

- To display system usage statistics, type:

? MONITOR /USAGE

- To display storage statistics for all levels of storage, type:

? MONITOR /STORAGE

Monitoring User Activity

You can use the SHOW USER command to display the account identification code, user identification code, and other current information for one or more users signed on to StorHouse.

The following table defines the modifiers you can use with the SHOW USER command:

Modifier	Description	Default
/CURRENT	Displays current information for a StorHouse user.	/CURRENT
/FULL	Displays the following information for the specified user(s): <ul style="list-style-type: none"> • Default access group name and rights • Wild card • Operator console message status (if enabled) • Default volume set name and file set name • Privileges • Command 	-
/SYSTEM	Selects for display the current commands for the specified users.	-

You must have SHOW privilege to use the /FULL and /SYSTEM modifiers.

▼ To display current information for one or more active StorHouse users:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press Enter ↵:

SHOW USER uid modifiers

where uid is the user identification code you want to display and modifiers are other parameter modifiers you use to assign values other than the defaults. Below are some examples:

- To display information for user 2, type:

? SHOW USER 2 /FULL

The system responds with the following information:

```
UID=2 AID=SANDY GROUP=SERVICE RIGHTS=RWD WILDCARD=*
VSET=ERASE FSET=ERASE PRIVILEGE=(GET, PUT)
```


- To display the uid and aid only for user 2, type:

```
? SHOW USER 2 /NOCURRENT
```

The system responds with the following information:

```
UID=2 AID=SANDY
```

- To display all available information for all users, type:

```
? SHOW USER * /FULL
```

The system responds with the following information:

```
UID=2 AID=SANDY GROUP=SERVICE RIGHTS=RWD WILDCARD=*
VSET=ERASE FSET=ERASE PRIVILEGE=(GET, PUT)
COMMAND=none
```

```
UID=3 AID=SYSTEM GROUP=SERVICE RIGHTS=RWD WILDCARD=*
VSET=ERASE FSET=ERASE PRIVILEGE=(ACCOUNT, ALLOCATION,
ALLPRIVILEGE, ANYACCOUNT, ANYFILE, ANYGROUP, ATF,
CONSOLE, COPY, DELETE, FILE, GET, GROUP, LOCK, MESSAGE,
OPERATOR, PASSWORD, PUT, RECORD, SCHEDULE, SERVICE,
SETGROUP, SHOACCOUNT, SHOFIELD, SHOGROUP, SHOW,
SQLADMIN, SQLCOMMAND, SQLEXECUTE, SYSTEM, VRAM, VTF)
COMMAND=none
```

```
UID=4 AID=MVSCONSOLE GROUP=none RIGHTS=none
WILDCARD=* VSET=VSET$OLD FSET=FSET$OLD
PRIVILEGE=(CONSOLE, OPERATOR, SHOW) CONSOLE=ENABLED
COMMAND=CONSOLE
```

By adding the /FULL or /SYSTEM modifier, you can also see the current command each user is executing.

Determining System Uptime

You can use the StorHouse operating system timeup command to display when the StorHouse software was started and when the StorHouse operating system was initialized (booted or IPLed).

▼ To display when the StorHouse operating system and StorHouse software started:

1. Log in to the StorHouse operating system using the operator account.
2. Enter the following command at the hostname.1> system prompt and press

Enter ↵:

```
timeup
```


If StorHouse is up, the system displays the current, system boot, and StorHouse software start dates and times.

If StorHouse is down, the system displays the date and time StorHouse booted and the following note:

SM Software is not running.

System Parameter Descriptions

System parameters help define the StorHouse system's resource management. All parameters have default values. Some values can be changed by you to meet site requirements.

System Parameter Characteristics

System parameters have these characteristics:

- Parameter names can contain 1 to 16 characters.
- Default values are assigned at system installation unless the system administrator specifies other values.
- There are three types of system parameters:


Table A-1: System Parameter Types

System Parameter Type	Permitted Action
Static	You cannot change the parameter value while the StorHouse software is operating. (Your FileTek customer support representative can change static system parameters for you.)
Dynamic	You can change the parameter value while the StorHouse software is operating, and the change takes effect immediately.
Deferred Dynamic	You can change the parameter value while the StorHouse software is operating, but the changes do not take effect until the system is restarted.

Displaying System Parameters

You can display the current value of a StorHouse system parameter by using the `SHOW SYSTEM` command. You must have `SYSTEM` or `SHOW` privilege to use this command.

▼ To display a system parameter value:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

`SHOW SYSTEM name`

where `name` is the name of the system parameter. Below are some examples:

- To display the release number of the StorHouse software installed on the system, type:

`? SHOW SYSTEM RELEASE`

The system returns the following information:

`RELEASE = "5.2"`

- To display the date and time of the last checkpoint, type:

`? SHOW SYSTEM CHKP_TAKEN`

The system returns the following information:

`CHKP_TAKEN = "12-MAR-2000:03:00:02"`


- To display all system parameter values (* is the StorHouse wild card symbol), type:

`? SHOW SYSTEM *`

Setting System Parameters

You can set or change the value of a StorHouse system parameter by using the SET SYSTEM command. You must have SYSTEM privilege to use this command.

▼ To set or change a system parameter value:

1. Sign on to StorHouse.
2. At the StorHouse command prompt (?), type the following command and press :

SET SYSTEM name <value> modifiers

where name is the name of the system parameter, value specifies a value for the named system parameter, and modifiers are other command modifiers you use to assign values other than the defaults. Below are some examples:

- To change the default file attribute LIMIT to a value of 100, type:

? SET SYSTEM LIMIT 100
- To change the value of the system parameter CHKP_UPD_NOW from FALSE to TRUE, type:

? SET SYSTEM CHKP_UPD_NOW TRUE

Parameter Descriptions

The word SET in the “User Access” field of a parameter description indicates that you can change the parameter. The word SHOW indicates that you can show information about the parameter. See the SET SYSTEM and SHOW SYSTEM commands in the *Command Language Reference Manual* for instructions on how to change and display parameter values.

The StorHouse system parameters follow in alphabetical order.

ADMINLOG	<p>Specifies the number of versions of the system administration log to be retained by the system.</p> <ul style="list-style-type: none"> Expanded Name: Administration log versions Type: Dynamic parameter Range: 1 through 128 Default: 10 User Access: SET, SHOW
ARCHIVE_INDEX	<p>Controls whether an internal StorHouse index file is used to track user files to be archived.</p> <ul style="list-style-type: none"> Expanded Name: Archive information index Type: Static parameter (FileTek must set this parameter) Range: TRUE, FALSE Default: Value assigned by FileTek User Access: SHOW
ATF	<p>Specifies the default value for the ATF attribute for any new file being PUT to StorHouse. The ATF attribute indicates the importance of access time for the file. If the user omits an ATF value in the PUT or CREATE FILE command, and the file does not exist already, then the file is given the value specified by this parameter.</p> <ul style="list-style-type: none"> Expanded Name: Access Time Factor default value Type: Dynamic parameter Range: 1 through 3 Default: 3 User Access: SET, SHOW <p>A value of 1 indicates that a short file access time is very important. A value of 2 indicates that it is moderately important. A value of 3 indicates that access time is minimally important. Files are migrated off the performance buffer based on their ATF attributes, beginning with files with the largest ATF attribute values.</p>

AUTO_REBUILD_ Lxx	<p>Specifies whether library device rebuild is enabled for library device Lxx. TRUE indicates that a rebuild is to be done if library Lxx needs it at initialization. FALSE indicates that a rebuild is not enabled.</p> <p>Normally, the parameter is set to FALSE. If the volume directory for device Lxx has been corrupted or destroyed, the device is brought down. A FileTek customer support representative must investigate the problem. When ready to recover the device, the FileTek customer support representative must set the parameter to TRUE and initialize the device. StorHouse rebuilds the volume directory and resets the parameter to FALSE.</p> <ul style="list-style-type: none"> Expanded Name: Automatic library rebuild for device Lxx Type: Dynamic (StorHouse automatically sets it to FALSE after a rebuild) Range: TRUE, FALSE Default: FALSE User Access: SET, SHOW
BACKUP	<p>Specifies the default value for the BACKUP attribute for new file versions. The system assigns the BACKUP attribute for all new file versions based on the value of this parameter. TRUE indicates BACKUP. FALSE indicates NOBACKUP.</p> <ul style="list-style-type: none"> Expanded Name: Backup file attribute default value Type: Dynamic parameter Range: TRUE, FALSE Default: FALSE User Access: SET, SHOW
BACKUP_INDEX	<p>Controls whether an internal StorHouse index file is used to track user files to be backed up.</p> <ul style="list-style-type: none"> Expanded Name: Backup information index Type: Static parameter (FileTek must set this parameter) Range: TRUE, FALSE Default: Value assigned by FileTek User Access: SHOW
BARCODE_MIN_n BARCODE_MAX_n	<p>These two parameters specify a range of barcodes that are owned by StorHouse. Barcode ranges are used only for library devices that are shared with non-StorHouse applications. The number of barcode ranges, represented by n, can be 1 to 16. In other words, you can have a maximum of 16 BARCODE_MIN_n and BARCODE_MAX_n parameter pairs.</p> <p>The characters you assign to BARCODE_MIN_n and BARCODE_MAX_n must be members of the allowed character set for the shared library. If your system supports ACSLS or LibraryStation, the valid characters are 0-9, A-Z, #, \$, and (space). You must specify the exact number of characters in the barcode label as the media requires. You can specify only numeric characters for the variable portion of the range. You define the variable portion of the range to suit your site. For example, if</p>

A**System Parameter Descriptions**Parameter Descriptions

your label is FTK000, the variable portion is 000. If your label is FT0000, the variable portion is 0000. The entire range can be variable.

- Expanded Name: Barcode ranges for shared libraries
- Type: Deferred dynamic parameter (takes effect on system restart)
- Range: Valid barcodes will vary by media (variable portion must be numeric)
- Default: None
- User Access: SET, SHOW

BKUP_MAX_LOAD Specifies the maximum number of data transfers to be queued, per drive, at one time for write-back operations.

- Expanded Name: Maximum drive load for backups
- Type: Dynamic parameter
- Range: 0 through 5
- Default: 2
- User Access: SET, SHOW

CALL_HOME Indicates whether the Call Home error reporting procedure is enabled or disabled. TRUE specifies that the procedure is enabled and will automatically call the FileTek home office or another destination to report error conditions. FALSE specifies that the procedure is disabled.

- Expanded Name: Call Home control
- Type: Dynamic parameter
- Range: TRUE, FALSE
- Default: TRUE
- User Access: SET, SHOW

CHKP_ACCOUNT Specifies the StorHouse account that will be used to write system checkpoint files. If you need to change this parameter, call your FileTek customer support representative.

- Expanded Name: Checkpoint account
- Type: Deferred dynamic parameter (takes effect on system restart)
- Range: Any valid StorHouse account identifier
- Default: SYSTEM
- User Access: SET, SHOW

CHKP_FSET Specifies the file set that will be used for system checkpoint files. CHKP_VSET specifies the volume set. If you need to change this parameter, call your FileTek customer support representative.

- Expanded Name: Checkpoint information file set
- Type: Deferred dynamic parameter (takes effect on system restart)
- Range: Any valid StorHouse file set name
- Default: CHKPOINT
- User Access: SET, SHOW

CHKP_GROUP	<p>Specifies the file access group that will be used for system checkpoint files. If you need to change this parameter, call your FileTek customer support representative.</p> <ul style="list-style-type: none"> Expanded Name: Checkpoint group Type: Deferred dynamic parameter (takes effect on system restart) Range: Any valid StorHouse access group name Default: CHKPOINT User Access: SET, SHOW
CHKP_LIMIT	<p>Indicates the maximum number of checkpoints to maintain on the checkpoint volume set. Only the last checkpoint is needed to recover a system; thus, StorHouse will automatically delete old checkpoint files to make room for new ones based on this value.</p> <ul style="list-style-type: none"> Expanded Name: Checkpoint limit (maximum) Type: Deferred dynamic parameter (takes effect on system restart) Range: 1 through 99 Default: 10 User Access: SET, SHOW
CHKP_ON	<p>Enables or disables the system's ability to perform a system checkpoint. TRUE enables the CHECKPOINT command. FALSE disables the CHECKPOINT command.</p> <ul style="list-style-type: none"> Expanded Name: Checkpoint control Type: Deferred dynamic parameter (takes effect on system restart) Range: TRUE, FALSE Default: FALSE User Access: SET, SHOW
CHKP_TAKEN	<p>Specifies whether a checkpoint has been taken. A valid date and time indicates that a checkpoint has been taken. The value "NOT TAKEN" indicates that a checkpoint has not been taken. The system automatically updates this parameter with the date and time of the most recent successful checkpoint.</p> <ul style="list-style-type: none"> Expanded Name: Checkpoint taken information Type: Dynamic parameter Range: "NOT TAKEN" or a valid date and time Default: Value assigned by FileTek User Access: SHOW
CHKP_UPD_NOW	<p>Enables or disables immediate writes directly to the checkpoint volume set of certain non-critical checkpoint information, such as account and group information updates. TRUE enables direct writes of this information to the checkpoint volume set. FALSE disables direct writes of this information to the checkpoint volume set. If this parameter is set to FALSE, any new account and group information will be written to the checkpoint volume set either when the system next writes the system log to the checkpoint volume set or when the system administrator issues the next CHECKPOINT command.</p>

A**System Parameter Descriptions**Parameter Descriptions

- Expanded Name: Checkpoint update control
- Type: Dynamic parameter
- Range: TRUE, FALSE
- Default: FALSE
- User Access: SET, SHOW

CHKP_VSET Specifies the volume set that will be used for system checkpoint files. This volume set must be a primary volume set. If you need to change this parameter, call your FileTek customer support representative.

- Expanded Name: Checkpoint information volume set
- Type: Deferred dynamic parameter (takes effect on system restart)
- Range: Any valid StorHouse volume set name
- Default: CHKPOINT
- User Access: SET, SHOW

DEFAULT_LD Specifies the default library device to be used in certain commands when a user does not assign a specific device. For example, the system assigns the DEFAULT_LD to a volume set when a user creates a volume set without specifying /LIBRARY.

- Expanded Name: Default library device
- Type: Dynamic parameter
- Range: Valid library device specification, Lxx, where xx is a unit number
- Default: L00
- User Access: SET, SHOW

DEFAULT_MED_did Specifies the default media for a specific library device (having device identifier did) to be used in certain commands when a specific media is not assigned. For example, the system assigns the DEFAULT_MED_did to a volume set when a user creates a volume set without specifying /MEDIA.

- Expanded Name: Default media for a specific library device
- Type: Dynamic parameter
- Range: Valid media specification, mmr, where mm is a media type and r is a recording type
- Default: Assigned by FileTek
- User Access: SET, SHOW

DEL_FILE_PERM Indicates whether StorHouse is to write deleted file labels on a removable optical volume (erasable or non-erasable) when files are removed from the deleted file directory. TRUE tells StorHouse to write deleted file labels. FALSE tells StorHouse not to write deleted file labels.

StorHouse will not write deleted file labels for files written before Release 3.0. It also does not write deleted file labels to volumes that are writelocked (volume state=WRITELOCKED). However, StorHouse does remove the directory entries for these files.

- Expanded Name: Delete files permanently
- Type: Dynamic parameter
- Range: TRUE, FALSE
- Default: FALSE
- User Access: SET, SHOW

DM_FNO Specifies the next file number to use for recovery purposes. A FileTek customer support representative will set DM_FNO when the system is first installed and under certain extended recovery conditions.

- Expanded Name: Directory manager file number
- Type: Dynamic parameter
- Range: 0 through 4294967295
- Default: 0
- User Access: SHOW

DUPLEX_BALANCE Specifies the required degree of similarity between primary and duplex (in other words, backup or archive) media for inclusion in duplex load balancing operations. StorHouse will load balance by reading duplex copies of file extents if StorHouse determines that using the duplex copy rather than the primary will result in better overall system performance.

You can indicate that any media can be load balanced, or you can restrict load balancing based on the media types and recording types of the media containing the primary and duplex copies. Using the two-character media type code followed by the one-character recording type code as a single three-character code, you can restrict load balancing to media whose codes match in the first one, two, or three characters, or to media whose codes are entirely different. The codes of the media containing the duplex copies and the primary copies must match in the number of characters specified by this parameter.

Note: You must create backup copies of files using the CREATE BACKUP command or archive copies using the ARCHIVE command if you intend to use duplex processing. In addition, you must set the DUPLEX_ENABLE system parameter to ALL before StorHouse will perform load balancing for these files.

- Expanded Name: Duplex load balancing media similarity
- Type: Dynamic parameter
- Range:
 - 0 indicates that any two media can be used for load balancing
 - 1 indicates that the first character (the general media type) must match
 - 2 indicates that the first two characters (the general media type and format type) must match
 - 3 indicates that all three characters of the media type and recording type code must match
- Default: 1
- User Access: SET, SHOW

**DUPLEX_
DIRECTORY**

Specifies the directory that StorHouse will use for duplex processing. Duplex processing allows backup or archive copies of files to be read by users when primary copies are unavailable or when the backup or archive copy will most likely provide quicker access than the primary. You can specify either the BACKUP or ARCHIVE directory.

Note: You must create backup copies of files using the CREATE BACKUP command or archive copies using the ARCHIVE command if you want to use duplex processing. In addition, you must set the DUPLEX_ENABLE system parameter to ALL before StorHouse will perform load balancing for these files.

- Expanded Name: Duplex processing directory name
- Type: Dynamic parameter
- Range: BACKUP, ARCHIVE
- Default: BACKUP
- User Access: SET, SHOW

DUPLEX_ENABLE

Specifies the level of duplex operations to be used by StorHouse. Duplex operations allow duplex (backup or archive) copies of file extents to be read when primaries are unavailable or when the duplex copy will most likely provide quicker access.

Note: You must create backup copies of files using the CREATE BACKUP command or archive copies using the ARCHIVE command if you intend to use duplex processing.

- Expanded Name: Enable duplex processing
- Type: Dynamic parameter
- Range:
 - NONE indicates that StorHouse will not use duplex processing.
 - DISABLED instructs StorHouse to access the duplex copy only when the primary copy resides on a disabled volume. (See the SET VOLUME /DISABLE command.) The duplex copies can be in a library device or on a shelf. If the duplex copy is on a shelf, StorHouse will request the operator to load the desired volume into a library device.
 - OFFLINE instructs StorHouse to access the duplex copy when the primary copy resides on a volume in an offline library or on a disabled volume. The duplex copies can be in a library device or on a shelf. If the duplex copy is on a shelf, StorHouse will request the operator to load the desired volume into a library device.
 - ALL instructs StorHouse to access the duplex copy for load balancing, or when the primary copy resides either on a volume in an offline library or on a disabled volume. StorHouse will load balance by reading duplex copies of file extents if StorHouse determines that using the duplex copy rather than the primary will result in better overall system performance. The DUPLEX_BALANCE system parameter indicates the required degree of similarity between primary and duplex media for inclusion in duplex load

balancing operations. If the duplex or primary copy does not exist or is inaccessible, StorHouse will select the other copy.

Note: If you are duplexing primary files that reside on tape, set DUPLEX_ENABLE to ALL so StorHouse will always use the duplex copy when the primary copy is unavailable or busy.

- Default: NONE
- User Access: SET, SHOW

EDC Specifies the default value for the EDC modifier for file transfers. If the user does not specify /EDC in the PUT command, the modifier is given the value specified by this parameter. If EDC=TRUE, then StorHouse generates EDC codes during the file transfer. If EDC=FALSE, then StorHouse does not generate EDC codes during the file transfer.

- Expanded Name: EDC modifier default value for file transfers
- Type: Static parameter
- Range: TRUE, FALSE
- Default: TRUE
- User Access: SHOW

EDC_BOARD Indicates whether an error detection code (EDC) board is configured in StorHouse. TRUE indicates that EDCs are generated using this board. FALSE indicates that an EDC board is not configured; EDCs are generated by software.

- Expanded Name: EDC board indicator
- Type: Static parameter
- Range: TRUE, FALSE
- Default: FALSE
- User Access: SHOW

EDC_COPY Enables the checking of EDCs on StorHouse when a file is copied from one location to another (when set to TRUE). FALSE disables the checking of EDCs for these copies.

- Expanded Name: File copy EDC indicator
- Type: Static parameter
- Range: TRUE, FALSE
- Default: TRUE
- User Access: SHOW

EDC_FROM_HOST Enables the checking of EDCs on StorHouse during transfers from a host when set to TRUE. FALSE disables the checking of EDCs on StorHouse for these transfers.

- Expanded Name: Transfer from host EDC indicator
- Type: Static parameter
- Range: TRUE, FALSE
- Default: TRUE
- User Access: SET, SHOW

A**System Parameter Descriptions**

Parameter Descriptions

EDC_INTERNAL	<p>Enables the checking of EDCs during internal StorHouse transfers involving an application, such as a VRAM process, when set to TRUE. FALSE disables the checking of EDCs for these transfers.</p> <ul style="list-style-type: none"> Expanded Name: Internal transfer EDC indicator Type: Static parameter Range: TRUE, FALSE Default: TRUE User Access: SHOW
EDC_TO_HOST	<p>Enables the checking of EDCs on StorHouse during transfers to a host when set to TRUE. FALSE disables the checking of EDCs on StorHouse for these transfers.</p> <ul style="list-style-type: none"> Expanded Name: Transfer to host EDC indicator Type: Static parameter Range: TRUE, FALSE Default: FALSE User Access: SHOW
EDC_TYPE	<p>Specifies the error detection code (EDC) algorithm used to generate error detection codes for file PUT operations. A value of 0 tells StorHouse not to generate an error detection code. A value of 1 tells StorHouse to use the VWEN32 algorithm. A value of 2 tells StorHouse to use the VWEA9520 algorithm.</p> <ul style="list-style-type: none"> Expanded Name: EDC_TYPE algorithm for file transfers Type: Static parameter Range: 0, 1, or 2 Default: 2 User Access: SHOW
FREE_POOL_ didmmr	<p>Specifies the minimum number of empty volumes desired for the library device free pool identified by the device identification code did (for example, L00), the media type mm, and the recording type r. If the number of empty volumes drops below this minimum, StorHouse sends messages to the console instructing the operator to add one or more blank volumes of the appropriate media to the library.</p> <p>The system rejects any request for storage space that cannot be satisfied using on-line storage, so the value of the parameter should be high enough to satisfy any single request. If the parameter is set to 0, StorHouse does not instruct the operator to add blank volumes when the library device has no more empty volumes with the specific media and recording type.</p> <p>This system parameter also defines the minimum number of tape cleaning cartridges to be maintained for the indicated library and media/recording type combination.</p> <ul style="list-style-type: none"> Expanded Name: Free volume pool for device did and media mmr Type: Dynamic parameter Range: 0 through 1 less than the total number of slots in the library device, with an absolute maximum of 255

	<ul style="list-style-type: none"> • Default: 2 for tape cleaning cartridges 4 for all other media/recording types • User Access: SET, SHOW
LABEL	<p>Specifies the last (hexadecimal) character of the volume label for the next blank volume added to the system. This parameter has this definition only when the LABEL_ALG system parameter is set to 2. If LABEL_ALG is set to 3, LABEL must be used in conjunction with the LABEL_MASK system parameter.</p> <ul style="list-style-type: none"> • Expanded Name: Last character of next volume label • Type: Dynamic parameter • Range: The value must be one hexadecimal character (0-9, uppercase A-F) • Default: 0 • User Access: SET, SHOW
LABEL_ALG	<p>Specifies the method StorHouse will use to generate volume labels for removable media in library devices that do not support bar code readers. A value of 0 tells StorHouse to base the volume label on the time the blank volume is initialized in the system. A value of 1 is reserved for FileTek testing. A value of 2 tells StorHouse to use the time method to generate volume labels, but to replace the last character of every label with a hexadecimal constant specified by the LABEL system parameter. A value of 3 tells StorHouse to use customer-defined masks to generate volume labels. This method requires the use of the LABEL_MASK_media and LABEL_media system parameters.</p> <ul style="list-style-type: none"> • Expanded Name: Volume label algorithm • Type: Dynamic parameter • Range: <ul style="list-style-type: none"> • 0=time method • 1=FileTek test method • 2=time method with last character constant • 3=user-defined mask method • Default: 3 • User Access: SET, SHOW
LABEL_MASK_ media	<p>Specifies the volume label format (mask) for the type of media specified in the parameter name. This parameter is used only if the LABEL_ALG system parameter is set to 3. LABEL_MASK_media specifies the format the system will use to generate labels for blank volumes as they are added to the system. This format is based on media and recording type. Your FileTek customer support representative can configure the media variable in this parameter as one or more of the following options:</p> <ul style="list-style-type: none"> • LABEL_MASK_mmr where mm is a specific media type and r is a specific recording type • LABEL_MASK_mm where mm is a specific media type • LABEL_MASK_m where m is a general media type • LABEL_MASK (for all types)

Note: If LABEL_ALG is set to 3, there must be a LABEL_MASK_media system parameter with the equivalent media variable configuration for each LABEL_media system parameter defined.

A volume label must be unique for a media type and recording type combination, but the same volume label can be used for different media type and recording type combinations.

- Expanded Name: Volume label mask for media
- Type: Dynamic parameter
- Range: The value must be 1 to 8 characters, where each character can be one of the following:
 - An uppercase alphabetic character (A-Z), a number (0-9), or a special character is used as a constant.
 - A lowercase d is a place holder for a decimal digit (0-9).
 - A lowercase h is a place holder for a hexadecimal character (0-F).
 - A lowercase a is a place holder for an alphanumeric character (0-9, A-Z).
 - A lowercase u is a place holder for an alphabetic character (A-Z).
- Default: dddddddd (an 8-character decimal value)
- User Access: SET, SHOW

LABEL_media Specifies the volume label to assign to the next blank volume added to the system for the media specified in the parameter name. This parameter is used only if the LABEL_ALG system parameter is set to 3. The configuration of the media variable in this parameter must match the media variable configuration specified by the LABEL_MASK_media system parameter. Your FileTek customer support representative can configure the media variable in this parameter as one or more of the following options:

- LABEL_mmr where mm is a specific media type and r is a specific recording type
- LABEL_mm where mm is a specific media type
- LABEL_m where m is a general media type
- LABEL (for all types)

A volume label must be unique for a media type and recording type combination, but the same volume label can be used for different media type and recording type combinations.

- Expanded Name: Next volume label for media
- Type: Dynamic parameter
- Range: The value can contain up to 8 characters, as defined by the value of the corresponding LABEL_MASK_media system parameter.
- Default: 00000001
- User Access: SET, SHOW

LIMIT Specifies the default value for the LIMIT attribute for primary files. If the user does not specify a LIMIT value in the PUT or CREATE FILE command, and the file does not exist already, then StorHouse gives file's LIMIT attribute the value specified by this parameter. LIMIT does not apply to archive and backup copies of files.

	<ul style="list-style-type: none"> Expanded Name: LIMIT file attribute default value Type: Dynamic parameter Range: 1 through 32768 Default: 32768 User Access: SET, SHOW
LOG_ACCOUNT	<p>Specifies the account under which StorHouse writes user (management information) logs into user storage. This account must have SETGROUP and PUT privileges and write access to the group into which logs are written.</p> <p>If you are using the FileTek StorHouse/Performance Monitor product, this system parameter is used to determine the account that will store the StorHouse/Performance Monitor data files in StorHouse.</p> <ul style="list-style-type: none"> Expanded Name: User (management information) log account Type: Dynamic parameter Range: Any valid StorHouse account identifier Default: SYSTEM User Access: SET, SHOW
LOG_COMMAND	<p>Enables or disables logging of command execution information records into the user (management information) log. TRUE enables logging. FALSE disables logging.</p> <ul style="list-style-type: none"> Expanded Name: User log control for command execution records Type: Dynamic parameter Range: TRUE, FALSE Default: TRUE User Access: SET, SHOW
LOG_COPY	<p>Enables or disables logging of file copy records (from ARCHIVE, CREATE BACKUP, CREATE PRIMARY, RELOCATE, RETIRE VOLUME, and RECOVER VOLUME commands) into the user log. TRUE enables logging. FALSE disables logging.</p> <ul style="list-style-type: none"> Expanded Name: User log control for file copy records Type: Dynamic parameter Range: TRUE, FALSE Default: TRUE User Access: SET, SHOW
LOG_DEVICE	<p>Enables or disables logging of device information records into the user (management information) log. TRUE enables logging. FALSE disables logging.</p> <p>If you are using StorHouse/Performance Monitor, be sure this system parameter is set to TRUE.</p> <ul style="list-style-type: none"> Expanded Name: User log control for device error or state change records Type: Dynamic parameter Range: TRUE, FALSE Default: TRUE User Access: SET, SHOW

A**System Parameter Descriptions**Parameter Descriptions

LOG_FILE Enables or disables logging of file open and close information records into the user (management information) log. TRUE enables logging. FALSE disables logging.

If you are using StorHouse/Performance Monitor, be sure this system parameter is set to TRUE.

- Expanded Name: User log control for file open and close records
- Type: Dynamic parameter
- Range: TRUE, FALSE
- Default: TRUE
- User Access: SET, SHOW

LOG_FSET Specifies the file set into which StorHouse writes user (management information) logs. This file set must exist in the volume set specified by the system parameter LOG_VSET.

If you are using StorHouse/Performance Monitor, this system parameter determines the file set that will store the StorHouse/Performance Monitor data files in StorHouse.

- Expanded Name: User (management information) log file set
- Type: Dynamic parameter
- Range: Any valid StorHouse file set name
- Default: SERVICE
- User Access: SET, SHOW

LOG_GROUP Specifies the access group into which StorHouse writes user (management information) logs.

If you are using StorHouse/Performance Monitor, this system parameter determines the access group that will store the StorHouse/Performance Monitor data files in StorHouse.

- Expanded Name: User (management information) log access group
- Type: Dynamic parameter
- Range: Any valid StorHouse access group name
- Default: SERVICE
- User Access: SET, SHOW

LOG_HEART Enables or disables logging of system heartbeat information records into the user (management information) log. TRUE enables logging. FALSE disables logging.

- Expanded Name: User log control for file system heartbeat records
- Type: Dynamic parameter
- Range: TRUE, FALSE
- Default: TRUE
- User Access: SET, SHOW

LOG_INTERVAL Specifies the time between automatic writes of interval log records into the StorHouse user (management information) log. A value of 0 disables interval logging.

If you are using StorHouse/Performance Monitor, FileTek recommends that you accept the default of 15 minutes.

- Expanded Name: User (management information) log interval message time
- Type: Static parameter
- Range: 0 through 1440 (in minutes)
- Default: 15
- User Access: SHOW

LOG_MAX Specifies the number of user logs to maintain. User logs contain management information.

- Expanded Name: User (management information) log maximum
- Type: Static parameter
- Range: 2 through 99
- Default: 3
- User Access: SHOW

LOG_OPERATOR Enables or disables logging of operator console message records into the user log. TRUE enables logging. FALSE disables logging.

- Expanded Name: User log control for operator console records
- Type: Dynamic parameter
- Range: TRUE, FALSE
- Default: TRUE
- User Access: SET, SHOW

LOG_POLL Enables (TRUE) or disables (FALSE) logging of polled (interval) records into the user (management information) logs.

If you are using StorHouse/Performance Monitor, be sure this system parameter is set to TRUE.

- Expanded Name: User log control for polled (interval) records
- Type: Dynamic parameter
- Range: TRUE, FALSE
- Default: TRUE
- User Access: SET, SHOW

LOG_SECURITY Enables or disables logging of security violation attempt information records for StorHouse/SM and StorHouse/RM into the user (management information) log. TRUE enables logging. FALSE disables logging.

- Expanded Name: User log control for security violation attempt records
- Type: Dynamic parameter
- Range: TRUE, FALSE
- Default: TRUE
- User Access: SET, SHOW

A**System Parameter Descriptions**Parameter Descriptions

LOG_SERVER	<p>Enables or disables logging of user (management information) log records for use by the real-time user log server. TRUE enables logging. FALSE disables logging.</p> <ul style="list-style-type: none"> Expanded Name: Server log control for real-time user log feed Type: Dynamic parameter Range: TRUE, FALSE Default: FALSE User Access: SET, SHOW
LOG_SIGN	<p>Enables or disables logging of signon and signoff information records for StorHouse/SM, and connect and disconnect records for StorHouse/RM, into the user (management information) log. TRUE enables logging. FALSE disables logging.</p> <ul style="list-style-type: none"> Expanded Name: User log control for signon/signoff records Type: Dynamic parameter Range: TRUE, FALSE Default: TRUE User Access: SET, SHOW
LOG_SQL_STMT	<p>Enables or disables logging of a user's SQL statement into the user (management information) log. TRUE enables logging. FALSE disables logging.</p> <ul style="list-style-type: none"> Expanded Name: User log control for sql_statement records Type: Dynamic parameter Range: TRUE, FALSE Default: TRUE User Access: SET, SHOW
LOG_SQL_TRANS	<p>Enables or disables logging of transaction statistics records upon the completion of a transaction into the user (management information) log. TRUE enables logging. FALSE disables logging.</p> <ul style="list-style-type: none"> Expanded Name: User log control for sql_trans records Type: Dynamic parameter Range: TRUE, FALSE Default: TRUE User Access: SET, SHOW
LOG_SYSTAT	<p>Enables or disables logging of system startup and shutdown information records into the user (management information) log. TRUE enables logging. FALSE disables logging.</p> <p>If you are using StorHouse/Performance Monitor, be sure this system parameter is set to TRUE.</p> <ul style="list-style-type: none"> Expanded Name: User log control for system startup and shutdown records Type: Dynamic parameter Range: TRUE, FALSE Default: TRUE User Access: SET, SHOW

LOG_VOLUME	<p>Enables or disables logging of volume mount/dismount/movement information records into the user (management information) log. TRUE enables logging. FALSE disables logging.</p> <p>If you are using StorHouse/Performance Monitor, be sure this system parameter is set to TRUE.</p> <ul style="list-style-type: none"> Expanded Name: User log control for volume mount/dismount/movement records Type: Dynamic parameter Range: TRUE, FALSE Default: TRUE User Access: SET, SHOW
LOG_VSET	<p>Specifies the volume set into which StorHouse writes user (management information) logs. This volume set must be a primary volume set. The file set specified by the system parameter LOG_FSET must be in this volume set.</p> <p>If you are using StorHouse/Performance Monitor, this system parameter determines the volume set that will store the StorHouse/Performance Monitor data files in StorHouse.</p> <ul style="list-style-type: none"> Expanded Name: User (management information) log volume set Type: Dynamic parameter Range: Any valid StorHouse volume set name Default: SYSTEM User Access: SET, SHOW
LOG_XFER	<p>Enables or disables logging of extent transfer records into the user log. TRUE enables logging. FALSE disables logging.</p> <ul style="list-style-type: none"> Expanded Name: User log control for extent transfer records Type: Dynamic parameter Range: TRUE, FALSE Default: FALSE User Access: SET, SHOW
MIG_FAC_PERIOD	<p>Specifies the number of seconds the system is to wait between migration factor updates (the “half-life” of the migration factor). If you change this parameter, the change does not take effect until after the next update or when the system is restarted, whichever comes first.</p> <ul style="list-style-type: none"> Expanded Name: Migration factor update period Type: Deferred dynamic parameter Range: 0 through 4294967295 (in seconds) Default: 86400 (60 x 60 x 24 = 1 day) User Access: SET, SHOW

A**System Parameter Descriptions**Parameter Descriptions

- MIG_FAC_UNIT** Specifies the number of bytes the system uses as a standard storage unit when calculating the accesses per unit of storage for the migration factor.
- Expanded Name: Migration factor storage unit size
 - Type: Static parameter
 - Range: 0 through 4294967295 (in bytes)
 - Default: 1000000
 - User Access: SHOW
- MIG_FROM** Enables or disables the system's ability to perform migrations from the performance buffer. TRUE enables migrations from the performance buffer. FALSE disables migrations from the buffer.
- Expanded Name: Performance buffer migration indicator
 - Type: Dynamic parameter
 - Range: TRUE, FALSE
 - Default: TRUE
 - User Access: SET, SHOW
- MIG_GENERAL** Specifies the minimum amount of space (in MB) on the performance buffer reserved for the general area (in other words, not available for reservation by groups). If the minimum amount is equal to or greater than the total size of the performance buffer, then the system does not allow reservation of the performance buffer by group.
- Expanded Name: Performance buffer minimum space for general area
 - Type: Static parameter
 - Range: 0-2147483647 (in MB)
 - Default: 0
 - User Access: SHOW
- MIG_MAX** Specifies the percentage of the performance buffer capacity that should be available after the StorHouse software completes a migration from the buffer.
- The MIG_MAX goal may not be realized because the buffer may be receiving new file extents at the same time that the software is migrating extents out of the buffer, or because new extents or deleted but not removed files occupy storage space, or because of a combination of these factors.
- You cannot set MIG_MAX lower than MIG_MIN. If you set both MIG_MIN and MIG_MAX to 100, the system migrates extents out of the buffer as soon as they are placed in the buffer.
- Expanded Name: Performance buffer maximum available space
 - Type: Dynamic parameter
 - Range: 0 through 100 (percent)
 - Default: 20 (percent)
 - User Access: SET, SHOW

MIG_MAX_LOAD	<p>Specifies the maximum number of purge requests to be queued at one time for migration operations.</p> <ul style="list-style-type: none"> Expanded Name: Maximum purge load for migrations Type: Dynamic parameter Range: 0 through 100 Default: 10 User Access: SET, SHOW
MIG_MIN	<p>Specifies the smallest amount of storage that can remain available in the performance buffer before the StorHouse software automatically begins to migrate file extents out of the buffer. MIG_MIN is expressed as a percentage of the storage capacity of the buffer.</p> <p>If you set MIG_MIN to a value higher than the current unused space, StorHouse will begin a migration. You cannot set MIG_MIN greater than MIG_MAX for the buffer. If you set both MIG_MIN and MIG_MAX to 100, the system migrates extents out of the buffer as soon as they are placed in the buffer.</p> <ul style="list-style-type: none"> Expanded Name: Performance buffer minimum available space Type: Dynamic parameter Range: 0 through 100 (percent) Default: 10 (percent) User Access: SET, SHOW
MIG_REPOP_LOAD	<p>Specifies the maximum number of data transfers to be queued at one time for repopulating (copying to) the performance buffer when a file extent is accessed (automatic staging).</p> <ul style="list-style-type: none"> Expanded Name: Performance buffer repopulate load Type: Dynamic parameter Range: 0 to 100 Default: 100 User Access: SET, SHOW
MIG_REPOP_MAX	<p>Specifies the maximum size (in bytes) of an extent that StorHouse will consider for repopulating (copying to) the performance buffer when the file is accessed. If this value is zero, no extents will be considered (automatic staging).</p> <ul style="list-style-type: none"> Expanded Name: Performance buffer repopulate maximum Type: Dynamic parameter Range: 0 to 2147483647 Default: 2147483647 User Access: SET, SHOW
MIG_STAGE_LOAD	<p>Specifies the maximum number of data transfers to be queued at one time for manual staging operations (using the STAGE command). If this value is zero, StorHouse suspends manual staging activity until the value is non-zero.</p> <ul style="list-style-type: none"> Expanded Name: Manual staging maximum load

A**System Parameter Descriptions**

Parameter Descriptions

- Type: Dynamic parameter
- Range: 0 to 100
- Default: 10
- User Access: SET, SHOW

**NET1LIMIT through
NET6LIMIT**

Specifies the maximum number of active sessions that are allowed on the network identified by the corresponding NETTYPE system parameter.

- Expanded Name: Network active session maximum
- Type: Deferred dynamic (takes effect on system restart)
- Range 1 through 1000
- Default: Site and network-specific value assigned by FileTek
- User Access: SET, SHOW

**NET1TYPE through
NET6TYPE**

Identifies up to six network types supported by StorHouse. A NETTYPE of D indicates the FileTek direct connect interface. A NETTYPE of T specifies TCP. Unused NETTYPE system parameters should be assigned a blank value.

- Expanded Name: Network identification
- Type: Static parameter
- Range: D, T, or space character
- Default: Value assigned by FileTek
- User Access: SET, SHOW

OPERATOR

Indicates whether an operator is present to handle requests. TRUE indicates that the operator is present; FALSE indicates that the operator is not present.

If OPERATOR is FALSE:

- EXPORT and IMPORT commands are rejected unless they are already in progress when you set the parameter to FALSE.
- Requests to load or unload volumes at a library device exchange station are rejected, and the system returns an error for any related command.
- Requests to access volumes on shelf are rejected, and the system returns an error for any related command.
- If an operation requires a blank volume and no blank volumes are available on-line, the system rejects the operation; however, requests for blank volumes are still sent to the operator console.

If you want requests to wait for an operator to process them, whether or not an operator is currently present, set OPERATOR to TRUE.

- Expanded Name: Operator resident indicator
- Type: Dynamic parameter
- Range: TRUE, FALSE
- Default: TRUE
- User Access: SET, SHOW

PERF_BUF_FSET	<p>Specifies the name of the level F file set used as the performance buffer.</p> <ul style="list-style-type: none"> Expanded Name: Performance buffer file set name Type: Static parameter Range: Any valid level F file set name Default: \$\$BUFFER User Access: SHOW
PERF_BUF_VSET	<p>Specifies the name of the level F volume set that contains the file set for the performance buffer.</p> <ul style="list-style-type: none"> Expanded Name: Performance buffer volume set name Type: Static parameter Range: Any valid level F volume set name Default: MAGDISK User Access: SHOW
PRIO_READ_REC	<p>Specifies the priority of record read operations for use in allocating drive resources. Append operations are fixed at 3. A number greater than 3 is considered high priority and will normally preempt an append operation.</p> <ul style="list-style-type: none"> Expanded Name: Priority for record read operations Type: Dynamic parameter Range: 3 through 5 Default: 5 User Access: SET, SHOW
PRIO_READ_SEQ	<p>Specifies the priority of sequential read operations for use in allocating drive resources. Append operations are fixed at 3. A number greater than 3 is considered high priority and will normally preempt an append operation.</p> <ul style="list-style-type: none"> Expanded Name: Priority for sequential read operations Type: Dynamic parameter Range: 3 through 5 Default: 3 User Access: SET, SHOW
PRIO_RM	<p>Specifies the priority of the StorHouse mount manager process, which manages volume mounts. The priority helps determine how quickly StorHouse processes mount operations with respect to other StorHouse software operations.</p> <ul style="list-style-type: none"> Expanded Name: Mount manager process priority Type: Static parameter Range: -3 through 4 Default: 0 User Access: SHOW
PRIO_RTM	<p>Specifies the priority of StorHouse master transfer processes, which transfer data. The priority helps determine how quickly StorHouse processes transfer operations with respect to other StorHouse software operations.</p>

A**System Parameter Descriptions**Parameter Descriptions

	<ul style="list-style-type: none"> Expanded Name: Master transfer process priority Type: Static parameter Range: -3 through 4 Default: 3 User Access: SHOW
PRIO_RTS	<p>Specifies the priority of StorHouse slave transfer processes, which transfer data. The priority helps determine how quickly StorHouse processes transfer operations with respect to other StorHouse software operations.</p> <ul style="list-style-type: none"> Expanded Name: Slave transfer process priority Type: Static parameter Range: -3 through 4 Default: 1 User Access: SHOW
PULL_MESSAGES	<p>Indicates whether the display of XROPULL “pull volume” operator messages is enabled or disabled. TRUE specifies that the messages display. FALSE specifies that they do not display.</p> <ul style="list-style-type: none"> Expanded Name: “Pull volume” operator messages Type: Dynamic parameter Range: TRUE, FALSE Default: FALSE User Access: SET, SHOW
RELEASE	<p>Specifies the release number of the current StorHouse software in the form x.y, where x is the version number, and y is the release number.</p> <ul style="list-style-type: none"> Expanded Name: StorHouse software release number Type: Static parameter Range: 0 through current release number Default: Current release number (assigned by FileTek) User Access: SHOW
RETENTION_MODE	<p>Specifies the retention enforcement level for all files.</p> <ul style="list-style-type: none"> Expanded Name: Retention mode Type: Static parameter Range: BASIC, STRICT Default: BASIC User Access: SHOW

Table A-2: RETENTION_MODE Value Descriptions

Value	Description
BASIC	<p>Prevents deletion of a retained file, irrespective of user privilege, before the file's retention period expires.</p> <p>Sets the default retention attribute to ZERO when the retention period is not specified at the file and file set level.</p> <p>Enables the retention setting specified on SET FSET to be more or less restrictive than the current setting. For example, a retention setting of 30 days can be changed to 60 days or 20 days.</p>
STRICT	<p>Prevents deletion of a retained file, irrespective of user privilege, before the file's retention period expires.</p> <p>Sets the default retention attribute to FOREVER when the retention period is not specified at the file and file set level.</p> <p>Forces StorHouse to write retained files to WORM or compliant media.</p> <p>Forces the retention setting specified on SET FSET to be more rather than less restrictive than the current setting. For example, a retention period of 30 days can be changed to 60 days but not to 20 days.</p>

FileTek Customer Support sets the value of RETENTION_MODE for your StorHouse system at installation and can subsequently reset the parameter at your request. The default RETENTION_MODE value at StorHouse installation is BASIC.

SITE_ID Contains a site identifier assigned by the system administrator at installation.

- Expanded Name: StorHouse site identification code
- Type: Static parameter
- Range: 14 printable or space characters
- Default: Assigned by FileTek
- User Access: SHOW

SMVU_EOM_DELAY Specifies the number of days past the end of the month for which StorHouse/Performance Monitor data are collected. If the current date is within the end-of-month delay period, the new value takes effect immediately. Otherwise, it takes effect at the beginning of the next delay period, which is the beginning of the following month.

- Expanded Name: StorHouse/Performance Monitor end-of-month delay value
- Type: Dynamic parameter
- Range: 1 through 15
- Default: 2
- User Access: SET, SHOW

SMVU_LOGGING Turns the collection of StorHouse/Performance Monitor data on and off.

- Expanded Name: Performance Monitor logging indicator
- Type: Dynamic parameter

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	<ul style="list-style-type: none"> • Range: TRUE, FALSE • Default: TRUE • User Access: SET, SHOW
SMVU_PUT_CYCLE	<p>Specifies the interval in hours at which the StorHouse/Performance Monitor data files are written from the StorHouse system directories on magnetic disk to user files on level L storage. Changes to this value take effect during the next PUT cycle.</p> <ul style="list-style-type: none"> • Expanded Name: StorHouse/Performance Monitor PUT cycle value • Type: Dynamic parameter • Range: 1 through 744 • Default: 24 • User Access: SET, SHOW
SMVU_VER_LIMIT	<p>Specifies the number of versions of StorHouse/Performance Monitor files kept in StorHouse.</p> <ul style="list-style-type: none"> • Expanded Name: StorHouse/Performance Monitor version limit • Type: Dynamic parameter • Range: 1 through 32768 • Default: 32768 • User Access: SET, SHOW
SQL_BKUP_ACCOUNT	<p>Specifies the account for the metadata backup utility backup files.</p> <ul style="list-style-type: none"> • Expanded Name: Metadata backup account • Type: Dynamic parameter • Range: Any valid account identifier • Default: SYSTEM • User Access: SET, SHOW
SQL_BKUP_FSET	<p>Specifies the file set for the metadata backup utility backup files. SQL_BKUP_VSET specifies the volume set.</p> <ul style="list-style-type: none"> • Expanded Name: Metadata backup file set • Type: Dynamic parameter • Range: Any valid file set name • Default: RMMDBKUP • User Access: SET, SHOW
SQL_BKUP_GROUP	<p>Specifies the file access group for the metadata backup utility backup files.</p> <ul style="list-style-type: none"> • Expanded Name: Metadata backup group • Type: Dynamic parameter • Range: Any valid access group name • Default: RMMDBKUP • User Access: SET, SHOW

SQL_BKUP_LIMIT	<p>Specifies the maximum number of backup files to keep for each database. Based on this value, StorHouse automatically deletes old backup files to make room for new ones. Only the last backup file version is used to recover metadata.</p> <ul style="list-style-type: none"> Expanded Name: Metadata file limit (maximum) Type: Dynamic parameter Range: 1 through 99 Default: 10 User Access: SET, SHOW
SQL_BKUP_VSET	<p>Specifies the volume set that will contain the metadata backup utility backup files. SQL_BKUP_FSET specifies the file set.</p> <ul style="list-style-type: none"> Expanded Name: Metadata backup volume set Type: Dynamic parameter Range: Any valid volume set name Default: RMMDBKUP User Access: SET, SHOW
SQL_BLD_INDXX_ MEM	<p>Specifies the number of megabytes of memory that can be used in building indexes during data load processing. This memory is used to perform in-memory sorts of blocks of index entries. These blocks are written to disk and later merged to create the index. The larger the memory, the faster the sort, but the fewer the loads that can be performed efficiently (without paging) in parallel. The product of this value and SQL_LDR_MAXLOAD should not exceed the virtual memory that can be allocated to data loading processes.</p> <p>Sorts invoked during user queries will use the value of this parameter to determine the amount of memory used by the sort (the amount used = a minimum of 5 MB or the value of this parameter divided by 10).</p> <ul style="list-style-type: none"> Expanded Name: SQL build index memory Type: Dynamic parameter (affects all engines started after the change) Range: 10 to 200 MB Default: 100 User Access: SET, SHOW
SQL_HOLD_DATA	<p>Specifies the number of days to hold table data extents in the performance buffer.</p> <p>Note: Setting values for SQL_HOLD_DATA depends on your data usage patterns. Your FileTek customer support representative can help you set the appropriate value for your site.</p> <ul style="list-style-type: none"> Expanded Name: SQL hold data extents Type: Dynamic parameter (affects all engines started after the change) Range: 0 to 32767 Default: 0 User Access: SET, SHOW

SQL_HOLD_INDEX	<p>Specifies the number of days to hold index data extents in the performance buffer.</p> <p>Note: Setting values for SQL_HOLD_INDEX depends on your data usage patterns. Your FileTek customer support representative can help you set the appropriate value for your site.</p> <ul style="list-style-type: none"> Expanded Name: SQL hold index extents Type: Dynamic parameter (affects all engines started after the change) Range: 0 to 32767 Default: 0 User Access: SET, SHOW
SQL_HOLD_SPECIAL	<p>Specifies the number of days to hold DF and index map extents in the performance buffer.</p> <p>Note: FileTek recommends that you use very large retention periods for these extents, particularly if you plan to migrate your data to tape.</p> <ul style="list-style-type: none"> Expanded Name: SQL hold special extents Type: Dynamic parameter (affects all engines started after the change) Range: 0 to 32767 Default: 0 User Access: SET, SHOW
SQL_INDEX_TYPE	<p>Specifies the default index type for CREATE INDEX statements specified with StorHouse SQL. (See the <i>StorHouse Database Administration Guide</i> for additional release-specific information.)</p> <ul style="list-style-type: none"> Expanded Name: SQL index type Type: Dynamic parameter (affects all engines started after the change) Range: HASH, VALUE, or RANGE Default: HASH User Access: SET, SHOW
SQL_LDR_ENGINES	<p>Specifies the maximum number of concurrent StorHouse engines used for load operations. One engine is required per LOAD statement. Requests beyond the maximum limit are queued. If you need to change this parameter, call your FileTek customer support representative.</p> <p>Note: Beginning with StorHouse Release 5.2, SQL_LDR_ENGINES provides the same functions as SQL_LDR_MAXLOAD and should be set to the same value. If the value differ, StorHouse uses the smaller value.</p> <ul style="list-style-type: none"> Expanded Name: SQL loader maximum LD processes Type: Deferred dynamic parameter (takes effect on system restart) Range: 1 through 99 Default: 25 User Access: SET, SHOW

SQL_LDR_MAXINTO Specifies the maximum number of INTO TABLE clauses in any one LOAD INTO TABLE statement.

Caution: If the maximum number of INTO TABLE clauses is exceeded, the load operation fails.

- Expanded Name: SQL loader maximum INTO TABLE clauses
- Type: Deferred dynamic parameter (takes effect on system restart)
- Range: 1 through 99
- Default: 6
- User Access: SET, SHOW

SQL_LDR_MAXLOAD Specifies the maximum number of LOAD INTO TABLE statements that can be processed at one time. One engine is required per statement. Requests beyond the limit are queued. If you need to change this parameter, call your FileTek customer support representative.

Note: Beginning with StorHouse Release 5.2, SQL_LDR_ENGINES provides the same functions as SQL_LDR_MAXLOAD and should be set to the same value. If the value differ, StorHouse uses the smaller value.

- Expanded Name: SQL loader maximum LD processes
- Type: Deferred dynamic parameter (takes effect on system restart)
- Range: 1 through 99
- Default: 25
- User Access: SET, SHOW

SQL_MAX_EXT_DATA For table segments, specifies the maximum data extent size (in megabytes) that StorHouse/RM will write to StorHouse. StorHouse/RM checkpoints each data extent when it reaches the maximum size and then creates a new one. StorHouse/RM can recover data extents to the last successful checkpoint.

Note: Contact your FileTek customer support representative if you require a data extent size smaller than 100 MB.

- Expanded Name: SQL maximum extent data
- Type: Dynamic parameter (affects all engines started after the change)
- Range: 100 through 800 MB
- Default: 400
- User Access: SET, SHOW

SQL_MAX_EXT_HASH For hash index files, specifies the maximum data extent size (in megabytes) that StorHouse/RM will write to StorHouse. StorHouse/RM checkpoints each hash index data extent when it reaches the maximum size and then creates a new one. StorHouse/RM can recover index data extents to the last successful checkpoint. FileTek recommends that you try to contain a hash index in one data extent. (Keep in mind, however, that the index must fit on the target device.)

- Expanded Name: SQL maximum extent hash
- Type: Dynamic parameter (affects all engines started after the change)

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- Range: 100 through 800 MB
- Default: 800
- User Access: SET, SHOW

SQL_MAX_EXT_VAL

For value index files, specifies the maximum data extent size (in megabytes) that StorHouse/RM will write to StorHouse. StorHouse/RM checkpoints each value index data extent when it reaches the maximum size and then creates a new one. StorHouse/RM can recover index data extents to the last successful checkpoint. FileTek recommends that you try to contain a value index in one data extent. (Keep in mind, however, that the index must fit on the target device.)

This parameter takes effect when the next StorHouse/RM engine starts.

- Expanded Name: SQL maximum extent value
- Type: Dynamic parameter (affects all engines started after the change)
- Range: 100 through 800 MB
- Default: 500
- User Access: SET, SHOW

SQL_SESSIONS

Specifies the maximum number of StorHouse engines that can run concurrently. This sets the maximum number of connections allowed system-wide. Note that the maximum number of connections includes the number of loads (one engine per LOAD statement) plus the number of queries. Requests beyond the maximum limit are rejected (the error code is XENORES).

- Expanded Name: SQL maximum number of sessions
- Type: Deferred dynamic parameter (takes effect on system restart)
- Range: 1 through 99
- Default: 50
- User Access: SET, SHOW

SSPNO

Specifies the maximum number of scheduled events that can execute concurrently. The maximum value for this parameter depends upon the operating system and can be set during installation.

- Expanded Name: Concurrent scheduled event limit
- Type: Deferred dynamic parameter
- Range: 1 through 10
- Default: 10
- User Access: SET, SHOW

STORHOUSE_REL

Specifies the release number of the current StorHouse/RM software in the form x.yz, where x is the version number, y is the release number, and z is a build number. If the value is a null string, StorHouse/RM software is not configured in the system.

- Expanded Name: StorHouse/RM software release number
- Type: Static parameter
- Range: Null string or StorHouse/RM release number
- Default: (Null string)

	<ul style="list-style-type: none"> User Access: SHOW
SYSTEM_ID	<p>FileTek assigns each StorHouse system a unique system identifier.</p> <ul style="list-style-type: none"> Expanded Name: StorHouse system identification code Type: Static parameter Range: 6 decimal characters (value assigned by FileTek) Default: Value assigned by FileTek Access: SHOW
TMD_DISMNT_DELAY	<p>Applies to libraries that cannot exchange volumes at the drive. In such a library device, when a mounted volume is no longer being used and there are no empty drives in the library device, the system will dismount and unload the volume, and store it in a slot.</p> <p>However, to avoid unnecessary volume movement, the system can delay the dismount in case another request for the volume is expected to arrive momentarily. The TMD_DISMNT_DELAY parameter specifies this delay time, in seconds.</p> <ul style="list-style-type: none"> Expanded Name: Dedicated device, dismount delay Type: Dynamic parameter Range: 0 to 84600 seconds (1 day) Default: 60 User Access: SET, SHOW
TMD_HOLD_HIGH	<p>Specifies the number of seconds the system is to hold a volume in a drive following completion of a high-priority transfer <i>if</i> another volume requires the drive. This parameter can be used to avoid unnecessary volume mounts when a series of high-priority transfer requests arrive for the same volume.</p> <ul style="list-style-type: none"> Expanded Name: Dedicated device, high-priority hold time Type: Dynamic parameter Range: 0 to 3600 seconds (1 hour) Default: 2 User Access: SET, SHOW
TMD_HOLD_LOW	<p>Specifies the number of seconds the system is to hold a volume in a drive following completion of a low-priority transfer <i>if</i> another volume requires the drive. This parameter can be used to avoid unnecessary volume mounts when a series of low-priority transfer requests arrive for the same volume.</p> <ul style="list-style-type: none"> Expanded Name: Dedicated device, low-priority hold time Type: Dynamic parameter Range: 0 to 3600 seconds (1 hour) Default: 2 User Access: SET, SHOW
TMD_RESV_SEQ	<p>Specifies the number of seconds the system is to reserve a volume for certain additional sequential processing on sequential media following completion of an</p>

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extent transfer. This parameter can be used to improve the performance of processing sequential extents on sequential media by avoiding unnecessary positioning time.

- Expanded Name: Dedicated device, sequential reserve time
- Type: Dynamic parameter
- Range: 0 to 3600 seconds (1 hour)
- Default: 1
- User Access: SET, SHOW

TMD_UNLOAD_IDLE

Specifies the number of seconds that StorHouse will wait before dismounting a volume in an idle drive, issuing an unload request for the volume, and storing the volume in a slot. This action prevents unnecessary wear on the drive.

If you set this parameter to 0, StorHouse will unload a volume immediately after it is used.

- Expanded Name: Dedicated device, unload idle time
- Type: Dynamic parameter
- Range: 0 to 84600 seconds (1 day)
- Default: 3600 (1 hour)
- User Access: SET, SHOW

VRAM_CACHE_MAX

Specifies the maximum number of bytes of cache for records read from a VRAM file. If the value is 0, the system does not cache records for VRAM files.

- Expanded Name: VRAM file cache maximum
- Type: Deferred dynamic parameter (takes effect after a restart)
- Range: 0 through 300000 bytes
- Default: 200000 bytes
- User Access: SET, SHOW

VRAM_FILE_CACHE

Specifies the maximum number of VRAM FPT frames contained in the magnetic layer frame pool. All KU processes will write to this pool of cached FPT frames. To deactivate this frame cache layer, set this parameter to 0.

- Expanded Name: VRAM FPT frames in magnetic layer frame pool
- Type: Deferred dynamic parameter (takes effect after a restart)
- Range: 0 through 100000
- Default: 500
- User Access: SET, SHOW

VRAM_FILE_OPEN

Specifies whether StorHouse is to keep data extents open between record read or update operations for a VRAM file. TRUE indicates that the extents are to be kept open; FALSE indicates that they are to be closed.

- Expanded Name: Keep VRAM file extent open indicator
- Type: Static parameter
- Range: TRUE, FALSE
- Default: FALSE
- User Access: SHOW

VRAM_KEYED	<p>Controls the creation of VRAM KEYED files by users. If this parameter is TRUE, users can create VRAM KEYED files; otherwise, users are not allowed to create this type of file.</p> <p>Note: This parameter does not control the creation of VRAM KEYSEQUENTIAL files.</p> <ul style="list-style-type: none"> Expanded Name: Control VRAM KEYED file creation Type: Dynamic parameter Range: TRUE, FALSE Default: FALSE User Access: SET, SHOW
VRAM_KEYS_PN	<p>Specifies the minimum capacity of nodes in VRAM K extents in terms of number of keys. VRAM_KEYS_PN affects performance of VRAM KEYED files by balancing tree depth (number of nodes) against node processing time. Small values of VRAM_KEYS_PN minimize node processing time at the expense of tree depth, whereas large values minimize tree depth at the expense of node processing time. For most general applications, a value of 32 provides satisfactory performance.</p> <ul style="list-style-type: none"> Expanded Name: VRAM keys per node Type: Static parameter Range: 1 through 256 Default: 32 User Access: SHOW
VRAM_MEM_CACHE	<p>Specifies the maximum number of VRAM FPT frames cached in local memory. Each KU process has its own independent frame cache. To deactivate this frame cache layer, set this parameter to 0.</p> <ul style="list-style-type: none"> Expanded Name: VRAM frames cached in memory Type: Deferred dynamic parameter (takes effect after a restart) Range: 0 through 1023 Default: 5 User Access: SET, SHOW
VRAM_NUM_KC	<p>Specifies the maximum number of concurrent VRAM copy processes that can be created. One process is created during StorHouse startup. The system can create additional processes, up to the specified maximum value, as required to process user commands.</p> <ul style="list-style-type: none"> Expanded Name: Number of VRAM copy processes Type: Dynamic parameter Range: 1 through 256 Default: 5 User Access: SHOW
VRAM_NUM_KS	<p>Specifies the maximum number of concurrent VRAM sequential read processes that can be created. One process is created during StorHouse startup. The system can</p>

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create additional processes, up to the specified maximum value, as required to process user commands.

- Expanded Name: Number of VRAM sequential processing processes
- Type: Dynamic parameter
- Range: 1 through 256
- Default: 10
- User Access: SHOW

VRAM_NUM_KU Specifies the maximum number of concurrent VRAM update processes that can be created. One process is created during StorHouse startup. The system can create additional processes, up to the specified maximum value, as required to process user commands.

- Expanded Name: Number of VRAM update processes
- Type: Dynamic parameter
- Range: 1 through 256
- Default: 120
- User Access: SHOW

VRAM_NUM_KW Specifies the maximum number of VRAM write processes that can be created. One process is created during StorHouse startup. The system can create additional processes, up to the specified maximum value, as required to process user commands.

- Expanded Name: Number of VRAM write processes
- Type: Dynamic parameter
- Range: 1 through 256
- Default: 10
- User Access: SHOW

VRAM_RELEASE Specifies the release number of the current VRAM software. If the value is a null string, VRAM software is not configured in the system. If a release number is followed by `_RRA`, the VRAM software includes Relative Record Access capabilities. If a release number is followed by `_KRA`, the VRAM software includes Keyed Record Access capabilities.

- Expanded Name: VRAM software release number
- Type: Static parameter
- Range: Null string or VRAM release number plus `_RRA` or `_KRA`
- Default: (Null string)
- User Access: SHOW

VRAM_UPDATE Indicates which method of updating VRAM files StorHouse must use for new files and files that have not been updated before. A value of 0 tells StorHouse to use the original update method, and a value of 1 tells StorHouse to use the no-duplicate-record method.

The original method duplicates previous update records and saves them with the new update records for quick access. The no-duplicate-record method saves new update records as a new component of the file and does not duplicate previous updates. With

this method, the system may have to access multiple update components of the file when reading records.

- Expanded Name: VRAM update method indicator
- Type: Static parameter
- Range: 0 or 1
- Default: 0
- User Access: SHOW

VSET_HOLD Specifies the default value of the volume set HOLD attribute to be used in certain commands when a specific value is not assigned. For example, the system assigns the VSET_HOLD value to a volume set when a user creates the volume set without specifying the /HOLD modifier. If VSET_HOLD is TRUE, the attribute is assigned a value of HOLD. If VSET_HOLD is FALSE, the attribute is assigned a value of NOHOLD.

- Expanded Name: Default volume set HOLD attribute
- Type: Dynamic parameter
- Range: TRUE, FALSE
- Default: FALSE
- User Access: SET, SHOW

VTF Specifies the default value for the VTF attribute for new file versions. The VTF attribute determines how long StorHouse leaves new extents of a file version in the performance buffer before copying them to their primary file set. If the user does not specify a VTF value when creating a new file version in a PUT or CREATE FILE command, StorHouse gives the version the value specified by this parameter.

- Expanded Name: Vulnerability Time Factor (VTF) file attribute default value
- Type: Dynamic parameter
- Range: DIRECT, NOW, NEXT
- Default: NEXT
- User Access: SET, SHOW

If you set this parameter to DIRECT, files bypass the performance buffer. Extents are written directly to their primary file set.

NOW tells StorHouse to copy the new file version from the performance buffer to the version's primary file set as part of the CREATE FILE or PUT command.

NEXT tells StorHouse to initially write the files to the performance buffer. The next time a backup occurs, StorHouse copies the file to the file's primary file set.

XFR_BUFSIZ Specifies the size of data transfer buffers in main memory. The value must be given in 1024-byte units. A value of 0 indicates that there are no data transfer buffers in main memory.

- Expanded Name: Main memory transfer buffer size
- Type: Static parameter
- Range: 0 through 620

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	<ul style="list-style-type: none"> • Default: 620 for UltraSPARC systems; 0 for all others • User Access: SHOW
XFR_BUFSIZ_D	<p>Specifies the size of data transfer buffers in special memory. The value must be given in 1024-byte units. A value of 0 indicates that there are no data transfer buffers in special memory.</p> <ul style="list-style-type: none"> • Expanded Name: Special memory transfer buffer size • Type: Static parameter • Range: 0 through 620 • Default: 0 for UltraSPARC systems; 620 for all others • User Access: SHOW
XFR_COUNT	<p>Specifies the number of transfer processes (RTs) started during system startup. The number of transfer processes is also the maximum number of data transfers that the system supports concurrently.</p> <ul style="list-style-type: none"> • Expanded Name: Number of transfer processes • Type: Static parameter • Range: 1 through 128 • Default: 24 • User Access: SHOW
XFR_MEMADR_D	<p>Specifies the physical starting address of the special memory for transfer buffers (if configured).</p> <ul style="list-style-type: none"> • Expanded Name: Special memory physical starting address • Type: Static parameter • Range: 0 through 809500671 • Default: 0 for UltraSPARC systems; 3145728 for all others • User Access: SHOW
XFR_MEMSIZ_D	<p>Specifies the total physical size of the special memory for transfer buffers (if configured).</p> <ul style="list-style-type: none"> • Expanded Name: Special memory physical size • Type: Static parameter • Range: 0 through 809500671 • Default: 0 for UltraSPARC systems; 7340032 for all others • User Access: SHOW

Kernel Parameter Descriptions

FileTek changes the default values for selected operating system parameters. The first section presents the minimum required values for StorHouse systems running the Solaris™ operating system, and the second section discusses the values for StorHouse systems running the HP-UX operating system.

Typically, these tunable parameters are modified only by FileTek customer support personnel during the manufacturing build. If you need to change the values of these parameters after installation, contact your FileTek customer support representative.

Solaris Kernel Parameters

Table B-1 shows the minimum required values for StorHouse systems running the Solaris operating system. For selected kernel parameters on E10000 systems running Solaris, FileTek uses Sun® default values rather than the values listed in the table. Consult your Sun documentation for these defaults.

Table B-1: Solaris Kernel Parameters

NOTE: For these parameters on E10000 systems, FileTek uses the Sun default values rather than the values listed here. The Sun defaults are higher than the FileTek values.

Parameter	Value	Description
semsys:seminfo_semmni	300	Number of semaphore identifiers. A semaphore identifier is needed for each system file.
semsys:seminfo_semmns	300	Number of semaphores in the system.
semsys:seminfo_semmnu	100	Number of undo structures in the system.
shmsys:shminfo_shmmax	2097152	Maximum shared memory segment size.
shmsys:shminfo_shmseg	400	Number of shared memory segments per process.
maxphys	0x100000	Maximum size of an I/O.

Table B-1: Solaris Kernel Parameters (continued)

Parameter	Value	Description
msgsys:msginfo_msgmnb	65536	Maximum number of bytes on a message queue. This number corresponds to the maximum number allowed for the StorHouse RC and RQ processes.
msgsys:msginfo_msgmni	1536	Number of message queue identifiers. Most StorHouse/SM and StorHouse/RM processes need at least one queue identifier. Each StorHouse/SM user requires the creation of two StorHouse/SM processes. Each configured device requires at least one StorHouse/SM process.
msgsys:msginfo_msgseg	4096	Number of message segments.
msgsys:msginfo_msgtql	2048	Number of system message headers. This parameter is set to the same value as msginfo_msgmni.
semsys:seminfo_semmap	100	Number of entries in the semaphore map.
semsys:seminfo_semume	300	Maximum number of undo entries per process.
shmsys:shminfo_shmmni	512	Number of shared memory identifiers.
sd:sd_error_level	0	Sun magnetic disk driver error reporting level.

HP-UX Kernel Parameters

The HP system management tool, called *sam*, provides bundles of kernel parameters. FileTek uses the *General OLTP/Database Server System* bundle for StorHouse.

Using Cycle, Deactivate, and Expire Timers

This appendix supplements the information in Chapter 6, “Managing Volume Sets.” It provides:

- Some general guidelines for using the volume set cycle, deactivate, and expire timers to control the placement of data on StorHouse volume sets and file sets
- An example that uses these timers to meet the requirements of a specific end-user application.

For other examples, consult the documentation for the CREATE VSET command in the StorHouse *Command Language Reference Manual*.

About Cycle, Deactivate, and Expire

The deactivate, cycle, and expire timers determine the life cycle of the volume sides in a volume set. The following table provides a quick review of their functionality.

Table C-1: Definitions of Cycle, Deactivate, and Expire Timers

Timer	Definition
Cycle	<p>Time period (in number of days) that controls which side of a logically two-sided volume StorHouse uses to allocate file space.</p> <p>When the specified number of days has elapsed since the last (most recent) file space was allocated on side A of the volume, StorHouse deactivates side A and activates side B. No storage allocations can occur on a deactivated volume side.</p>

Table C-1: Definitions of Cycle, Deactivate, and Expire Timers (continued)

Timer	Definition
Deactivate	<p>Time period (in number of days) that controls when StorHouse prevents additional storage allocations on a volume side.</p> <p>When the specified number of days has elapsed since the first file space allocation on a volume side, StorHouse deactivates that volume side.</p>
Expire	<p>Time period (in number of days) that controls when files on a volume side are ready to be removed from StorHouse. You can read but not write data on an expired volume side.</p> <p>When the specified number of days has elapsed after the last (most recent) file space was allocated on a volume side, StorHouse marks that volume side as expired.</p>

You initially set these timers by providing values for the /CYCLE, /DEACTIVATE, and /EXPIRE modifiers on the CREATE VSET command.

Note If you specify a cycle timer for a logically one-sided volume (for example, a volume with media and recording types of OCA), there is no second side of the volume to cycle. In this case, StorHouse simply deactivates the volume when the cycle timer elapses.

Analyzing Your Application – An Example

You must analyze the needs of your application before you can determine the best way to set the cycle, deactivate, and expire timers for your site. Your analysis should include finding answers to the following questions:

- What StorHouse media have you selected?
- How many volume sets and file sets do you want to create?
- How much data does your host application write to your volume sets each day?
- How long does it take for file allocations to fill up a volume side?
- How frequently do end-users access files in the volume set?
- How long do end-users need online access to information on the volume set?

Let's assume that you are the StorHouse system administrator for a site running an application with the following requirements:

Table C-2: Requirements for a Sample Application

Specification	Application Requirement
Media choice	Use 5.25-inch WORM optical (media and recording types OEC).
Number of volume sets	Write all files to one volume set called USERVSET, which may grow indefinitely.
Number of file sets	Write all files to one file set called USERFSET, which may grow indefinitely one whole volume side at a time.
Write rate	Write data on the average of one volume side per work day (five days per week). In other words, volume sides fill up in approximately one day.
Access frequency	Need frequent access to data only for the first five days after files are written from the host to StorHouse.
Data retention period	Uncatalog all files written to USERVSET after 30 days.

To satisfy these requirements, you'll need to create one volume set called USERVSET and one file set called USERFSET in USERVSET. When you create USERVSET, you'll also need to set timer values for the CREATE VSET /CYCLE, /DEACTIVATE, and /EXPIRE modifiers as follows:

- DEACTIVATE=4
- CYCLE=6
- EXPIRE=30.

The following sections explain why you need to set these modifiers to these values.

Setting /DEACTIVATE

A deactivation timer of four days means that StorHouse deactivates a volume side in USERVSET four days after it allocates the *first* file space on that side. Deactivating a volume side prevents the system from writing additional files on that side. It also ensures that StorHouse will not extend cycle and expiration timers unnecessarily by making storage allocations for small files. You picked four days to avoid unnecessary deactivation of volume sides that were written before a weekend or holiday.

Setting /CYCLE

A cycle of six days means that six days after StorHouse writes the *last* file on side A of a volume, it deactivates side A and allows writes to side B (because /DEACTIVATE=4, side A will already be deactivated). For this application, StorHouse writes the first and last file on side A on the same day. Therefore, the application fills up approximately five A sides (seven days counting the weekend, but only five work days) of volumes before using side B of the first volume. This strategy ensures that StorHouse does not

write files on the B side of a volume before files on the A side of the same volume have passed their period of most frequent use.

Setting /EXPIRE

Setting /EXPIRE to 30 days means that StorHouse expires side A of a volume 30 days after it writes the *last* file on side A. Then, 30 days after writing the last file on side B of the same volume, StorHouse expires side B. This makes the entire volume a candidate for removal from StorHouse because both volume sides are expired.

Snapshot of USERVSET's Life Cycle

Side B of each volume in USERVSET becomes available (and becomes the next side to be allocated to the file set) no more than about seven days after StorHouse deactivates side A. Side B becomes deactivated no more than four days after that. Using this strategy, side A and side B expire no more than approximately 37 days after the first file was written to the volume.

The following table presents a snapshot of USERVSET's life cycle. It's designed to help you follow the cycle, deactivate, and expire pattern for this volume set.

Table C-3: USERVSET's Life Cycle

Date	Volume Side Allocated	Activity		
		Deactivated	Cycled	Expired
Sun 30	-			
1	1A			
2	2A			
3	3A			
4	4A			
5	5A	1A		
Sat 6	-	2A		
Sun 7	-	3A	1A	
8	1B	4A	2A	
9	2B	5A	3A	
10	3B	-	4A	
11	4B	-	5A	
12	5B	1B		
Sat 13	-	2B		
Sun 14	-	3B		
15	6A	4B		
16	7A	5B		
17	8A	-		
18	9A	-		
19	10A	6A		
Sat 20	-	7A		
Sun 21	-	8A	6A	
22	6B	9A	7A	
23	7B	10A	8A	
24	8B	-	9A	
25	9B	-	10A	
26	10B	6B		
Sat 27	-	7B		
Sun 28	-	8B		
29	11A	9B		
30	12A	10B		
31	13A	-		1A
1	14A	-		2A
2	15A	11A		3A
Sat 3	-	12A		4A
Sun 4	-	13A	11A	5A
5	11B	14A	12A	
6	12B	15A	13A	
7	13B	-	14A	1B
8	14B	-	15A	2B
9	15B	11B		3B
Sat 10	-	12B		4B

Creating USERVSET and USERFSET

You can use the following command to create USERVSET:

```
? CREATE VSET USERVSET /CYCLE=6 /DEACTIVATE=4 /EXPIRE=30
```

There is no need to specify /LIMIT=0, /DIRECTORY=PRIMARY, and /SIZE=0 on the command because these settings are the default values for these modifiers.

You can use the following command to create USERFSET:

```
? CREATE FSET USERFSET /VSET=USERVSET
```

There is no need to specify /LIMIT=0, /CONTIGUOUS, and /SIZE=0 on the command because these settings are the default values for these modifiers.

Understanding Storage and Buffer Allocation

This appendix discusses how to allocate storage for system, directory, and Virtual Record Access Manager (VRAM) scratch files and how to set StorHouse system parameters to control buffer allocation. Chapter 4, “Allocating Storage for User Files” and the *StorHouse Concepts and Facilities Manual* explain how to allocate storage for user files.

System File Space

StorHouse uses two or more magnetic disks and/or RAID attached to the StorHouse operating system to store system files and directories. User files and VRAM scratch files may also be stored on the system disks.

During installation, storage is allocated for each file type. Some system files change very little in size; others, such as log files, may change a great deal. The StorHouse resource management and migration functions control the amount of magnetic disk used by user files. However, it is possible for log files, StorHouse directory files, and VRAM scratch files to grow beyond the space allocated for them.

Log File Space

The size of the administration log file depends on the amount of information selected for logging, the length of time the log is open, and the amount of activity while the log is open. During normal operations, the amount of information selected for logging is small. If StorHouse experiences a problem, your FileTek customer support representative may use the SERVICE command to select additional information for logging. You can schedule the NEWLOG command to limit the length of time a log is open.

Directory File Space

The StorHouse directory files increase in size as the numbers of user files and VRAM extents increase. There is also a small increase as users add access groups, volume sets, file sets, and volumes. Because of the number of variables involved, calculating the directory size is a multistep procedure.

Estimating Directory Space

To obtain a rough estimate of a directory's size, estimate the number of each type of object you plan to have in the directory: access groups, primary file copies, archive file copies, backup file copies, password protected files, file extents, volumes, volume sets, and file sets. Multiply each number by the appropriate BYTES/ITEM shown in Table D-1 and add the results to obtain the total estimated directory size.

Table D-1: Estimating Directory Size

Item	Bytes Per Item
Access group	75
Primary file copy	590
Archive file copy	615
Backup file copy	695
Password protected file	260
File extent	80
Volume	500
Volume set	250
File set	150

The number of extents in a VRAM file depends upon how the file is created (in other words, what command is used to create the file) the size of the file, whether the file is KEYED, the number of updates made to the file, and the number of VRAM checkpoints taken. When a user creates a file, it has one Definitions File (DF) extent. When a user appends data to the file, StorHouse creates another DF extent, a data extent, and (for KEYED files) a K extent whenever a checkpoint is issued or the file is closed. When a user updates the file, StorHouse adds a DF extent. If any records were changed (not just deleted), it also adds an update extent. For KEYED files where the value of a key was changed in at least one updated record, it adds a K extent. (K extents always contain all key data for a KEYED file, not just the changed keys.)

Thus, a VRAM file with data consists of a minimum of two extents if the file was created with the CREATE OPEN command or three extents if the file was created using the CREATE FILE command. For example, after the first append, a KEYSEQUENTIAL file may have three extents: the initial DF produced by CREATE FILE, a second DF, and a data extent.

Example

The example shown below calculates the approximate directory size for a StorHouse system with 500 access groups, 75,000 VRAM primary file copies, 75,000 non-VRAM primary file copies, 25,000 VRAM backup file copies, 25,000 non-VRAM backup file copies, 15,000 VRAM archive file copies, 15,000 non-VRAM archive file copies, 10,000 password protected files, 128 volumes, 50 volume sets, and 150 file sets. This example assumes the files are created using the CREATE FILE command. All VRAM files are KEYSEQUENTIAL, with no updates. That is, they have three extents. All non-VRAM files have one extent.

Table D-2: Sample Directory Size

Item	Number	Directory Size
Access group	500	38KB
Primary files	150,000	88,500KB
Primary file extents	300,000	24,000KB
Backup files	50,000	34,750KB
Backup file extents	100,000	8,000KB
Archive files	30,000	18,450KB
Archive file extents	60,000	4,800KB
Password protected files	10,000	2,600KB
Volumes	128	64KB
Volume sets	50	13KB
File sets	150	23KB
Total		181,238KB

VRAM Scratch File Space

If your StorHouse system includes VRAM, part of the storage space on magnetic disks must be allocated for VRAM scratch files. For each open VRAM file, at least one of its extents occupies VRAM scratch space. This extent, the Definitions File (DF) extent, normally uses 200 bytes to 2KB of scratch space, but can grow quite large.

In addition, for files opened for updating or sequential reading, there may be one or more update extents in scratch space. These files contain updates to extents that contain original data records. An update extent's size depends on the number of updates made to the file and the sizes of the updated records. If a file has big records and many updates, its update extent(s) can grow quite large.

Normally, StorHouse deletes DF and update extents from scratch space after copying any new extents to user storage space when the file is closed. However, StorHouse leaves Key Data Base (K) extents in scratch space to improve file open performance.

For the current VRAM release, VRAM scratch space normally contains a copy of the Key Data Base extent for a KEYED (but not KEYSEQUENTIAL) VRAM file. The *StorHouse Concepts and Facilities Manual* describes how to estimate Key Data Base sizes. If you plan to store a large number of KEYED files in your StorHouse system, consult your FileTek customer support representative to make sure enough scratch space is configured for your needs.

Buffer Allocation

StorHouse provides buffer allocation system parameters that control the use of memory.

StorHouse stores and transfers data in logical structures called *frames*. Normally, frames are 31 kilobytes in length. In many cases, StorHouse buffers multiple frames to obtain the best transfer rate to or from a device or to make up for differences in data transfer rates between two devices.

You can use the following system parameters to control buffer allocations:

Table D-3: Buffer Allocation System Parameters

Parameter	Description
XFR_BUFSIZ	Controls the size of buffers in regular StorHouse processor memory. XFR_BUFSIZ should be set during installation and changed only after consulting with your FileTek customer support representative.
XFR_BUFSIZ_D	Controls the size of buffers in special StorHouse processor memory. XFR_BUFSIZ_D should be set during installation and changed only after consulting with your FileTek customer support representative.
VRAM_CACHE_MAX	Specifies the maximum number of bytes of cache for records read from a VRAM file. VRAM_CACHE_MAX is a deferred dynamic parameter (it can be changed using SET SYSTEM). Changes take effect after a system restart. It can range in value from 0 through 300000 bytes and its default installation value is 100000 bytes. If the value is 0, VRAM files have no record caches.

File and Volume Integrity

The system uses error detection codes (EDCs) to detect errors during data transfers and while data is in storage. StorHouse also uses system and site identifiers in volume labels to help verify labels.

This appendix discusses

- Error detection codes
- System and site identifiers.

Error Detection Codes

StorHouse error detection code type and selection are controlled by the following system parameters:

- | | |
|-----------------|----------------|
| • EDC | • EDC_INTERNAL |
| • EDC_BOARD | • EDC_TO_HOST |
| • EDC_COPY | • EDC_TYPE |
| • EDC_FROM_HOST | |

These parameters are explained in the following sections.

Note If you need to change EDC operations in your StorHouse system, contact your FileTek customer support representative.

Error Detection Code Type

StorHouse and its host interfaces support more than one type of EDC algorithm for data transfers. The EDC_TYPE system parameter specifies the default EDC type to be used for file transfers.

FileTek can change the EDC_TYPE system parameter to one of the following values:

- A value of 0 indicates that StorHouse will not generate an error detection code.
- A value of 1 indicates that StorHouse will use the VWEN32 algorithm when it generates error detection codes during transfer operations.
- A value of 2 indicates that StorHouse will use the VWEA9520 algorithm.

FileTek recommends that EDC_TYPE always be set to 2.

The system parameter EDC_BOARD indicates if the EDC hardware is present. The value is set during installation and cannot be changed using SET SYSTEM. The value TRUE indicates that an EDC board is configured in StorHouse; EDCs are generated using this board. The value FALSE indicates that an EDC board is not configured; EDCs are generated by software. The default value of this parameter is FALSE.

EDC Selection for Host Interfaces

The host access program can generate an EDC for each frame of data it sends to StorHouse. The host interface does not use the EDC hardware board.

Assuming EDC_TYPE is not zero, users can request or suppress EDC generation by specifying /EDC or /NOEDC, respectively, as a modifier for the PUT or CREATE FILE command. Users can also use the EDC modifier to specify an alternate EDC type.

If users do not specify /EDC in a command, the EDC system parameter provides the default value for the EDC modifier. EDC processing slows down file transfers, but FileTek suggests that it be used to protect data.

FileTek can change the EDC system parameter. The value TRUE indicates that EDCs are to be generated; the value FALSE indicates that EDCs are not to be generated. The default installation value is TRUE.

EDC Selection for File Version Copy Operations

The EDC_COPY system parameter determines if StorHouse checks EDCs during user data copy operations within the system.

FileTek can change the EDC_COPY system parameter. The value TRUE enables the checking of EDCs on StorHouse when a file version is copied from one location to another. The value FALSE disables the checking of EDCs for these copies. The default installation value is TRUE.

EDC Selection for Host-StorHouse Operations

The EDC_FROM_HOST and EDC_TO_HOST system parameters determine if StorHouse checks EDCs during data transfers with hosts.

FileTek can set the EDC_FROM_HOST and EDC_TO_HOST system parameters. The value TRUE enables the checking of EDCs on StorHouse during data transfers from or to a host. The value FALSE disables the checking of EDCs for these transfers. EDC_FROM_HOST is set to TRUE at installation; EDC_TO_HOST is set to FALSE at installation.

EDC Selection for Internal Operations

The EDC_INTERNAL system parameter determines if StorHouse checks EDCs during internal StorHouse transfers involving an application, such as a VRAM process.

FileTek can change the EDC_INTERNAL parameter. The value TRUE enables the checking of EDCs. The value FALSE disables the checking of EDCs. The default installation value is TRUE.

System and Site Identifiers

FileTek assigns each StorHouse system a unique six-character *system identifier*. This identifier is saved in the SYSTEM_ID system parameter and cannot be changed.

During installation, you can assign the StorHouse system a 14-character *site identifier*. The site identifier is saved in the SITE_ID system parameter and you should not change it once you have set it.

The system records the system and site identifiers in label records on removable optical disk and tape volumes. It uses these fields in subsequent volume accesses to help verify that the label records are correct.



File and Volume Integrity

System and Site Identifiers

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NOTE: This index lists all special characters, such as !, /, and numeric characters, before alphabetic characters.

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