Safeguard User’s Guide

Abstract

This manual describes the Safeguard product, the use of the command interpreter SAFECOM, and the basic security tasks performed by all users.

The manual is intended for security administrators, system managers, and general users of HP NonStop™ systems.

Product Version

Safeguard G07, H05

Supported Release Version Updates (RVUs)

This publication supports J06.03 and all subsequent J-series RVUs, H06.08 and all subsequent H-series RVUs, and G06.29 and all subsequent G-series RVUs, until otherwise indicated by its replacement publications. Additionally, all considerations for H-series throughout this manual will hold true for J-series also, unless mentioned otherwise.

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422089-013	Safeguard G07, H04	August 2009
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What's New in This Manual

Manual Information

Abstract

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New and Changed Information

Changes to 422089-020 Manual:

- Updated the Using the LOGON Command on page 2-2.
- Updated the Error Handling in Command Files on page 7-14.

Changes to 422089-019 Manual:

- Added new example on page 3-10.

Changes to the H06.22/J06.11 Manual:

- Updated the Safeguard product version on page -1.
- Updated the description of PRIV-LOGON ^ in Table 3-2 on page 3-3.
- Updated the SAFECOM screen display on page 7-14.

Changes to the H06.21/J06.10 Manual

- Added Safeguard Helper Process to the Components of the Safeguard Subsystem on page 1-7.
- Added Granting or Denying Access to an ACL section on page 3-12.
- Added SAFECOM Saved-Diskfile-Pattern Commands section containing the following:
  - Table 9-5, Saved-Diskfile-Pattern Commands, on page 9-16 describing the Saved Diskfile-Pattern Commands.
  - Examples on how to use the following Saved Diskfile-Pattern Commands:
    - ADD SAVED-DISKFILE-PATTERN on page 9-17.
    - ALTER SAVED-DISKFILE-PATTERN on page 9-17.
    - DELETE SAVED-DISKFILE-PATTERN on page 9-18.
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    - INFO SAVED-DISKFILE-PATTERN on page 9-18.
    - RESET SAVED-DISKFILE-PATTERN on page 9-19.
    - SET SAVED-DISKFILE-PATTERN on page 9-19.
    - SHOW SAVED-DISKFILE-PATTERN on page 9-20.
    - THAW SAVED-DISKFILE-PATTERN on page 9-20.

Changes to the H06.20/J06.09 Manual

- Added Logging On With -STOP Option on page 2-5.
- Updated the Logging On to a Remote System section with the -STOP option on page 2-6.

Changes to the 422089-014 Manual

- Updated notes in the following sections to include support for G-series RVUs:

  - DISK-FILE-ATTRIBUTES Table 3-2 on page 3-2.
  - AUDIT-PRIV-LOGON attribute on pages 3-5, 3-6, 3-8, 3-16, 3-17, 3-18, 3-19, 3-20, 3-22, and C-7.
  - Viewing an Alias Authentication Record section on page 6-7.
  - CREATION_TIME of User on page 6-2.
  - Viewing Your User Authentication Record section on page 6-4.
- Updated the DISKFILE display with OBJECT-TEXT-DESCRIPTION on page 7-4 and 7-14.
- Added a note to the CHECK-DISKFILE-PATTERN settings section to include H-series and J-series support on pages 9-8 and 9-10.

Changes to the H06.19/J06.08 Manual

- Updated the About Your User Authentication Record section on page 6-2.
- Added the following to the display of INFO USER command:
  - CREATION-TIME on page 6-3.
  - CREATOR-USER-NAME on page 6-3.
  - CREATOR-USER-TYPE on page 6-3.
  - CREATOR-NODENUMBER on page 6-3.
- Updated What the INFO USER Display Tells You on page 6-4.
- Added the following to the display of INFO ALIAS command:
  - CREATION-TIME on page 6-6.
  - CREATOR-USER-NAMEon page 6-6.
  - CREATOR-USER-TYPE on page 6-6.
  - CREATOR-NODENUMBER on page 6-6.
- Updated What the INFO ALIAS Display Tells You on page 6-7.
- Added MID option on page 9-5.
- Added Table 9-2, CHECK-DISKFILE-PATTERN settings when value is MID and Direction Diskfile is Filename-First, on page 9-7.
- Added Table 9-3, CHECK-DISKFILE-PATTERN settings when value is MID and Direction Diskfile is Volume-First, on page 9-8.

About This Manual

This user's guide is intended for all Safeguard users. It is intended especially for the general user who needs to use the Safeguard software to secure disk files, subvolumes, and processes. The manual describes the basic features of the Safeguard distributed security management facility and its command interpreter, SAFECOM. This manual does not cover those Safeguard features normally reserved for privileged users.

The first section of the manual introduces Safeguard security and compares it to the standard security mechanisms provided by the operating system.

The remainder of the manual covers the following topics:

- Logging on from a terminal controlled by the Safeguard subsystem
- Securing disk files, working with access control lists, and specifying auditing conditions
- Securing subvolumes
- Securing processes and subprocesses
- Obtaining information about your user ID and any user aliases you may have
- Working with SAFECOM, the Safeguard command interpreter, in three different modes: interactive mode, execute-and-quit mode, and batch mode
- Changing the standard SAFECOM prompt and changing the format of the INFO command report
- Section 9 discusses using patterns to secure diskfiles.
- Appendix A summarizes standard Guardian file security.
- Appendix B provides basic guidelines for protecting your terminal from unauthorized use.
- Appendix C summarizes the syntax of the SAFECOM commands presented in this manual.

This manual is designed to teach you how to use the Safeguard software to secure your disk files, subvolumes, and processes. This information applies to all users. If you are a security administrator, system administrator, or group manager, you will also need to read the *Safeguard Administrator's Manual* to learn how to secure volumes and devices and how to add users to the Safeguard security database.

For information on all SAFECOM commands, see the *Safeguard Reference Manual*.

Before reading this manual, you should be familiar with the *NonStop Systems Introduction* and the *Guardian User's Guide*.

Notation Conventions

Hypertext Links

Blue underline is used to indicate a hypertext link within text. By clicking a passage of text with a blue underline, you are taken to the location described. For example:

> This requirement is described under Backup DAM Volumes and Physical Disk Drives on page 3-2.

General Syntax Notation

The following list summarizes the notation conventions for syntax presentation in this manual.

UPPERCASE LETTERS. Uppercase letters indicate keywords and reserved words; enter these items exactly as shown. Items not enclosed in brackets are required. For example:

```
MAXATTACH
```

lowercase italic letters. Lowercase italic letters indicate variable items that you supply. Items not enclosed in brackets are required. For example:

file-name

computer type. `Computer type` letters within text indicate C and Open System Services (OSS) keywords and reserved words; enter these items exactly as shown. Items not enclosed in brackets are required. For example:

```
myfile.c
```

italic computer type. *`Italic computer type`* letters within text indicate C and Open System Services (OSS) variable items that you supply. Items not enclosed in brackets are required. For example:

pathname

[ ] Brackets. Brackets enclose optional syntax items. For example:

```
TERM [\system-name.]$terminal-name
```

```
INT[ERRUPTS]
```

A group of items enclosed in brackets is a list from which you can choose one item or none. The items in the list may be arranged either vertically, with aligned brackets on

each side of the list, or horizontally, enclosed in a pair of brackets and separated by vertical lines. For example:

```
FC [ num  ]
   [ -num ]
   [ text ]

K [ X | D ] address
```

{ } Braces. A group of items enclosed in braces is a list from which you are required to choose one item. The items in the list may be arranged either vertically, with aligned braces on each side of the list, or horizontally, enclosed in a pair of braces and separated by vertical lines. For example:

```
LISTOPENS PROCESS { $appl-mgr-name }
                  { $process-name  }

ALLOWSU { ON | OFF }
```

| Vertical Line. A vertical line separates alternatives in a horizontal list that is enclosed in brackets or braces. For example:

```
INSPECT { OFF | ON | SAVEABEND }
```

… Ellipsis. An ellipsis immediately following a pair of brackets or braces indicates that you can repeat the enclosed sequence of syntax items any number of times. For example:

```
M address [ , new-value ]...

[ - ] {0|1|2|3|4|5|6|7|8|9}...
```

An ellipsis immediately following a single syntax item indicates that you can repeat that syntax item any number of times. For example:

```
"s-char..."
```

Punctuation. Parentheses, commas, semicolons, and other symbols not previously described must be entered as shown. For example:

```
error := NEXTFILENAME ( file-name ) ;

LISTOPENS SU $process-name.#su-name
```

Quotation marks around a symbol such as a bracket or brace indicate the symbol is a required character that you must enter as shown. For example:

```
"[" repetition-constant-list "]"
```

Item Spacing. Spaces shown between items are required unless one of the items is a punctuation symbol such as a parenthesis or a comma. For example:

```
CALL STEPMOM ( process-id ) ;
```

If there is no space between two items, spaces are not permitted. In the following example, there are no spaces permitted between the period and any other items:

```
$process-name.#su-name
```

Line Spacing. If the syntax of a command is too long to fit on a single line, each continuation line is indented three spaces and is separated from the preceding line by a blank line. This spacing distinguishes items in a continuation line from items in a vertical list of selections. For example:

```
ALTER [ / OUT file-spec / ] LINE

   [ , attribute-spec ]...
```

!i and !o. In procedure calls, the !i notation follows an input parameter (one that passes data to the called procedure); the !o notation follows an output parameter (one that returns data to the calling program). For example:

```
CALL CHECKRESIZESEGMENT (  segment-id                    !i
                         , error        ) ;              !o
```

!i,o. In procedure calls, the !i,o notation follows an input/output parameter (one that both passes data to the called procedure and returns data to the calling program). For example:

```
error := COMPRESSEDIT ( filenum ) ;                      !i,o
```

!i:i. In procedure calls, the !i:i notation follows an input string parameter that has a corresponding parameter specifying the length of the string in bytes. For example:

```
error := FILENAME_COMPARE_ (  filename1:length           !i:i
                            , filename2:length ) ;       !i:i
```

!o:i. In procedure calls, the !o:i notation follows an output buffer parameter that has a corresponding input parameter specifying the maximum length of the output buffer in bytes. For example:

```
error := FILE_GETINFO_ (  filenum                        !i
                        , [ filename:maxlen ] ) ;        !o:i
```

Notation for Messages

The following list summarizes the notation conventions for the presentation of displayed messages in this manual.

Bold Text. Bold text in an example indicates user input entered at the terminal. For example:

```
ENTER RUN CODE

?123

CODE RECEIVED:      123.00
```

The user must press the Return key after typing the input.

Nonitalic text. Nonitalic letters, numbers, and punctuation indicate text that is displayed or returned exactly as shown. For example:

```
Backup Up.
```

lowercase italic letters. Lowercase italic letters indicate variable items whose values are displayed or returned. For example:

```
p-register
```

```
process-name
```

[ ] Brackets. Brackets enclose items that are sometimes, but not always, displayed. For example:

```
Event number = number [ Subject = first-subject-value ]
```

A group of items enclosed in brackets is a list of all possible items that can be displayed, of which one or none might actually be displayed. The items in the list might be arranged either vertically, with aligned brackets on each side of the list, or horizontally, enclosed in a pair of brackets and separated by vertical lines. For example:

```
proc-name trapped [ in SQL | in SQL file system ]
```

{ } Braces. A group of items enclosed in braces is a list of all possible items that can be displayed, of which one is actually displayed. The items in the list might be arranged either vertically, with aligned braces on each side of the list, or horizontally, enclosed in a pair of braces and separated by vertical lines. For example:

```
obj-type obj-name state changed to state, caused by
{ Object | Operator | Service }
```

```
process-name State changed from old-objstate to objstate
{ Operator Request. }
{ Unknown.          }
```

| Vertical Line. A vertical line separates alternatives in a horizontal list that is enclosed in brackets or braces. For example:

```
Transfer status: { OK | Failed }
```

% Percent Sign. A percent sign precedes a number that is not in decimal notation. The % notation precedes an octal number. The %B notation precedes a binary number. The %H notation precedes a hexadecimal number. For example:

```
%005400
```

```
%B101111
```

```
%H2F
```

```
P=%p-register E=%e-register
```

Notation for Management Programming Interfaces

The following list summarizes the notation conventions used in the boxed descriptions of programmatic commands, event messages, and error lists in this manual.

UPPERCASE LETTERS. Uppercase letters indicate names from definition files; enter these names exactly as shown. For example:

```
ZCOM-TKN-SUBJ-SERV
```

lowercase letters. Words in lowercase letters are words that are part of the notation, including Data Definition Language (DDL) keywords. For example:

```
token-type
```

!r. The !r notation following a token or field name indicates that the token or field is required. For example:

```
ZCOM-TKN-OBJNAME       token-type ZSPI-TYP-STRING.          !r
```

!o. The !o notation following a token or field name indicates that the token or field is optional. For example:

```
ZSPI-TKN-MANAGER       token-type ZSPI-TYP-FNAME32.         !o
```

Change Bar Notation

Change bars are used to indicate substantive differences between this edition of the manual and the preceding edition. Change bars are vertical rules placed in the right margin of changed portions of text, figures, tables, examples, and so on. Change bars highlight new or revised information. For example:

> The message types specified in the REPORT clause are different in the COBOL environment and the Common Run-Time Environment (CRE).
>
> The CRE has many new message types and some new message type codes for old message types. In the CRE, the message type SYSTEM includes all messages except LOGICAL-CLOSE and LOGICAL-OPEN.

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Include the document title, part number, and any comment, error found, or suggestion for improvement you have concerning this document.

1

Introduction to the Safeguard Subsystem

The Safeguard subsystem extends the security features of the Guardian environment to provide more comprehensive security for your system. The Safeguard subsystem works with the Guardian environment and allows you to apply more extensive and specific security controls. A comparison of Guardian security features and the extended features of the Safeguard software is presented later in this section.

Although the Safeguard subsystem can be used to secure access to various system resources, its primary benefit to the general user is extended protection for disk files, subvolumes, and processes. Other Safeguard features, which are reserved for privileged users, are described in the *Safeguard Administrator's Manual*. Only privileged users can add other users to the Safeguard database and, typically, control the security of volumes and devices.

Subjects and Objects

With the Safeguard subsystem, logged-on users are referred to as subjects, and system resources such as disk files and subvolumes are referred to as objects. An individual user can own an object, such as a disk file. Object owners can use the Safeguard software to allow others to share their resources.

To manage your system's subjects and objects, the Safeguard subsystem maintains both subject and object databases. The subject database contains authentication records for users and aliases. (Aliases are alternate user names with their own authentication records.) Object databases contain authorization records for system resources such as disk files, processes, and volumes.

General users can create and alter the authorization records stored in the object databases for disk files, subvolumes, and processes. The authorization records for other types of objects and the authentication records for users are under the control of your system's security administrator and security team.

For convenience in this manual, authorization records and authentication records are referred to collectively as protection records.

What Can the Safeguard Subsystem Do?

The Safeguard subsystem provides three major security capabilities to protect the general user's disk files, subvolumes, and processes:

- Authentication—Verifying a user name and password when a user requests access to the system. As a general user, you can change your password, but you have no

additional control over the authentication process, even though it provides the first line of defense against intrusion into your files and the entire system.

- Authorization—Checking access control lists to determine whether another user has authority to access your disk files, subvolumes, and processes. You can designate the specific access authorities that another user may have to your objects.
- Auditing—Recording attempts to access your disk files, subvolumes, and processes. The Safeguard subsystem can record attempts to access your objects or to change the protection records associated with them.

User Authentication

The Safeguard subsystem, like Guardian security, authenticates users by ensuring that only persons who enter a valid user name and associated password can access the system.

When the Safeguard software is installed, it takes over the existing USERID files, which contain user records for each user on the system. The Safeguard software expands user records by adding unique security attributes to them. The security administrator controls user authentication by modifying these attributes. For example, the security administrator can use the PASSWORD-MUST-CHANGE attribute to require that users change their passwords every 30 days. Similarly, the security administrator can temporarily suspend a user ID so the user with that ID cannot access the system.

As a general user, you need to be aware of how the security administrator has defined your user authentication record. This is particularly important if you are required to change your password at regular intervals or if your disk files have been assigned some default security protection. Section 6, Obtaining User and Alias Information, describes how you can check your user authentication record.

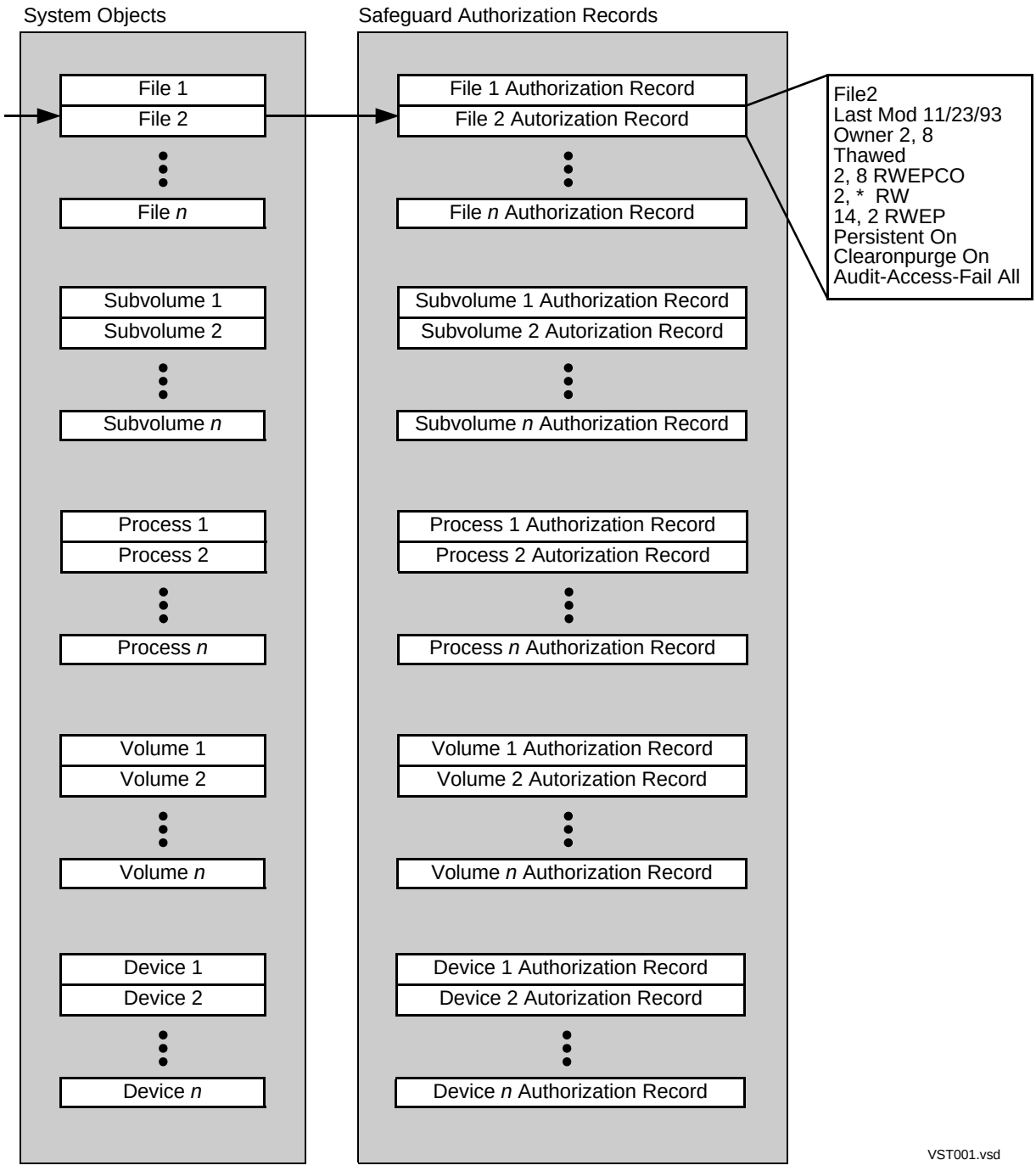
Object Authorization

Disk files, subvolumes, and processes are objects. To specify Safeguard protection for an object, you add a protection record for that object to the Safeguard database. When you add an object to the Safeguard database, that object is no longer subject to Guardian security settings. The Safeguard software creates an authorization record that contains the security attributes pertaining to that object. You (or whoever owns the authorization record) can modify these attributes with SAFECOM commands. SAFECOM is the Safeguard command interpreter.

You protect an object by defining an access control list with the ACCESS attribute. Access control lists specify who can access an object and what authorities they have. The authorities assigned to a disk file or subvolume—READ, WRITE, EXECUTE, PURGE, CREATE, and OWNER—indicate the functions a user can perform on that object.

Figure 1-1 shows the Safeguard object databases and depicts the process of the Safeguard software checking an object authorization record to authorize use of an object. This figure is representational. For simplicity, it omits certain technical details regarding the object databases.

Figure 1-1. Safeguard Object Authorization



Auditing

At your request, the Safeguard subsystem can create audit records of attempts to access your objects. When a user attempts to access an object for which auditing is specified, the Safeguard software records the attempt in an audit file. Records in the audit files contain information such as the name of the object, the date and time of the access attempt, and the user ID of the user attempting the access.

Security administrators can use the audit files to detect any attempts to access an object. The Safeguard software can also audit attempts to access or change the authorization records for subjects or objects. In addition, the Safeguard subsystem can be configured for systemwide auditing of all objects or specific types of objects, such as disk files. Auditing is fully described in the *Safeguard Audit Service Manual*.

The Safeguard Subsystem and Standard Security

The Safeguard subsystem does not completely replace the standard security mechanisms of the Guardian environment. Working with Guardian, the Safeguard subsystem enforces the additional security controls established by system managers, security administrators, and general users.

Table 1-1 compares the standard security features to the extensions offered by the Safeguard subsystem. This table summarizes commonly used Safeguard security features, including those reserved for privileged users. The table does not provide a complete list of all Safeguard security features.

The basic differences between Safeguard security and standard security are:

- In the Guardian environment, users control their own security attributes (that is, logon password and disk-file security).

  In the Safeguard database, each user is represented by a user authentication record, and the owner of the authentication record controls the security attributes for that user. Typically, privileged users own the user authentication records.

  Similarly, each object protected by the Safeguard software is represented by an object access authorization record, and the owners of that authorization record control the security attributes for that object. General users usually own the authorization records for their own files and subvolumes. Privileged users own the authorization records for other object types such as volumes and devices.

- The Guardian environment can control access to only one object type: disk files. File access is permitted according to the security string associated with the file. The file owner can specify that access to the file be limited to the owner or to users in the owner's group, or that access be granted to all users.

  In addition to disk files, the Safeguard software controls access to several other types of objects, such as volumes, subvolumes, and devices. With the Safeguard software, the owner of the authorization record for any protected object can create

and modify an access control list (ACL) for that object. The ACL specifies which individual users and specific user groups can access the object and what access authorities those users have to the object.

Without the Safeguard subsystem installed, the Guardian environment provides basic security controls for users and disk files. The Safeguard subsystem extends and complements this basic set of security controls for users and for protected objects.

To achieve the extra control over user authentication that the Safeguard software provides, a security administrator can specify values for the user attributes that are unique to the Safeguard subsystem.

Table 1-1. Comparing Guardian Security and Safeguard Security (page 1 of 2)

Security Feature	Guardian Security	Safeguard Security
Users		
User authentication	Yes	Yes
Remote password authentication	Yes	Yes
Password expiration	-	Yes
Password expiration grace period	-	Yes
Password expiration warning	-	Yes
Password change during logon	-	Yes
User expiration	-	Yes
Audit of logon and logoff	+	Yes
Audit of attempts to manage a Safeguard record	N.A.	Yes
Audit of a specific user's actions	-	Yes
Minimum password length	-	Yes
One-way password encryption	-	Yes
Prompt for old password before allowing a password change	-	Yes
Password history	-	Yes
Password required	-	Yes
Maximum password length	-	Yes
Password compatibility mode	-	Yes
Disk Files and Diskfile Patterns		
ACL authorities	RWEP	RWEPCO

ACL Access control list.
* Offered by extensions to the PASSWORD program.
\+ Offered by the $CMON interface of TACL.

Codes for access authorities in ACL:

R - Read	E - Execute	C - Create
W - Write	P - Purge	O - Owner

Table 1-1. Comparing Guardian Security and Safeguard Security (page 2 of 2)

Security Feature	Guardian Security	Safeguard Security
LICENSE, CLEARONPURGE, PROGID	Yes	Yes
PERSISTENT protection	-	Yes
Audit of attempts to access a file	-	Yes
Audit of attempts to manage a Safeguard record	N.A.	Yes
Disk Volumes And Subvolumes		
ACL authorities	-	RWEPCO
Audit of attempts to access a volume or subvolume	-	Yes
Audit of attempts to manage a Safeguard record	N.A.	Yes
Processes And Subprocesses		
ACL authorities	-	RWPCO
Audit of attempts to access process name	-	Yes
Audit of attempts to manage s Safeguard record	N.A.	Yes
Control of NAMED or UNNAMED as a group	-	Yes
Devices And Subdevices Other Than Disks		
ACL authorities	-	RWO
Audit of attempts to access device	-	Yes
Audit of attempts to manage a Safeguard record	N.A.	Yes
OBJECTTYPE		
ACL authorities	N.A.	CO
Audit of attempts to add objects of a certain type	-	Yes
Audit of attempts to manage an OBJECTTYPE record	N.A.	Yes

ACL Access control list.
* Offered by extensions to the PASSWORD program.
\+ Offered by the $CMON interface of TACL.

Codes for access authorities in ACL:

R - Read	E - Execute	C - Create
W - Write	P - Purge	O - Owner

Similarly, to achieve the extra control over object-access authorization, objects must first be given Safeguard protection. For example, until a disk file is added to the Safeguard database, the Guardian disk-file security mechanism remains in effect. For your convenience, Appendix A, Guardian File Security, describes how to specify Guardian security for your disk files.

Because the Safeguard subsystem works with the security of the Guardian environment, you have complete and selective control over the level of file security. For example, you can place a single disk file under Safeguard control and leave the rest of your database and program files under Guardian security. At the other extreme, you can place every database and program file under Safeguard protection.

The relationship between the Safeguard subsystem and the Guardian environment can extend to a network of HP systems. Depending on your security requirements, you can install the Safeguard software on a single node in your network, on a few nodes, or on every node.

Components of the Safeguard Subsystem

The Safeguard subsystem consists of three major processes and several security database files. The following Safeguard components reside on every system on which the Safeguard software is installed:

- A subject database, which contains a user authentication record for every user and alias on the system
- Object databases, which contain object authorization records for every object under control of the Safeguard software
- SAFECOM, the Safeguard command interpreter, which allows you to communicate with the Safeguard subsystem
- SMON, the Security Monitor, which authorizes all attempts to access protected objects
- SMP, the Security Manager Process, which is responsible for managing all changes to the subject and object databases and for authenticating user logon attempts
- SHP, the Safeguard Helper Process, which assists SMP in identifying and updating process attributes whenever the following user attributes in user database files are modified:
  - AUDIT-USER-ACTION-PASS
  - AUDIT-UER-ACTION-FAIL
  - Primary group
  - Supplementary group list
  - Group count

Who Can Use the Safeguard Subsystem?

To use the Safeguard command interpreter, you must have EXECUTE authority for the SAFECOM program. Your security administrator can limit this authority to certain users by creating an access control list for the SAFECOM program file. This manual assumes that you have execute authority for the SAFECOM program.

Initially, SAFECOM limits what certain classes of users can do. Normally, general users can protect their own disk files, subvolumes, and processes with the Safeguard software. General users can also manage the access control lists associated with their disk files, subvolumes, and processes.

The security administrator can decide to limit or expand any user's authorities to suit the company's security policy. In certain instances you might be given additional authority. For example, your system administrator could add an object such as a printer to the Safeguard database and then grant owner authority to you as a general user. With owner authority, you can manage the access control list for that printer.

2 Safeguard Logon Dialog

This section explains how to log on and how to change your password on systems where the Safeguard subsystem is running. If the Safeguard subsystem is not running on your system, see the *Guardian User's Guide* for logon instructions.

To gain access to your system, use the LOGON command. To do so, you must have a user name and user ID assigned to you. In addition, you should be given a password. Typically, a user name, user ID, and password are assigned to a new user by the user's group manager or the system security administrator. You must enter your user name and password when you log on to your system.

If you have been assigned an alias, use it as a user name. However, be aware that aliases are case-sensitive. Uppercase and lowercase letters are recognized exactly as you type them. User names, on the other hand, are recognized as uppercase, regardless of how you type them. For more information about aliases, see About Alias Authentication Records on page 6-5.

The Logon Prompt

The type of logon prompt you see depends on whether your terminal is a Safeguard terminal. A Safeguard terminal is defined by a member of the security staff with the ADD TERMINAL command. If your terminal is a Safeguard terminal, the logon prompt looks like this:

```
SAFEGUARD 1>
```

If your terminal is not a Safeguard terminal, the TACL logon prompt appears on your screen:

```
TACL 1>
```

In either case, the logon dialog described in this section applies to your terminal as long as the Safeguard subsystem is running on your system. For the purposes of the examples in this section, the logon prompt for a Safeguard terminal is shown.

The logon prompt accepts only three commands: LOGON, PAUSE, and TIME. If you enter any other command, the terminal displays the following message:

```
Expecting:  LOGON, PAUSE or TIME
```

The TIME command returns the current date and time:

```
SAFEGUARD 1> TIME
20 MAY 1993, 13:47:22
SAFEGUARD 2>
```

The PAUSE command suspends the logon prompting and allows other processes to interact with the terminal:

```
SAFEGUARD 1> PAUSE
```

To restore the logon prompt, press the Break key.

You can also terminate the LOGON command at any time by pressing Ctrl/Y or Break.

Using the LOGON Command

The LOGON command accepts your user name and password in several different formats, as the following examples shows.

From H06.28/J06.17 RVU onwards, the PASSWORD-ERROR-DETAIL global attribute is supported for password change during LOGON also. A detailed error message is displayed when the following conditions are met:

- If this attribute is set to ON
- The Authentication and Password Event Exit Processes are not enabled, and
- The password provided does not meet the complexity criteria

For example, the detailed error message can be in the following form based on which all password quality attributes are set to ON:

```
* ERROR *
    The password provided does not meet one or more of the
    following complexity requirements:
    Has atleast <n1> Alphabets,
    Has atleast <n2> Uppercase Characters [A-Z],
    Has atleast <n3> Lowercase Characters [a-z],
    Has atleast <n4> Numerals [0-9],
    Has atleast <n5> Special Characters(Such As !, $, *)
```

Note. n1, n2, n3, n4 and n5 are the integer numbers.

Logging On With a Blind Password

In the standard Safeguard configuration, passwords are blind. They are not displayed when typed at the password prompt. If you attempt to enter your password on the same line as your user name, it is displayed but not accepted. You must type it on the following line at the password prompt. The standard Safeguard configuration also requires that you use your user name (*group name*.*member name*) or alias when logging on. You cannot log on using your user ID (*group number*,*member number*).

The following example shows how a user with the user name support.jane logs on to the system. The user's password is alpha4. The password appears in this example even though it does not appear on the screen when support.jane types it.

```
SAFEGUARD 1> LOGON support.jane
Password: alpha4
*WARNING* Password Expires:  4 Jan 1995, 12:00
Last Logon:  18 DEC 1994, 11:23
Last Unsuccessful Attempt: 18 Dec 1994, 11:20 Total Failures: 5
Good Morning.  Welcome to \SFO
```

The terminal displays a series of messages after a successful logon. The first logon confirmation message tells the user when her current password expires. This message

appears only if the password has an expiration date and the user is allowed to change the password at this time. Another message indicates the date and time of the last successful logon for this user. Most systems also display a greeting message that typically includes the name of the system being accessed.

Another message describes failed logon attempts. Safeguard counts the number of times a login fails, for example, when you mistype your password. Safeguard also remembers the time that the last failure took place. The logon dialog message shows the time of the last failed logon, and the total number of failures for your account since it was created. If the message with this information changes unexpectedly, notify your security administrator.

The following example shows how support.jane could log on if the Safeguard configuration is altered to accept a user ID for logging on. This example assumes that the user ID for support.jane is 12,115:

```
SAFEGUARD 1> LOGON 12,115
Password: alpha4
*WARNING* Password Expires:  4 Jan 1995, 12:00
Last Logon:  18 DEC 1994, 11:23
Last Unsuccessful Attempt: 18 Dec 1994, 11:20 Total Failures: 5
Good Morning.  Welcome to \SFO
```

Changing Your Password With Blind Passwords

You can change your password as part of the logon sequence. Initially, the logon dialog is the same as a normal logon. However, to indicate that you want to change your password, type a comma at the end of your password. The system prompts you for a new password and then requests reentry of the new password to verify it. The following dialog shows a sequence in which support.jane changes her password from alpha4 to BigTop:

```
SAFEGUARD 1> LOGON support.jane
Password: alpha4,
Enter new password: BigTop
Reenter new password: BigTop
The password for support.jane has been changed.
Last Logon:  18 DEC 1994, 11:23
Last Unsuccessful Attempt: 18 Dec 1994, 11:20 Total Failures: 5
Good Morning.  Welcome to \SFO
```

Passwords are case-sensitive, so the Safeguard software recognizes uppercase and lowercase letters exactly as you type them. Each time support.jane uses her new password, she must remember to capitalize the letters B and T.

An alternative method of changing an unexpired password is to enter the current password, the new password, and the verification of the new password on the same line. The following dialog shows this type of password change. The passwords must be separated by commas:

```
SAFEGUARD 1> LOGON support.jane
Password: alpha4,BigTop,BigTop
The password for support.jane has been changed.
```

```
Last Logon:  18 DEC 1994, 11:23
Last Unsuccessful Attempt: 18 Dec 1994, 11:20 Total Failures: 5
Good Morning.  Welcome to \SFO
```

Another option for changing the password is to enter the current and new passwords on one line and the verification of the new password on the next line:

```
SAFEGUARD 1> LOGON support.jane
Password: alpha4,BigTop
Reenter new password: BigTop
The password for support.jane has been changed.
Last Logon:  18 DEC 1994, 11:23
Last Unsuccessful Attempt: 18 Dec 1994, 11:20 Total Failures: 5
Good Morning.  Welcome to \SFO
```

Note. If the PASSWORD program is available on your system, you can use it to change your password after you log on. For instructions on the use of the PASSWORD program, refer to the *Guardian User's Guide.*

Logging On With an Expired Password

Your password can have an extension or grace period during which it can be changed after expiration. If you have ignored warnings of a pending password expiration date and allowed your password to expire, you can change your password during the grace period. The following example shows how support.jane can change her expired password during the grace period:

```
SAFEGUARD 1> LOGON support.jane
Password: alpha4
Password expired
Enter new password: BigTop
Reenter new password: BigTop
The password for support.jane has been changed.
Last Logon:  18 DEC 1994, 11:23
Last Unsuccessful Attempt: 18 Dec 1994, 11:20 Total Failures: 5
Good Morning.  Welcome to \SFO
```

Similarly, support.jane could enter the new password and verification on the same line:

```
SAFEGUARD 1> LOGON support.jane
Password: alpha4
Password expired
Enter new password: BigTop,BigTop
The password for support.jane has been changed.
Last Logon:  18 DEC 1994, 11:23
Last Unsuccessful Attempt: 18 Dec 1994, 11:20 Total Failures: 5
Good Morning.  Welcome to \SFO
```

Logging On With Displayable Passwords

In the standard Safeguard configuration, passwords are not accepted if entered on the LOGON command line. If the Safeguard configuration has been changed so that passwords are allowed on the LOGON command line, you can use the following

procedure. With displayable passwords, you type your user name and password on the same line, separated by a comma:

```
SAFEGUARD 1> LOGON support.jane,alpha4
*WARNING* Password Expires:  4 Jan 1995, 12:00
Last Logon:  18 DEC 1994, 11:23
Last Unsuccessful Attempt: 18 Dec 1994, 11:20 Total Failures: 5
Good Morning.  Welcome to \SFO
```

Changing Your Password With Displayable Passwords

With displayable passwords, you can change your password by typing your user name, current password, and new password on the same line:

```
SAFEGUARD 1> LOGON support.jane,alpha4,BigTop
The password for support.jane has been changed.
Last Logon:  18 DEC 1994, 11:23
Last Unsuccessful Attempt: 18 Dec 1994, 11:20 Total Failures: 5
Good Morning.  Welcome to \SFO
```

Logging On With -STOP Option

The Safeguard LOGON program terminates after you log off. However, you can use the -STOP option to terminate the LOGON program after the username and password authentication is complete.

The following example shows how to use -STOP option:

```
SAFEGUARD 1> LOGON -STOP support.jane
Password: alpha4
*WARNING* Password Expires:  4 Jan 1995, 12:00
Last Logon:  18 DEC 1994, 11:23
Last Unsuccessful Attempt: 18 Dec 1994, 11:20 Total Failures: 5
Good Morning.  Welcome to \SFO
```

If you enter an option other than -STOP, Safeguard issues the following message:

```
Error: BAD OPTION SPECIFIED
```

Note.

- The -STOP option is not case-sensitive.
- It is recommended that you avoid using the -STOP option when the Safeguard LOGON program is launched through a command-line interpreter because stopping a LOGON program causes more than one command-line interpreter to be active on a terminal. This might generate an incorrect output for any command.
- The -STOP option is supported only on systems running J06.09 and later J-series RVUs and H06.20 and later H-series RVU.

Logging On to a Remote System

To access a remote system using the Safeguard logon dialog, you must use the Safeguard LOGON program. To run this program, you must already be logged on to your local system, and the Safeguard software must be running on the remote system. The program initiates the logon prompt from the Safeguard software on the remote system so that you can log on to that system from your local terminal.

The following example shows how to use the LOGON program to log on to the remote system named \STL:

```
4> \STL.LOGON
SAFEGUARD 1>
```

When you receive the logon prompt, you log on in the usual manner. You can also use the -STOP option, as described previously in this section.

Type your user name on the same line as the LOGON command. When you initiate the remote logon in this manner, the Safeguard software responds by prompting you for your password as in the normal logon dialog.

The following example shows the start of such a remote logon sequence:

```
4> \STL.LOGON -STOP support.jane
Password:
```

If the remote system is configured to allow displayable passwords, you can follow your user name with a comma and your password:

```
4> \STL.LOGON support.jane,BigTop
```

You can also change your password during a remote logon in the same manner as you do during a local logon.

To log on to a remote system, your user ID must have been added to the remote system, and you must have remote passwords established to allow network access. Your security administrator handles these functions.

3 Securing Disk Files

This section acquaints you with the process of securing disk files with the Safeguard subsystem. When you secure a disk file, you can:

- Specify an access control list and the associated access authorities
- Temporarily freeze an access control list so users on the list cannot access the file
- Thaw the access control list so users on the list can once again access the file
- Specify auditing conditions for the file
- Give control of the file to someone else (change or share ownership)
- Retain an authorization record for a disk file if that file is purged
- Set special security features for disk files that contain program object code
- Erase the data stored in a disk file when the file is purged

  Normally, the PURGE command releases the space allocated for the file but does not erase the data.

You can also use diskfile patterns to secure disk files. For more information, see Section 9, Working with Patterns.

Table 3-1 lists the SAFECOM disk-file commands. The examples in this section illustrate the use of these commands. For the detailed syntax of the disk-file security commands, see the *Safeguard Reference Manual*.

Table 3-1. Disk-File Commands (page 1 of 2)

Command	Action
ADD DISKFILE	Adds a disk file to the Safeguard database by creating an authorization record for the file.
ALTER DISKFILE	Changes one or more of the security attributes in the disk-file authorization record.
DELETE DISKFILE	Removes a disk file from the Safeguard database by deleting the disk-file authorization record. The disk file is returned to Guardian protection.
FREEZE DISKFILE	Suspends access authority to a disk file. No one except an owner, the primary owner's group manager, and the super ID can gain access to the frozen file.
INFO DISKFILE	Displays the security attributes of the disk-file authorization record.
RESET DISKFILE	Resets one or more default disk-file attributes to values predefined by the Safeguard software. Any subsequent ADD DISKFILE commands use these predefined defaults for attributes not specified in the ADD DISKFILE command.

Table 3-1. Disk-File Commands (page 2 of 2)

Command	Action
SET DISKFILE	Establishes default disk-file attributes that you specify. Any subsequent ADD DISKFILE commands use these defaults for attributes not specified in the ADD DISKFILE command.
SHOW DISKFILE	Displays the current default attributes for disk files. Any subsequent ADD DISKFILE commands use these defaults for attributes not specified in the ADD DISKFILE command.
THAW DISKFILE	Restores disk-file access authorities for users on the access control list.

Note. The disk-file commands can be entered with either DISKFILE or DISCFILE because SAFECOM accepts either spelling. The examples in this book use DISKFILE.

Table 3-2 shows the disk-file security attributes you can control. This section describes these attributes and explains how to set them using the commands listed in Table 3-1. The audit attributes are explained in detail in the *Safeguard Audit Service Manual*.

You can abbreviate any SAFECOM command, attribute, or keyword. Usually, any such reserved word can be abbreviated to its first three characters. Some abbreviations must be more than three characters so that the Safeguard software can distinguish between similar reserved words, such as DISKFILE and DISPLAY. The shortest abbreviation allowed for DISKFILE is DISK. The shortest abbreviation for DISPLAY is DISP. When a reserved word is hyphenated, do not omit any hyphens. Each component of a hyphenated word must have at least its first three characters. The shortest possible abbreviation for AUDIT-MANAGE-PASS is AUD-MAN-PAS.

Table 3-2. Disk-File Attributes (page 1 of 2)

Attribute	Function
OWNER	Transfers ownership or gives another user OWNER authority to a file.
ACCESS	Grants users access authority to a file.
AUDIT-ACCESS-PASS	Specifies auditing of successful attempts to access a file.
AUDIT-ACCESS-FAIL	Specifies auditing of unsuccessful attempts to access a file.
AUDIT-MANAGE-PASS	Specifies auditing of successful attempts to change a file's authorization record.
AUDIT-MANAGE-FAIL	Specifies auditing of unsuccessful attempts to change a file's authorization record.
CLEARONPURGE	Specifies that null characters are to be written over the space allocated to a purged file.

^ Supported only on systems running H06.11 and later H-series RVUs and G06.32 and later G-series RVUs.

^^ Supported only on systems running J06.05 and later J-series RVUs, H06.16 and later H-series RVUs, and G06.32 and later G-series RVUs.

Table 3-2. Disk-File Attributes (page 2 of 2)

Attribute	Function
PERSISTENT	Specifies that the authorization record for a file is to be retained if the file is purged.
PROGID	Applicable only to files that contain object code; sets the process access ID (PAID) to the user ID of the file's primary owner.
TRUST	Specifies whether or not the file can be trusted to not access I/O buffers during execution. Applies only to program files. Only the super ID can set this attribute. This attribute is valid only on systems running H-series RVUs.
LICENSE	Applicable only to files that contain privileged object code; specifies that nonprivileged users can execute the code.
OBJECT-TEXT-DESCRIPTION^^	Allows comments on authorization records to be associated with objects.
PRIV-LOGON ^	Specifies whether the program file (object disk file) added in Safeguard protection can request additional logon-related sensitive features and whether delay should be imposed for failed authentication attempts.

^ Supported only on systems running H06.11 and later H-series RVUs and G06.32 and later G-series RVUs.

^^ Supported only on systems running J06.05 and later J-series RVUs, H06.16 and later H-series RVUs, and G06.32 and later G-series RVUs.

Getting Started

You must use SAFECOM, the Safeguard command interpreter, to enter commands. As described in Section 7, Working With SAFECOM, you can choose different operating modes and options when you run SAFECOM.

For simplicity, the examples in this section assume that you are running SAFECOM in interactive mode. To start SAFECOM in interactive mode, type the following command at the TACL prompt:

```
1> SAFECOM
```

In response to this command, SAFECOM displays its program banner and an equal sign (=). The equal sign is the SAFECOM command prompt. It indicates SAFECOM is ready to accept commands.

To end an interactive session, type EXIT at the SAFECOM command prompt.

Adding a Disk File to the Safeguard Subsystem

You must own a disk file or be owner's group manager or a super user to secure a disk file with the Safeguard subsystem. The ADD DISKFILE command puts a file under

Safeguard control by creating an authorization record for the file. You can define the security for a file by setting the file's attributes in the authorization record. One of these attributes is the OWNER attribute. Unless you change the OWNER attribute, you are the owner, and only you (or a privileged user, namely, owner's group manager and super user) can make changes to the authorization record. You can also specify multiple owners by giving other users OWNER authority on an access control list entry. Any user with OWNER authority (or a privileged user, namely, owner's group manager and super user) can change the authorization record for the file. For additional details, see Specifying Ownership on page 3-16.

You can use diskfile patterns to add disk files to the Safeguard subsystem. For more information, see Section 9, Working with Patterns.

The following exercise acquaints you with the process of adding a disk file to the Safeguard database. The exercise assumes your user ID is 2,1, that you have a file named report1, and that your default subvolume is $data.sales. The exercise further assumes that you have started an interactive session by typing SAFECOM at the TACL prompt.

Add the file named report1 to the Safeguard database using the following SAFECOM command:

```
=ADD DISKFILE report1,OBJECT-TEXT-DESCRIPTION ‘‘Record created &
on April 04’’
```

This command creates an authorization record for report1 and associates the object text description as comments of the authorization record. At this point, you can no longer access the file because you have not specified an access control list. However, because you are the file's owner, you can create an access control list that includes your user ID. Only users specified on the access control list can access the file.

To see the authorization record for report1:

```
=INFO DISKFILE report1
```

The display shows:

```
                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 REPORT1          18JUL05, 11:00       2,1    THAWED        OFF

 NO ACCESS CONTROL LIST DEFINED!
```

The INFO display tells you that no access control list is defined.

Specify a simple access control list that gives you all authorities:

```
=ALTER DISKFILE report1, ACCESS 2,1 *
```

The asterisk (*) specifies READ, WRITE, EXECUTE, PURGE, and OWNER authorities for user ID 2,1. It does not grant CREATE authority for disk files. CREATE is a special type of authority that you use in conjunction with the PERSISTENT attribute. For details, see The PERSISTENT Attribute on page 3-18.

Once again, display the authorization record:

```
=INFO DISKFILE report1
```

The display shows:

```
                     LAST-MODIFIED      OWNER    STATUS    WARNING-MODE
$DATA.SALES
 REPORT1           18JUL05, 11:03        2,1    THAWED          OFF

    002,001         R,W,E,P, O
```

The file report1 is protected by the Safeguard software with a simple access control list that consists of only your user ID. To modify or expand the access control list, see Working With Access Control Lists on page 3-7.

Note. If you display the Guardian security string with the FUP INFO command or the TACL FILEINFO command, the value of the RWEP field appears as four asterisks ("****") for the file that is placed under Safeguard protection through the ADD DISKFILE command. But if the file is placed under Safeguard control through the use of a DEFAULT-PROTECTION or PERSISTENT PROTECTION record FUP INFO and FILEINFO will display Guardian security string in the RWEP column though the file will be placed under Safeguard protection.

Controlling Default Attributes

When you add a file to the Safeguard database, any unspecified attributes take on the default attributes for a disk file. As the previous examples showed, when report1 was initially added to the Safeguard database, it did not have an access control list. This occurred because the default disk-file attributes do not include an access control list. To see the default values for disk files:

```
=SHOW DISKFILE
```

The display shows:

```
TYPE              OWNER             WARNING-MODE
 DISKFILE          2,1                   OFF

OBJECT-TEXT-DESCRIPTION =

  AUDIT-ACCESS-PASS = NONE         AUDIT-MANAGE-PASS = NONE
  AUDIT-ACCESS-FAIL = NONE         AUDIT-MANAGE-FAIL = NONE

  AUDIT-PRIV-LOGON = OFF

  LICENSE = OFF  PROGID = OFF  CLEARONPURGE = OFF  PERSISTENT = OFF
  TRUST = OFF                  PRIV-LOGON = OFF

 NO ACCESS CONTROL LIST DEFINED!
```

Note. The attributes, AUDIT-PRIV-LOGON and PRIV-LOGON, are supported only on systems running H06.11 and later H-series RVUs and G06.32 and later G-series RVUs. The OBJECT-TEXT-DESCRIPTION attribute is supported only on systems running J06.05 and later J-series RVUs and H06.16 and later H-series RVUs.

The display shows the default attributes for a disk file that are in effect when you start a SAFECOM session. No access control list is defined.

You can change any of the default attributes at any time during the session, and the changes remain in effect until you exit SAFECOM. The default attributes return to their original state when you exit SAFECOM.

To change any of the default attributes, use the SET DISKFILE command. To set a default access control list:

```
=SET DISKFILE ACCESS  2,1 (R,W,E,P) ; 2,* (R,E)
```

This access control list gives you READ, WRITE, EXECUTE, and PURGE authority and gives all other users in group 2 READ and EXECUTE authority. Use the semicolon (;) to separate access control list entries.

Enter:

```
=SHOW DISKFILE
```

The display shows:

```
TYPE             OWNER                WARNING-MODE
 DISKFILE         2,1                     OFF

OBJECT-TEXT-DESCRIPTION =

  AUDIT-ACCESS-PASS = NONE         AUDIT-MANAGE-PASS = NONE
  AUDIT-ACCESS-FAIL = NONE         AUDIT-MANAGE-FAIL = NONE

  AUDIT-PRIV-LOGON = OFF

  LICENSE = OFF  PROGID = OFF  CLEARONPURGE = OFF  PERSISTENT = OFF
  TRUST = OFF                 PRIV-LOGON = OFF

    002,001      R,W,E,P
    002,*        R,  E
```

Note. The attributes, AUDIT-PRIV-LOGON and PRIV-LOGON, are supported only on systems running H06.11 and later H-series RVUs and G06.32 and later G-series RVUs. The OBJECT-TEXT-DESCRIPTION attribute is supported only on systems running J06.05 and later J-series RVUs and H06.16 and later H-series RVUs.

The default attributes include an access control list. Any files you add to the Safeguard database during this SAFECOM session will have this access control list unless you specify otherwise. You can specify additional access control list entries when you add files. See Working With Access Control Lists.

To reset the default attributes to the original Safeguard defaults:

```
=RESET DISKFILE
```

The default attributes also assume their original values when you start SAFECOM.

Working With Access Control Lists

You can define access control lists in three ways:

- By setting a default access control list for a SAFECOM session (with the SET DISKFILE command)
- By specifying an access control list when you add the file to the Safeguard database (with the ADD DISKFILE command)
- By altering the authorization record (with the ALTER DISKFILE command)

In every case, the access control list for a disk file defines the users and user groups who can access the file. Only the primary owner of the authorization record for a disk file, the primary owner's group manager, the local super ID, and users with OWNER authority on the access control list can modify the access control list. For more information about ownership, see Specifying Ownership on page 3-16.

An access control list for a disk file can grant or deny any combination of the following access authorities:

READ	The authority to read a disk file
WRITE	The authority to write to a disk file
EXECUTE	The authority to execute a program file as a process
PURGE	The authority to purge a disk file
CREATE	The authority to create a disk file
OWNER	The authority to change the authorization record for a disk file

Establishing a Default Access Control List

If you are adding several disk files to the Safeguard database during one SAFECOM session, you might want to create a default access control list. Then, if you want to use the same access control list for each file, you do not need to respecify it each time you add a file to the Safeguard database.

To establish a default access control list, use the SET DISKFILE command. Consider the following set of commands:

```
=RESET DISKFILE ACCESS
=SET DISKFILE ACCESS 2,1 (R,W,E,P)
=SET DISKFILE ACCESS 2,18 (R,W,E,P)
=SET DISKFILE ACCESS 2,* (R,W)
=SET DISKFILE ACCESS admin.* R ; admin.bill DENY R
```

Once again, assume you are user 2,1. The RESET command clears the current default access control list. This preliminary step ensures that no default access control list entries remain from previous SET DISKFILE commands. Then use SET commands to establish a new default access list.

Parentheses enclose multiple access authorities in three of the commands. You can include more than one access specification in a single SET command, as in the last command, by separating the specifications with a semicolon.

There are two ways to specify users—by name or by number. In the last command, the user name admin.bill corresponds to user ID 8,4. The DENY keyword in the last command specifically denies admin.bill a certain access, in this case R, which is READ access. A specific denial such as this takes precedence over the access granted to admin.bill as a group member. All other members of the admin group retain READ access.

Next, use the SHOW command to make sure that the default access list is correct:

```
=SHOW DISKFILE
```

The display shows:

```
TYPE             OWNER              WARNING-MODE
 DISCFILE         2,1                    OFF

OBJECT-TEXT-DESCRIPTION =

  AUDIT-ACCESS-PASS = NONE        AUDIT-MANAGE-PASS = NONE
  AUDIT-ACCESS-FAIL = NONE        AUDIT-MANAGE-FAIL = NONE

   AUDIT-PRIV-LOGON = OFF

  LICENSE = OFF  PROGID = OFF  CLEARONPURGE = OFF  PERSISTENT = OFF
  TRUST = OFF                  PRIV-LOGON = OFF

    002,001      R,W,E,P
    002,018      R,W,E,P
    008,004 DENY R
    002,*        R,W
    008,*        R
```

Note. The attributes, AUDIT-PRIV-LOGON and PRIV-LOGON, are supported only on systems running H06.11 and later H-series RVUs and G06.32 and later G-series RVUs. The OBJECT-TEXT-DESCRIPTION attribute is supported only on systems running J06.05 and later J-series RVUs and H06.16 and later H-series RVUs.

If you add files to the Safeguard database without specifying an access control list, the files acquire the default access control list. The default access control list stays in effect for the current SAFECOM session unless you change it.

Specifying Access With the ADD DISKFILE Command

If you specify access control list entries with the ADD DISKFILE command, those entries plus the default entries make up the access control list for the added file.

Assume you want to use the default access control list for a file named quarter1 and you also want to add user 4,12 with only READ access. If you have not exited SAFECOM since the defaults were defined:

```
=ADD DISKFILE quarter1, ACCESS 4,12 R
```

To see the settings for quarter1:

```
=INFO DISKFILE quarter1
```

The display shows:

```
                     LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 QUARTER1          23JUL05, 15:00       2,1    THAWED          OFF

    002,001       R,W,E,P
    002,018       R,W,E,P
    004,012       R
    008,004 DENY  R
    002,*         R,W
    008,*         R
```

The access control list includes both the new entry with READ authority for user 4,12, and the entries specified in the default access control list.

Specifying Access With the ALTER DISKFILE Command

You can use the ALTER DISKFILE command to add, delete, and change entries in an access control list. To do so, specify the ACCESS attribute in the ALTER command.

For example, you can grant read, write, execute, and purge privileges to user OAKLAND.ADMIN:

```
=ALTER DISKFILE $data.log02, ACCESS \OAKLAND.ADMIN (R,W,E,P)
```

After changing the access control list, make sure the modified access control list is correct:

```
=INFO DISKFILE $data.log02
```

The display shows:

```
                     LAST-MODIFIED     OWNER           STATUS  WARNING-MODE
$DATA.AUDIT5
LOG02              19SEP05, 15:11     SECURITY.ADMIN  THAWED  OFF

    TESTER.USER1              R
    SECURITY.ADMIN            R,W,E,P  O
    \TEST.PROD.OPER   DENY    R
    \OAKLAND.ADMIN            R,W,E,P
```

For example, you can grant user 9,23 both READ and WRITE authority to quarter1:

```
=ALTER DISKFILE quarter1, ACCESS 9,23 (R,W)
```

After changing the access control list, make sure the modified access control list is correct:

```
=INFO DISKFILE quarter1
```

The display shows:

```
                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 QUARTER1         23JUL05, 15:08       2,1    THAWED          OFF

    002,001       R,W,E,P
    002,018       R,W,E,P
    004,012       R
    008,004 DENY  R
    009,023       R,W
    002,*         R,W
    008,*         R
```

An entry for user ID 9,23 has been added.

When you specify a new access control list entry, that entry does not replace the existing entries. It is added to them. Similarly, if you specify an access authority for a user ID that is already on the list, the new authority is added to the entry for that user ID. The new authority does not replace the existing authorities.

You can also use the ALTER DISKFILE command to deny access authorities to users already on the access control list. For example, as a member of group 2, user 2,6 has READ and WRITE authority to the file quarter1. Suppose you want to limit this user's authority to READ only. To deny the user's WRITE authority:

```
=ALT DISK quarter1, ACCESS 2,6 DENY W
```

To verify the denial:

```
=INFO DISKFILE quarter1
```

The display shows:

```
                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 QUARTER1         23JUL05, 15:15       2,1    THAWED          OFF

    002,001       R,W,E,P
    002,006 DENY  W
    002,018       R,W,E,P
    004,012       R
    008,004 DENY  R
    009,023       R,W
    002,*         R,W
    008,*         R
```

User ID 2,6 has been denied WRITE authority.

Assume you want to use the default PROCESS-ACCESS control list for a file named TEST and you also want to add user 2,1 with only execute process-access

```
=ALTER DISKFILE TEST,PROCESS-ACCESS 2,1 E
```

To see the settings for TEST.

```
=INFO DISKFILE TEST
```

The display shows:

```
                     LAST-MODIFIED      OWNER    STATUS    WARNING-MODE
$SYSTEM.SFGD TEST

                      14JUL11, 17:34     255,255   THAWED          OFF

NO ACCESS CONTROL LIST DEFINED!

PROCESS-ACCESS LIST =
                  2,1     E
```

.

Note. A denial of authorities for a user takes away only those authorities specifically denied. Any other authorities granted to that user or that user's group are still valid for the user.

A grant of authorities for a specific user is not cumulative even if that user's group also appears on the access control list. Furthermore, the authorities required for any specific transaction must appear in a single entry on the access control list.

For instance, assume that user 2,5 has only READ access to a file and that group 2,* has WRITE access to the file. In this case, user 2,5 could either read the file or write to it but could not perform an operation such as editing that requires both READ and WRITE access.

You can specify up to 50 access control list entries. To remove an access authority from an entry, use the minus sign (-), as described in the next subsection.

Deleting an Access Control List Entry

You can revoke access authorities previously granted to a user or group of users by using a minus sign (-). If you revoke all authorities granted to a user or group of users, the access control list entry is deleted.

For example, suppose you no longer want user ID 9,23, to have access to quarter1. To remove the entry on the access control list:

```
=ALTER DISKFILE quarter1, ACCESS 9,23 - (R,W)
```

Because you removed all the authorities granted to user 9,23 the entry is deleted. To display the modified access control list:

```
=INFO DISK quarter1
```

```
                     LAST-MODIFIED      OWNER    STATUS     WARNING-MODE
$DATA.SALES
 QUARTER1          23JUL05, 15:15       2,1    THAWED          OFF

    002,001       R,W,E,P
    002,006 DENY  W
    002,018       R,W,E,P
    004,012       R
    008,004 DENY  R
    002,*         R,W
    008,*         R
```

The entry for user ID 9, 23 has been removed from the access control list.

Note. If you are attempting to remove a deleted user from an access control list, you must specify the user ID, not the user name. A deleted user is one whose user authentication record has been deleted from the Safeguard database.

Granting or Denying Access to an ACL

You can grant or deny access to entries in an ACL.

Granting Access

The rules for granting access are:

- A local super ID is granted all access to a Safeguard object, unless specifically denied.
- The primary owner of a Safeguard object is granted owner access (“O”), unless specifically denied.

  Note. This rule does not apply to remote access.

- Except for the above two rules, any form of access is denied unless an ACL specifically grants it.
- Attempts to open a file for read/write access are not granted unless both accesses are granted on the same ACL entry. For example, consider that the following ACL is protecting a file:

  ```
  001,255      R
  *.*          W
  ```

  If user ID 1, 255 attempts to open the file for read/write access, the open will be rejected with error 48.

  The read and write access authorities must be listed in a single access entry for read/write access to be granted.

Denying Access

You can deny access to ACLs using the DENY clause to:

- Counteract cases where Safeguard grants access by default.
- Address situations where a group is allowed access, but certain individual members are denied access.

The following examples illustrate different scenarios in which the DENY clause is used.

Example 1:

```
      040,002   R
      040,004   R
      040,006   R
DENY  040,*     R
```

In this example, the owner of the object wants to allow read access to only specific users in group 40. However, the DENY statement overrides the other ACLs.

Example 2:

```
DENY    040,002   R
DENY    040,004   R
DENY    040,006   R
        040,*     R
```

In this example, read access is granted to all group 40 users except those specified in the DENY statements. An alternative method is to grant access to specific users in group 40.

Example 3:

```
DENY    030,030    O
        200,200    R,O
DENY    255,255    *
      (owner is 030,030)
```

In this example, the DENY clause is used to deny access to the super ID (255, 255) and to the owner (030, 030).

Note. In this example, user (200,200) has owner (O) access and can change the record.

Using One Authorization Record to Define Another

Managing long access control lists can be time consuming. To save time, you can use an existing disk file authorization record to define another when you are adding a new disk file. Use the keyword LIKE. You can use this keyword with the ADD DISKFILE or SET DISKFILE command to specify the attributes and access control list of one file as the base authorization record of another file.

For example, suppose you want to use the same authorization record you defined for quarter1 for another disk file called quarter2. To add quarter2 to the Safeguard database, using the same security attributes and access control list as quarter1:

```
=ADD DISK quarter2, LIKE quarter1
```

Note. The LIKE keyword sets all the security attributes of one file (not just the access control list) to those of another file. LIKE sets all the attributes listed in Table 3-2, but it does not alter the THAWED or FROZEN status of the file being added or altered.

You can also use LIKE with the ALTER DISKFILE command. However, with the ALTER DISKFILE command, the access control list designated by LIKE does not replace the existing access control list. The new list is added to the existing access control list. LIKE does replace the other security attributes, such as auditing specifications, CLEARONPURGE, and LICENSE.

Freezing and Thawing an Access Control List

The FREEZE DISKFILE command temporarily suspends the access control list for a disk file. Only the primary owner (specified by the OWNER attribute), the primary owner's group manager, the local super ID, and the users with OWNER authority on the access control list can freeze or thaw an access control list. Also, only these users can access the file while the access control list is frozen. No other users can read the file, change it, execute it (if it is a program object file), or purge it.

For example, because you own quarter1, you can freeze access to the file with this command:

```
=FREEZE DISKFILE quarter1
```

Use the INFO DISKFILE command to verify that the access control list is frozen:

```
=INFO DISK quarter1
```

```
                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 QUARTER1         23JUL05, 15:25       2,1    FROZEN         OFF

    002,001       R,W,E,P
    002,006 DENY  W
    002,018       R,W,E,P
    004,012       R
    008,004 DENY  R
    002,*         R,W
    008,*         R
```

Note. Freezing an access control list has no effect on processes that already have the file open.

To restore a frozen access control list, use the THAW DISKFILE command. Any user who can freeze an access control list can also thaw it.

For example, the owner of the disk file (user ID 2,1) can restore the access control list for quarter1 by entering:

```
=THAW DISKFILE quarter1
```

The STATUS field of the INFO display shows that the access control list is thawed:

```
=INFO DISKFILE quarter1
```

```
                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 QUARTER1         23JUL05, 15:33       2,1    THAWED         OFF

    002,001       R,W,E,P
    002,006 DENY    W
    002,018       R,W,E,P
    004,012       R
    008,004 DENY  R
    002,*         R,W
    008,*         R
```

Specifying Auditing Conditions

The Safeguard subsystem provides facilities for auditing attempts to access a disk file or its corresponding authorization record. For detailed information on auditing, see the *Safeguard Audit Service Manual*.

You can specify four auditing attributes in a disk-file authorization record. They are:

- AUDIT-ACCESS-PASS
- AUDIT-ACCESS-FAIL
- AUDIT-MANAGE-PASS
- AUDIT-MANAGE-FAIL

You can set these attributes to ALL, LOCAL, REMOTE, or NONE. The default value for the auditing attributes is NONE, which indicates no auditing.

As with other security attributes, you can specify auditing conditions with the ADD DISKFILE, ALTER DISKFILE, or SET DISKFILE commands.

The attribute, AUDIT-PRIV-LOGON can also be specified in a disk-file authorization record.

The following command causes the Safeguard software to audit all unsuccessful remote attempts to access quarter1:

```
=ALTER DISKFILE quarter1, AUDIT-ACCESS-FAIL REMOTE
```

Similarly, the following command specifies auditing of all unsuccessful attempts (local and remote) to manage the authorization record for the file quarter1:

```
=ALT DISK quarter1, AUDIT-MANAGE-FAIL ALL
```

To display the audit settings for quarter1:

```
=INFO DISKFILE quarter1, DETAIL
```

The DETAIL option shows an expanded version of the INFO display:

```
                     LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 QUARTER1         23JUL05, 15:38       2,1    THAWED         OFF

    002,001       R,W,E,P
    002,006 DENY    W
    002,018       R,W,E,P
    004,012       R
    008,004 DENY  R
    002,*         R,W
    008,*         R

OBJECT-TEXT-DESCRIPTION =

  AUDIT-ACCESS-PASS = NONE         AUDIT-MANAGE-PASS = NONE
  AUDIT-ACCESS-FAIL = REMOTE       AUDIT-MANAGE-FAIL = ALL

  AUDIT-PRIV-LOGON = OFF

  LICENSE = OFF  PROGID = OFF  CLEARONPURGE = OFF  PERSISTENT = OFF
  TRUST = OFF                      PRIV-LOGON = OFF
```

Note. The attributes, AUDIT-PRIV-LOGON and PRIV-LOGON, are supported only on systems running H06.11 and later H-series RVUs and G06.32 and later G-series RVUs. The OBJECT-TEXT-DESCRIPTION attribute is supported only on systems running J06.05 and later J-series RVUs and H06.16 and later H-series RVUs.

AUDIT-ACCESS-PASS is set to REMOTE, and AUDIT-MANAGE-PASS is set to ALL.

Specifying Ownership

Normally, when you add a disk file to the Safeguard database, you must be the Guardian owner of the file. Unless you specify otherwise, the Safeguard subsystem recognizes you as the owner of the authorization record for the file (your user ID is specified for the OWNER attribute). Your group manager or the super ID can be the owner of the authorization record if either of them adds one of your files to the Safeguard database.

Ownership allows you to change the authorization record. In fact, you can even change the OWNER attribute of the authorization record, thereby giving control of the file to someone else.

You can specify ownership in two ways: with the OWNER attribute or with OWNER authority in an access control list. You can use OWNER authority to establish multiple owners. Both forms of ownership provide the ability to change the authorization record. However, if the disk file is removed from the Safeguard database, the primary owner (specified by the OWNER attribute) becomes the Guardian owner. Also, only the primary owner can set the PROGID attribute to protect program code. See The PROGID Attribute on page 3-20.

In the previous examples in this section, you are the only owner of quarter1. Assume you want user ID 2,18 to own quarter1 also. You could change the OWNER attribute, but then you would no longer own the file. Instead, you might want to grant user ID 2,18 OWNER authority in an access control list.

To give user ID 2,18 OWNER authority:

```
=ALTER DISK quarter1, ACC 2,18 O
```

The INFO display now shows an O in the entry for user ID 2,18:

```
=INFO DISK quarter1, DETAIL
```

```
                  LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 QUARTER1        23JAN05, 15:43       2,1    THAWED       OFF

    002,001       R,W,E,P
    002,006 DENY    W
    002,018       R,W,E,P,  O
    004,012       R
    008,004 DENY  R
    002,*         R,W
    008,*         R

OBJECT-TEXT-DESCRIPTION =

  AUDIT-PRIV-LOGON = OFF

  AUDIT-ACCESS-PASS = NONE         AUDIT-MANAGE-PASS = NONE
  AUDIT-ACCESS-FAIL = REMOTE       AUDIT-MANAGE-FAIL = ALL

  LICENSE = OFF  PROGID = OFF  CLEARONPURGE = OFF  PERSISTENT = OFF
  TRUST = OFF                      PRIV-LOGON = OFF
```

Note. The attributes, AUDIT-PRIV-LOGON and PRIV-LOGON, are supported only on systems running H06.11 and later H-series RVUs and G06.32 and later G-series RVUs. The OBJECT-TEXT-DESCRIPTION attribute is supported only on systems running J06.05 and later J-series RVUs and H06.16 and later H-series RVUs.

Other Disk-File Security Features

The Safeguard subsystem provides five special attributes for disk files: CLEARONPURGE, PERSISTENT, LICENSE, PROGID, and, in H-series RVUs only, TRUST. Like other security attributes, these attributes can be specified with the ADD DISKFILE, ALTER DISKFILE, or SET DISKFILE commands.

The CLEARONPURGE Attribute

Normally, a disk process purges a disk file by removing the file entry from the volume directory, thereby releasing the space occupied by the file. However, the data is not physically erased from the disk and is vulnerable to intruders until it is overwritten by another file. If you purge a file with CLEARONPURGE ON, however, the disk process writes null characters over all space allocated to the file.

To set the CLEARONPURGE attribute for the file quarter1, used in the previous examples:

```
=ALTER DISKFILE quarter1, CLEARONPURGE ON
```

To verify that the CLEARONPURGE attribute is on:

```
=INFO DISKFILE quarter1, DETAIL
```

```
                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 QUARTER1         23JUL05, 15:48       2,1    THAWED         OFF

    002,001       R,W,E,P
    002,006 DENY    W
    002,018       R,W,E,P,  O
    004,012       R
    008,004 DENY  R
    002,*         R,W
    008,*         R

OBJECT-TEXT-DESCRIPTION =

  AUDIT-PRIV-LOGON = OFF

  AUDIT-ACCESS-PASS = NONE         AUDIT-MANAGE-PASS = NONE
  AUDIT-ACCESS-FAIL = REMOTE       AUDIT-MANAGE-FAIL = ALL

  LICENSE = OFF  PROGID = OFF  CLEARONPURGE =  ON  PERSISTENT = OFF
  TRUST = OFF                 PRIV-LOGON = OFF
```

Note. The attributes, AUDIT-PRIV-LOGON and PRIV-LOGON, are supported only on systems running H06.11 and later H-series RVUs and G06.32 and later G-series RVUs. The OBJECT-TEXT-DESCRIPTION attribute is supported only on systems running J06.05 and later J-series RVUs and H06.16 and later H-series RVUs.

The PERSISTENT Attribute

The PERSISTENT attribute causes the disk file authorization record to be retained even if the file itself is purged. That is, if you purge a file with PERSISTENT ON and later create a file with that name, the new file assumes the authorization record associated with the old file.

For example, to set the PERSISTENT attribute to ON and give user 2,18 CREATE authority for the file quarter1:

```
=ALTER DISK quarter1, ACCESS 2,18 C, PERSISTENT ON
```

To verify the setting:

```
=INFO DISKFILE quarter1, DETAIL
```

```
                    LAST-MODIFIED     OWNER    STATUS     WARNING-MODE
$DATA.SALES
 QUARTER1         23JUL05, 15:48       2,1    THAWED        OFF

    002,001       R,W,E,P
    002,006 DENY    W
    002,018       R,W,E,P,C,O
    004,012       R
    008,004 DENY  R
    002,*         R,W
    008,*         R

OBJECT-TEXT-DESCRIPTION =

  AUDIT-PRIV-LOGON = OFF

  AUDIT-ACCESS-PASS = NONE         AUDIT-MANAGE-PASS = NONE
  AUDIT-ACCESS-FAIL = REMOTE       AUDIT-MANAGE-FAIL = ALL

  LICENSE = OFF  PROGID = OFF  CLEARONPURGE =  ON  PERSISTENT = ON
  TRUST = OFF                      PRIV-LOGON = OFF
```

Note. The attributes, AUDIT-PRIV-LOGON and PRIV-LOGON, are supported only on systems running H06.11 and later H-series RVUs and G06.32 and later G-series RVUs. The OBJECT-TEXT-DESCRIPTION attribute is supported only on systems running J06.05 and later J-series RVUs and H06.16 and later H-series RVUs.

The PERSISTENT attribute is set to ON, and user 2,18 can create this file with the same access control list if it is purged.

Note. If a file with persistent protection is purged, the PROGID and LICENSE attributes are set to OFF.

The PERSISTENT attribute is associated with a file name. Because of this, persistent protection is lost when you rename a file. The persistent protection record remains associated with the original file name, which refers to a file that no longer exists.

The LICENSE Attribute

The LICENSE attribute applies only to disk files that contain object code.

Normally, only the super ID can run programs containing privileged code. By setting the LICENSE attribute to ON, the super ID can license a file containing privileged code so other users can run it. Only the super ID can license a file, but any owner of the file can revoke the license.

You can use the special WHERE LICENSE option with most disk file commands to select only licensed files. For example, the following command lists licensed files on $DATA:

```
=INFO DISKFILE $data.*.*, WHERE LICENSE
```

You can also use the WHERE LICENSE option with the ALTER, DELETE, FREEZE, and THAW commands.

The PROGID Attribute

The PROGID attribute applies only to disk files that contain object code.

The PROGID attribute is used to determine the process access ID (PAID) when a program file is run as a process. When PROGID is set to ON, the PAID is set to the user ID of the primary owner of the program file, thereby giving the program all the privileges associated with the primary owner's ID. Only the primary owner can set PROGID to ON. When PROGID is set to OFF, the PAID is set to the user ID of the user running the program.

If the primary owner of a file is changed, PROGID is automatically set to OFF.

Assume that you have a program file called progfile, which is already protected by the Safeguard software. As the primary owner, you issue the following command to set the PROGID attribute to ON:

```
=ALTER DISKFILE progfile, PROGID ON
```

To verify the setting:

```
=INFO DISK progfile, DET
```

```
                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 PROGFILE         24JUL05, 11:38       5,5    THAWED         OFF

    005,005       R,W,E,P
    004,*         R,E
    005,*         R,W

OBJECT-TEXT-DESCRIPTION=

  AUDIT-PRIV-LOGON = OFF

  AUDIT-ACCESS-PASS = NONE         AUDIT-MANAGE-PASS = NONE
  AUDIT-ACCESS-FAIL = NONE         AUDIT-MANAGE-FAIL = NONE

  LICENSE = OFF  PROGID = ON   CLEARONPURGE = OFF  PERSISTENT = OFF
  TRUST = OFF                     PRIV-LOGON = OFF
```

Note. The attributes, AUDIT-PRIV-LOGON and PRIV-LOGON, are supported only on systems running H06.11 and later H-series RVUs and G06.32 and later G-series RVUs.The attribute, OBJECT-TEXT-DESCRIPTION is supported only on systems running J06.05 and later J-series RVUs and H06.15 and later H-series RVUs.

You can use the special WHERE PROGID option with most disk file commands to select only PROGID files. For example, the following command lists PROGID files on $DATA:

```
=INFO DISKFILE $data.*.*, WHERE PROGID
```

You can also use the WHERE PROGID option with the ALTER, DELETE, FREEZE, and THAW commands.

The TRUST Attribute

The TRUST attribute enables the operating system to optimize I/O performance and applies only to object files. It is available only in H-series RVUs and can be set only by the super ID.

On systems running H-series RVUs, these two types of user I/O buffer access should not be performed:

- Reading from a nowaited I/O buffer that has an ongoing read operation
- Writing to an I/O buffer that has any type of ongoing operation

These actions are detected and prevented by the operating system. The prevention mechanism detects the access, suspends the process until the I/O operation has completed, and then resumes the process. This suspend/resume behavior can significantly affect process performance.

The TRUST attribute informs the operating system that the process can be “trusted” not to access I/O buffers in the preceding manner. The system will bypass the checking behavior, thus improving performance.

The TRUST attribute has three settings:

- TRUST OFF specifies that the program is not to be trusted. The initial value of the TRUST attribute is OFF.
- TRUST ME specifies that the program can be trusted not to access I/O buffers private to the process before I/O completion.
- TRUST SHARED specifies that the program can be trusted not to access buffers private to the process, or shared with another process that also has TRUST SHARED set, before I/O completion.

To set the TRUST attribute of the program file progfile used in the previous example:

```
=ALTER DISKFILE progfile, TRUST SHARED
```

To verify the setting:

```
=INFO DISK progfile, DET
```

```
                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 PROGFILE         24JUL05, 11:38       5,5    THAWED         OFF

    005,005       R,W,E,P
    004,*         R,E
    005,*         R,W

OBJECT-TEXT-DESCRIPTION =

  AUDIT-PRIV-LOGON = OFF

  AUDIT-ACCESS-PASS = NONE         AUDIT-MANAGE-PASS = NONE
  AUDIT-ACCESS-FAIL = NONE         AUDIT-MANAGE-FAIL = NONE

  LICENSE = OFF  PROGID = ON   CLEARONPURGE = OFF  PERSISTENT = OFF
  TRUST = SHARED                   PRIV-LOGON = OFF
```

Note. The attributes, AUDIT-PRIV-LOGON and PRIV-LOGON, are supported only on systems running H06.11 and later H-series RVUs and G06.32 and later G-series RVUs. The OBJECT-TEXT-DESCRIPTION attribute is supported only on systems running J06.05 and later J-series RVUs and H06.16 and later H-series RVUs.

The PRIV-LOGON { ON | OFF} Attribute

The PRIV-LOGON { ON | OFF } attribute specifies whether the programfile (object disk file) can request additional logon-related sensitive features and impose a delay for failed authentication attempts.

The initial value is OFF.

PRIV-LOGON may also be used in the WHERE expression of a command to restrict the scope of that command to files with PRIV-LOGON ON.

Note. This attribute is supported only on systems running H06.11 and later H-series RVUs.

Removing a File From Safeguard Control

The DELETE DISKFILE command removes a file from the Safeguard database by deleting the authorization record for the file. DELETE DISKFILE does not purge the file itself.

When you remove a file from the Safeguard database, the file is no longer subject to Safeguard authorization checks and auditing. The file is returned to Guardian security, and it receives the security settings it had before being added to the Safeguard database. Only the primary owner of a file, the primary owner's group manager, the super ID, and users with OWNER authority on the access control list can use DELETE DISKFILE to remove a file from Safeguard protection.

When a file is removed from the Safeguard database, the user specified by the OWNER attribute becomes the Guardian owner. Users who had OWNER authority on the access control list no longer own the file.

Removing a disk file from the Safeguard database does not change the setting of the CLEARONPURGE, LICENSE, or PROGID attributes. These settings remain in effect with Guardian security.

You can remove more than one file at a time from the Safeguard database. For example, to remove the files report1 and quarter1 from the Safeguard database:

```
DELETE DISKFILE (report1, quarter1)
```

The Safeguard software sends a message informing you that the files are returned to Guardian protection.

4 Securing Subvolumes

The Safeguard subsystem allows you to secure disk subvolumes in generally the same manner as you secure disk files. The same principles apply when you add, change, or delete authorization records for subvolumes. You use the same basic set of commands—ADD, ALTER, DELETE, FREEZE, INFO, RESET, SET, SHOW, and THAW. For example, to add a subvolume to the Safeguard database, use the ADD SUBVOLUME command.

You can also use the same security attributes to specify auditing for subvolumes. Additionally, you can freeze and thaw an access control list for a subvolume.

Any user can add a subvolume authorization record. However, to manage the record, the user must be the owner of the record, or the owner's group manager, or have a super ID. The authority to add and manage subvolumes can be restricted with the appropriate OBJECTTYPE authorization, as described in the *Safeguard Administrator's Manual.*

The security attributes and access authorities for subvolumes are the same as those for disk files. You can also use LIKE, DENY, and the minus sign (-) to control attributes of subvolumes in the same manner you use them with disk files.

As with disk files, you can transfer ownership of a subvolume by changing the OWNER attribute. You can also designate additional owners by specifying OWNER authority in an access control list. Both forms of ownership allow you to modify the authorization record for the subvolume.

You can also use diskfile patterns to secure subvolumes. For more information, see Section 9, Working with Patterns.

General Procedure for Protecting a Subvolume

As with other objects, the general procedure for protecting a subvolume with the Safeguard software is:

1. Establish default attributes using the SET SUBVOLUME or RESET SUBVOLUME commands.
2. Verify the default settings with the SHOW SUBVOLUME command.
3. Add the subvolume to the Safeguard database with the ADD SUBVOLUME command. Doing this creates an authorization record for the subvolume.
4. Verify the attributes in the authorization record with the INFO SUBVOLUME command.
5. Make any necessary changes to the authorization record with the ALTER SUBVOLUME command.

Access Authorities for Subvolumes

By default, anyone can protect a subvolume by adding it to the Safeguard database and specifying the access authorities for the subvolume. The valid access authorities for a subvolume are:

READ	The authority to read disk files on a protected subvolume
WRITE	The authority to write to disk files on a protected subvolume
EXECUTE	The authority to execute program files on a protected subvolume
PURGE	The authority to purge disk files on a protected subvolume
CREATE	The authority to create disk files on a protected subvolume
OWNER	The authority to change the authorization record for a subvolume

Commands Used With Subvolumes

All the Safeguard commands described for disk files in Section 3, Securing Disk Files, are also valid for subvolumes. You can add, alter, delete, and freeze or thaw a subvolume just as you do a disk file. You can also display and change the defaults for subvolumes.

For example, the following command adds an authorization record for the subvolume xdata, allows to enter OBJECT-TEXT-DESCRIPTION, gives CREATE authority to group number 24, and gives ownership of the SUBVOLUME authorization record to user 24,9:

```
=ADD SUBVOLUME xdata, OBJECT-TEXT-DESCRIPTION ‘‘Record created &
on April 04’’, OWNER 24,9, ACCESS 24,* C
```

The Safeguard software always checks subvolumes for CREATE authority, but it must be configured to check for the other ACCESS authorities at the subvolume level. For example, if you have created an authorization record for a subvolume that restricts certain users from purging files on that subvolume, those users are still allowed to purge files unless the Safeguard software has been configured to check access control lists at the subvolume level.

Your system administrator is responsible for configuring the Safeguard software, as described in the *Safeguard Administrator's Manual*.

You can also specify auditing for a subvolume in the same manner as you do for a disk file. For example, this command causes all successful attempts to access the subvolume xdata to be audited:

```
=ALTER SUBVOL xdata, AUDIT-ACCESS-PASS ALL
```

5

Securing Processes and Subprocesses

You secure processes and subprocesses in generally the same manner as disk files and subvolumes. You use the same set of commands: ADD, ALTER, DELETE, FREEZE, INFO, RESET, SET, SHOW, and THAW. Also, except for EXECUTE authority, the same access authorities—READ, WRITE, PURGE, CREATE, and OWNER—apply to individual processes and subprocesses. There is no EXECUTE authority for processes and subprocesses.

You can also use the same security attributes to specify auditing for processes and subprocesses. Additionally, you can freeze and thaw an access control list for a process or subprocess.

For additional information about protecting processes and subprocesses, refer to the *Safeguard Reference Manual*.

Protection of Process and Subprocess Names

Until a process name is added to the Safeguard database, any user can create a process with that name and access a process running with that name. Unless your security administrator has restricted process protection, any user can add a process or subprocess name to the Safeguard database and create an access control list for it.

An access control list for a process or subprocess name grants users (and processes running on behalf of those users) any combination of the following access authorities:

READ	The authority to open a process or subprocess with a protected name for input operations.
WRITE	The authority to open a process or subprocess with a protected name for output operations.
CREATE	The authority to create a process with a protected name. (A user must also have EXECUTE authority for the program object disk file.) CREATE authority does not apply to subprocesses.
PURGE	The authority to stop a process with a protected name. PURGE authority does not apply to subprocesses.
OWNER	The authority to change the authorization record for the process or subprocess.

The following command creates an authorization record for the process name $add, associates the object text description as comments of the authorization record, gives READ and WRITE authority to all members of group 33, and gives all authorities to user ID 33,12:

```
=ADD PROCESS $add, OBJECT-TEXT-DESCRIPTION ‘‘Record created’’,
ACCESS 33,* (R,W); 33,12 *
```

Protecting Processes

Process descriptors contain a sequence number. Because this sequence number is not part of SAFECOM syntax, do not include it when protecting process names with the Safeguard subsystem.

Upon creation of a process, you have the option of naming the process. You can either name the process yourself or allow the system to generate a name. However, to enable protection of a process, you should name the process yourself and create a protection record for that name.

6

Obtaining User and Alias Information

As a general user, you can obtain security information about your disk files, subvolumes, and processes, as well as information about your own user authentication record. As discussed in previous sections of this manual, you use the SHOW command to display default security attributes for a session and the INFO command to display current security attributes for an existing file, subvolume, or process.

This section introduces the INFO USER command, which allows you to view the security attributes in your user authentication record. You can examine these attributes, but you cannot change them. Because your user authentication record is owned by a privileged user, only that individual can change the security attributes.

If any aliases have been defined for your ID, you can also use the INFO ALIAS command to display the attributes of an alias authentication record.

About Your User Authentication Record

Your user authentication record contains important information about the status of your password and your user ID. With the INFO USER command, you can display the attributes of your user authentication record and determine:

- The primary and secondary owners of the record.

  Note. The secondary owner attribute is supported only on systems running G06.27 and later G-series RVUs and H06.07 and later H-series RVUs.

- The expiration date, if any, for your user ID.
- How often you must change your password.
- The expiration date, if any, for your password.
- The date when you are allowed to change your password.
- If you have a grace period for changing your password after expiration.
- Your Guardian default subvolume.
- The Guardian default security string for disk files that you create.
- The file-sharing groups to which you belong.
- If any aliases are defined for your user ID.
- If Safeguard default protection is defined for disk files that you create.
- The last logon time. If this time is not consistent with the last time you logged on, someone else might have learned your password and logged on with your user ID.

- CREATION-TIME of the user.

  Note. The CREATION-TIME attribute is supported only on systems running J06.04 and later J-series RVUs, H06.15 and later H-series RVUs and G06.32 and later G-series RVUs.

- Creator details specifying name, type, user ID, and node number where user was created.

  Note. This information is supported only on systems running J06.04 and later J-series RVUs, H06.15 and later H-series RVUs, and G06.32 and later G-series RVUs.

The user authentication record also contains information that is of primary interest to your security administrator or the owner of your authentication record.

The INFO USER command has several display options. The DETAIL option used in the following example selects all of the attributes. You can use other options to select specific portions of the record. For example, you can use the AUDIT option to select the audit attributes. For information on other INFO USER display options, see the *Safeguard Reference Manual*.

Viewing Your User Authentication Record

The following command produces a display of your user authentication record. It assumes that your user ID is 8,54 and that you are using SAFECOM in execute-and-quit mode. Use the DETAIL option of the INFO USER command to view your record:

1> SAFECOM INFO USER 8,54, DETAIL

```
 GROUP.USER         USER-ID    OWNER     LAST-MODIFIED    LAST-LOGON
STATUS
 ACCTS.JOAN           8,54       8,255  23JUN05,  8:11  24JUN05, 15:31
THAWED

   UID                          =       2102
   USER-EXPIRES                 =    * NONE *
   PASSWORD-EXPIRES             = 23JUL05,  0:00
   PASSWORD-MAY-CHANGE          =    * NONE *
   PASSWORD-MUST-CHANGE EVERY   =    30 DAYS
   PASSWORD-EXPIRY-GRACE        =    10 DAYS
   LAST-LOGON                   = 24JUN05, 15:31
   LAST-UNSUCCESSFUL-ATTEMPT    = 24JUN05, 15:30
   LAST-MODIFIED                = 23JUN05,  8:11
   CREATION-TIME                = 15JUN05,  2:03
   FROZEN/THAWED                = THAWED
   STATIC FAILED LOGON COUNT    = 1
   STATIC-FAILED-LOGON-RESET    = NONE
   GUARDIAN DEFAULT SECURITY    = NUNU
   GUARDIAN DEFAULT VOLUME      = $DATA.JOAN
{
   CREATOR-USER-NAME            = SUPER.SUPER
   CREATOR-USER-TYPE            = USER  (255,255)
   CREATOR-NODENUMBER           = 86

{  AUDIT-AUTHENTICATE-PASS  = NONE       AUDIT-MANAGE-PASS  = NONE
   AUDIT-AUTHENTICATE-FAIL  = NONE       AUDIT-MANAGE-FAIL  = NONE
   AUDIT-USER-ACTION-PASS   = NONE
   AUDIT-USER-ACTION-FAIL   = NONE

   TEXT-DESCRIPTION =

   BINARY-DESCRIPTION-LENGTH =    0

   CI-PROG  = * NONE *
   CI-LIB   = * NONE *
   CI-NAME  = * NONE *
   CI-SWAP  = * NONE *
   CI-CPU   = * NONE *
   CI-PRI   = * NONE *
   CI-PARAM-TEXT =

   INITIAL-PROGTYPE     =PROGRAM
   INITIAL-PROGRAM      =
   INITIAL-DIRECTORY    =

   PRIMARY-GROUP   =ACCTS
   GROUP           =ACCTS

   ALIAS = J-Brown
   ALIAS = userD54

  SUBJECT DEFAULT-PROTECTION SECTION

   OWNER=       8,54
   AUDIT-ACCESS-PASS = NONE      AUDIT-MANAGE-PASS = NONE
   AUDIT-ACCESS-FAIL = NONE      AUDIT-MANAGE-FAIL = NONE

     008,054      R,W,E,P,  O
     008, *       R,  E
    \100.8,1  R,W

  SUBJECT OWNER-LIST SECTION

              \TEST.PROJ.DBA
              \ABC.PROJ.USR5
```

Note. The TEXT-DESCRIPTION attribute is supported only on systems running G06.27 and later G-series RVUs and H06.06 and later H-series RVUs.

The CREATION-TIME, CREATOR-USER-NAME, CREATOR-USER-TYPE and CREATOR-NODENUMBER attributes are supported only on systems running J06.04 and later J-series RVUs, H06.15 and later H-series RVUs, and G06.32 and later G-series RVUs.

What the INFO USER Display Tells You

Assuming you are the user in the preceding example, the INFO USER display shows that your user ID has no expiration date, that you must change your password every 30 days, and that your current password will expire on July 23, 2005. You can change your password as often as you want because no value is defined in the PASSWORD-MAY-CHANGE field. If the PASSWORD-MAY-CHANGE field contains a date, you can change your password beginning on that date. The display also indicates that you have a grace period of 10 days during which to change your password if you allow it to expire. To change your expired password during the grace period, you use the LOGON command, as described in Section 2, Safeguard Logon Dialog.

The OWNER-LIST section shows that two secondary owners have been defined for your user authentication record.

The default Guardian security string for disk files that you create is "NUNU." Your default Guardian subvolume is $DATA.JOAN.

The INFO USER display also shows the creation time of the user and the name, type, user ID, and node number of the creator.

Additionally, the INFO USER display also shows that you have two aliases: J-Brown and userD54. An alias is an alternate name that you can use to log on to the system. To obtain information about an alias, use the INFO ALIAS command, as described later in this section.

Default protection has been established for you. With default protection, every disk file you create is automatically added to the Safeguard database with the specified access and audit settings. The display shows that you are the owner of every file you create and you have all access authorities. All other members of your group have READ and EXECUTE authority. No auditing is specified. If Safeguard protection is removed from an individual file after you create it, the Guardian default security string applies.

The last logon time appears at the top of the display. If you are concerned that someone might have learned your password, check LAST-LOGON to determine if it matches the last time you logged on. If you suspect a problem, change your password and notify your security administrator. Your last logon time is also displayed as part of the Safeguard logon dialog.

If you are concerned that someone might be trying to guess your password, check STATIC FAILED LOGON COUNT. Each logon attempt that fails, for example if you mistype your password, increases the failed logon count and sets the LAST-UNSUCCESSFUL-ATTEMPT time. If you find these values have changed

unexpectedly, notify your security administrator. The failed logon count and last failed logon time also appear as a part of the Safeguard logon dialog.

About Alias Authentication Records

You can have one or more user aliases. An alias is an alternate name that you can use to log on to the system. An alias has its own authentication record with attributes that can differ from those in your user authentication record. For example, your alias can have a different password and password expiration date.

When you are logged on using an alias, the Safeguard software makes access decisions based on your underlying user ID. For example, if you log on as J-Brown, your ability to access protected objects is based on the access authorities of user ID 8,54.

If you have an alias, you can view the alias authentication record with the INFO ALIAS command. The INFO ALIAS command has several display options. The DETAIL option in the following example selects all attributes. You can use other options to select specific portions of the record. For example, you can use the AUDIT option to select the audit attributes. For information on other INFO ALIAS options, see the *Safeguard Reference Manual*.

Viewing an Alias Authentication Record

The following example shows how to check the authentication record for the user alias J-Brown. To view your record, use the DETAIL option of the INFO ALIAS command:

```
1> SAFECOM INFO ALIAS J-Brown, DETAIL
```

```
 NAME                                USER-ID    OWNER
STATUS
 J-Brown                               8,54      8,255
THAWED

   UID                          =       2102
   USER-EXPIRES                 = 30SEP05,  0:00
   PASSWORD-EXPIRES             =    * NONE *
   PASSWORD-MAY-CHANGE          =    * NONE *
   PASSWORD-MUST-CHANGE EVERY =    * NONE *
   PASSWORD-EXPIRY-GRACE        =    * NONE *
   LAST-LOGON                   =    * NONE *
   LAST-UNSUCESSFUL-ATTEMPT     =    * NONE *
   LAST-MODIFIED                = 12AUG94, 17:43
   CREATION-TIME                = 11JUN94,  2:03

   FROZEN/THAWED                = THAWED
   STATIC FAILED LOGON COUNT    =          0
   STATIC-FAILED-LOGON-RESET    = NONE
   GUARDIAN DEFAULT SECURITY    = NUNU
   GUARDIAN DEFAULT VOLUME      = $DATA.JBROWN

   CREATOR-USER-NAME              = SUPER.SUPER
   CREATOR-USER-TYPE              = USER  (255,255)
   CREATOR-NODENUMBER             = 86

   AUDIT-AUTHENTICATE-PASS  = NONE       AUDIT-MANAGE-PASS  = NONE
   AUDIT-AUTHENTICATE-FAIL  = NONE       AUDIT-MANAGE-FAIL  = NONE
   AUDIT-USER-ACTION-PASS   = ALL
   AUDIT-USER-ACTION-FAIL   = ALL

   TEXT-DESCRIPTION =

   BINARY-DESCRIPTION-LENGTH =    0

   CI-PROG  = * NONE *
   CI-LIB   = * NONE *
   CI-NAME  = * NONE *
   CI-SWAP  = * NONE *
   CI-CPU   = * NONE *
   CI-PRI   = * NONE *
   CI-PARAM-TEXT =

   INITIAL-PROGTYPE     =PROGRAM
   INITIAL-PROGRAM      =
   INITIAL-DIRECTORY    =

   PRIMARY-GROUP   =ACCTS
   GROUP           =ACCTS

  SUBJECT DEFAULT-PROTECTION SECTION UNDEFINED

  SUBJECT OWNER-LIST SECTION UNDEFINED
```

Note. The TEXT-DESCRIPTION attribute is supported only on systems running G06.27 and later G-series RVUs and H06.06 and later H-series RVUs.

The CREATION-TIME, CREATOR-USER-NAME, CREATOR-USER-TYPE and CREATOR-NODENUMBER attributes are supported only on systems running J06.04 and later J-series RVUs, H06.15 and later H-series RVUs, and G06.32 and later G-series RVUs.

What the INFO ALIAS Display Tells You

An INFO ALIAS display contains most of the same attributes as an INFO USER display. However, the values can differ from those of the underlying user ID.

The INFO ALIAS display for J-Brown shows that the alias expires on September 30, 2005, and that the Safeguard software audits all attempted actions by the alias J-Brown. The display also shows that there are no special requirements for changing the alias password.

Safeguard default protection is not defined for this alias. Therefore, the default Guardian security string "NUNU" is applied to disk files that J-Brown creates.

The last logon time and failed logon count are also important for aliases. For example, if LAST-LOGON for J-Brown does not match the last time you logged on as J-Brown, someone else might have learned the alias password and logged on as J-Brown.

The INFO ALIAS display also shows the creation time of the alias, the name, type, user ID, and node number of the creator.

7 Working With SAFECOM

SAFECOM is the Safeguard command interpreter. You can use SAFECOM to enter commands in any of the following modes of operation:

- Interactive mode
- Execute-and-quit mode
- Batch mode

Interactive mode allows you to enter any number of commands and verify the results before proceeding. For the general user, this mode is simple to use yet flexible enough to handle routine Safeguard tasks.

Execute-and-quit mode is most useful for entering one or two commands. In this mode, SAFECOM returns to the TACL prompt after executing the command.

Batch mode allows you to execute a series of SAFECOM commands stored in a disk file. This mode is useful when you are adding a large number of disk files to the Safeguard database. For example, batch mode is especially useful when a system administrator is initially installing the Safeguard software.

This section describes how to run SAFECOM in these three modes of operation. The examples in this section illustrate the most simple and basic ways to use the modes of operation. Additional options are available, as described in the *Safeguard Reference Manual*. The commands used as examples in this section are more thoroughly described in the previous sections of this manual.

Using SAFECOM in Interactive Mode

When you have many SAFECOM commands to enter and you want to monitor your progress, use SAFECOM in the interactive mode. To start interactive mode, type SAFECOM at the TACL prompt. SAFECOM opens your home terminal for both input and output, and displays its program header and equal-sign (=) command prompt.

From TACL, for example, this command begins an interactive SAFECOM session:

```
6> SAFECOM
SAFEGUARD COMMAND INTERPRETER - T9750CD30
=
```

After the SAFECOM command prompt appears, you can enter SAFECOM commands. When you are finished, type EXIT at the command prompt to end the SAFECOM session.

The equal sign is the normal SAFECOM prompt. It is used in all examples in this manual. If you want to customize this prompt, use the DISPLAY PROMPT command, which is described in Section 8, Changing Display Options.

SAFECOM keeps track of the command lines you enter during an interactive session. Each line is numbered sequentially and retained in a history buffer. This approach

allows you to use the HISTORY, ?, !, and FC session-control commands to recall, edit, and execute commands entered earlier in the same session.

SAFECOM Session-Control Commands

After you start an interactive SAFECOM session, you can enter either of two types of commands: session-control commands, which manage your interactive session, and security commands, which specify the security controls for your disk files and subvolumes. The session-control commands are listed in Table 7-1. This section demonstrates the use of most of the session-control commands. A special session-control command, the DISPLAY command, is described in Section 8, Changing Display Options.

All session-control commands are described in detail in the *Safeguard Reference Manual*. The session-control commands manage your SAFECOM session, but they do not apply security controls.

Security commands are also shown in the examples in this section. These commands are described in detail in the previous sections of this manual.

Table 7-1. SAFECOM Session-Control Commands (page 1 of 2)

Command	Meaning
ASSUME	Establishes a default object type for subsequent SAFECOM commands. For the general user, the object types are DISKFILE, SUBVOLUME, PROCESS, and SUBPROCESS.
ENV	Displays the current default values of the environmental parameters (SYSTEM, VOLUME, OUT, LOG, ASSUME, and DISPLAY options).
EXIT	Stops an interactive SAFECOM session. Control of your terminal is returned to your command interpreter. You can also use Ctrl/Y for this purpose.
FC	(Fix Command) Displays and allows you to edit a previously entered SAFECOM command.
HELP	Displays help screens describing the SAFECOM commands.
HISTORY	Displays a specified number of your most recently entered SAFECOM commands. Also clears last or all commands in the history buffer.
LOG	Defines a log file in which SAFECOM writes a record of the current SAFECOM session.
OBEY	Specifies a command file containing SAFECOM commands for batch execution.
OUT	Directs SAFECOM to write its output to a specified file. (SAFECOM output text includes both input commands and responses to those commands.)
SYNTAX	Directs SAFECOM to check the syntax of commands only but not to execute them.
SYSTEM	Establishes a default system name for file-name expansion.
VOLUME	Establishes a default disk-volume name and a default subvolume name for the file-name expansion of disk files.

Table 7-1. SAFECOM Session-Control Commands (page 2 of 2)

Command	Meaning
?	(Question mark) Displays a specified command that you previously entered during the current SAFECOM session.
!	(Exclamation point) Displays and executes a specified command that you previously entered during the current SAFECOM session.
--	(Two hyphens) Delimits comments in SAFECOM command lines.
&	(Ampersand) Indicates that the command is continued on the next line.

Checking Your Progress

In an interactive command session, SAFECOM executes each complete command as you enter it. It is advisable to check your progress periodically and verify the results of the commands executed during the session. Three commands—the ENV session-control command, and the SHOW and INFO security commands—allow you to check your progress. Use ENV at the start of a session to check the default environment. Use SHOW to check the current default attributes for specific types of objects. Use INFO during a session to verify the results of a previous command. The examples in this section illustrate the use of these commands. SHOW and INFO are discussed more thoroughly in Section 4, Securing Subvolumes, and Section 6, Obtaining User and Alias Information.

Entering More Than One Command on a Line

To enter more than one SAFECOM command on a single command line, separate the commands with a semicolon:

```
=LOG logfile; ASSUME diskfile; ENV
```

This display shows:

```
SYSTEM  \LA
VOLUME  $DATA.SALES
OUT     \LA.$TIM              -- Interactive, OUT = IN --
LOG     $DATA.SALES.LOGFILE
ASSUME  DISKFILE
```

The command line in this example contains these three SAFECOM session-control commands:

- The LOG command opens a log file named logfile and sends a copy of the input and output of this SAFECOM session to that file.
- The ASSUME command defines DISKFILE as the default object type.
- The ENV (environment) command verifies the results of the previous two commands.

The comments "Interactive, OUT = IN" in the display indicate an interactive session. (The OUT file is the same as the IN file.)

Note. Do not put a semicolon within a comment because it terminates the line and causes the remainder of the comment to be treated as a SAFECOM command.

Continuing Commands From One Line to the Next

A single SAFECOM command or multiple commands separated by semicolons can span two or more command lines if you end each continued line with an ampersand (&). The ampersand is the command-line continuation character.

You can use the ampersand to enter a single command string across any number of command lines, but the total number of characters in the entire command string cannot exceed 528.

You can break a command at any point. In the following example, the ADD DISKFILE command uses two ampersands to span three command lines. The first ampersand falls between two disk-file attributes (AUDIT-ACCESS-FAIL and ACCESS). The second ampersand is embedded in the ACCESS specification.

For example:

```
=ADD DISKFILE $data.sales.report1, AUDIT-ACCESS-FAIL all,&
=ACCESS 8,7 *; (mkt.jane, software.blane, software.karl)&
=(read, write)
=INFO DISKFILE $data.sales.report1, DETAIL
```

This display shows:

```
                    LAST-MODIFIED     OWNER     STATUS    WARNING-MODE
$DATA.SALES
 REPORT1          15JUL05, 14:46       8,7     THAWED         OFF

    001,069       R,W
    001,098       R,W
    008,007       R,W,E,P, O
    033,104       R,W

  OBJECT-TEXT-DESCRIPTION=

  AUDIT-ACCESS-PASS = NONE         AUDIT-MANAGE-PASS = NONE
  AUDIT-ACCESS-FAIL = ALL          AUDIT-MANAGE-FAIL = NONE

  LICENSE = OFF  PROGID = OFF  CLEARONPURGE = OFF  PERSISTENT = OFF
  TRUST = OFF  (assumes H-series system)
```

In this example, the ADD command adds an authorization record for the disk file $data.sales.report1 to the Safeguard object database. The ADD DISKFILE command includes an AUDIT-ACCESS-FAIL specification and four access control list entries. Semicolons separate the elements of the ACCESS specification. Commas separate other command elements.

The INFO DISKFILE command displays a detailed report for the disk file $data.sales.report1. The display includes the access control list for this file, the four auditing specifications, and four special disk-file attributes.

Redirecting Output for a Single Command

Usually, with SAFECOM operating in interactive mode, output is displayed on the home terminal because the home terminal is the default OUT file. However, SAFECOM can be directed to report to an EDIT file or to list a SAFECOM report on a printer. To do this, include an OUT option to redirect SAFECOM output for a single command. Specify the OUT option immediately following the command and enclose it in slashes as follows.

For example, this command redirects the output of the SAFECOM HELP command to a spooler location:

```
=HELP / OUT $s.#lp1 / ALL
```

This command prints all the SAFECOM help screens on the printer defined for the spooler location $S.#LP1.

To save a SAFECOM report in an EDIT file, enter a disk-file name. If the file already exists, SAFECOM opens the file and appends the INFO report to the file. If the file does not exist, SAFECOM creates an EDIT file with the specified name and then writes the output report to that file.

The next example writes an INFO report for all the files on the subvolume named report3 to the file named $data.report3.myfiles. First, establish a default disk volume and subvolume:

```
=VOLUME $data.report3
```

Then request the report:

```
=INFO / OUT myfiles / DISKFILE *,DETAIL
```

Using the OUT option with a SAFECOM command redirects output for only that command. After the command completes, SAFECOM again directs its output to the session OUT file, which is your terminal. To keep a complete record of a SAFECOM session, use the LOG command. The LOG command sends a copy of the session input and output to a log file but does not change the current IN and OUT files.

Getting Online Help

In interactive mode, you can use the SAFECOM help facility to find the answer to syntax questions. The help facility supports all SAFECOM commands, including those reserved for your security administrator.

To display a list of the commands at the SAFECOM prompt:

=HELP

```
HELP is available for the following SAFECOM commands:

    ADD       ALTER     ASSUME    DELETE    DISPLAY   ENV       EXIT
    FC        FREEZE    HELP      HISTORY   INFO      LOG       NEXTFILE
    OBEY      OUT       RELEASE   RESET     RUN       SELECT    SET
    SHOW      STOP      SYNTAX    SYSTEM    THAW      VOLUME    ?
    !

    Enter HELP COMMANDS for brief descriptions of all SAFECOM commands.

    Enter HELP GRAMMAR for the complete syntax of all SAFECOM commands.

    Enter HELP  command-name  for a detailed description of the syntax
    and function of any specific SAFECOM command.

    Enter HELP ALL for detailed descriptions of the function and syntax
    for all SAFECOM commands, attributes, and lists.

    HELP is also available for each keyword, individually, and you can
    enter  HELP *  for help on all keywords.

    HELP is also available for the following attributes and lists:

        ALIAS-LIST, EVENT-EXIT-PROCESS-ATTR, GROUP-ATTR, GROUP-LIST,
        OBJECT-ATTR, OBJECT-LIST, SAFEGUARD-ATTR, TERMINAL-ATTR,
        USER-ATTR, and USER-LIST.

    All command names may be followed by [ / OUT  fname  / ] to define
    a command-specific OUT file which is distinct from an out file that
    might have been established by any LOG or OUT session commands.
```

As the previous help screen describes, you can also use the HELP command to display the syntax of a particular command. For example, to display the syntax for the ASSUME command:

=HELP ASSUME

```
ASSUME [ object-type ]

    The ASSUME command establishes a default object-type so that it
    need not be repeatedly entered for commands that require it.  This
    command also clears any previously established object-type.

    object-type is [ VOLUME | SUBVOLUME | DISKFILE | TERMINAL   ]
                   [ DEVICE | SUBDEVICE | PROCESS  | SUBPROCESS ]
                   [ USER   | ALIAS     | EVENT-EXIT-PROCESS    ]

    When object-type is omitted, any previously established value is
    cleared.  Note that object-types GROUP, OBJECTTYPE, SAFEGUARD, and
    SECURITY-GROUP can never be established or cleared with this command.

    ASSUME OBJECTTYPE is also a parameter to the DISPLAY PROMPT command,
    which causes the current assumed objecttype to be displayed in the
    command line prompt.
```

Displaying and Editing Previous Commands

SAFECOM provides four commands that allow you to display, change, and execute commands that you previously entered during the current session. These commands and their functions are:

HISTORY	Displays a designated number of the most recent commands entered during the current session; also can clear the last command or all commands from the history buffer.
?	Displays a single previously entered command that you specify by line number, relative line number, or text string.
!	Functions like the ? command except that it also executes the displayed command.
FC	Functions like the ? command except that it also provides a command-line template on which you can edit the displayed command

The examples that follow highlight the main features of these commands. For complete details, refer to the command descriptions in the *Safeguard Reference Manual*.

Displaying Previous Commands

Because SAFECOM retains the commands you enter during an interactive session, you can use the HISTORY command to retrieve a specified number of the most recent commands. If you enter the HISTORY command without specifying the number of commands, the last 10 commands appear.

For example, the following command displays the last five commands entered during your current session. The example assumes that the HISTORY command is the seventh command you executed in this session.

```
=HISTORY 5

3=VOLUME $DATA.REPORT3
4=INFO / OUT MYFILES / DISKFILE *, DETAIL
5=HELP
6=HELP ASSUME
7=HISTORY 5
```

The HISTORY command adds line numbers to the commands even if your normal SAFECOM prompt does not include them. However, the ?, !, and FC commands do not display these line numbers unless your normal SAFECOM prompt includes a line number.

The HISTORY command also allows you to delete all commands in the SAFECOM history buffer and to reset line numbering to line 1:

```
=HISTORY RESET ALL
```

Displaying a Specific Command

The ? command allows you to display a specific command entered earlier in the current session. You can specify the command to be displayed by entering a line number, a relative line number, or a text string, as the following examples show.

For example, this ? command requests the display of command line number 18:

```
=? 18
=ALTER DISKFILE PROGFILE, PROGID ON
=
```

You can also specify a minus (-) line number to search for a command line number relative to the current line number. For example, if your current command line number is 23, the following ? command displays the command at line 20. For clarity, the following examples assume that you used the DISPLAY PROMPT command to specify that your normal SAFECOM prompt is to include a line number. The command line number does not change until you execute a command other than ?, !, or FC.

```
23=? -3
23=INFO DISKFILE PROGFILE, DETAIL
23=
```

There are two ways to request a search for a command that contains a specific text string. If you do not enclose the string in quotes, the ? command searches for the most recent command that starts with the designated string. The following ? command illustrates this type of search:

```
23=? add
23=ADD DISKFILE QUARTER1, ACC 2,18 O
23=
```

If you enclose the text string in quotes, the ? command searches the most recent command that contains that string anywhere within the command. The following ? command performs this type of search:

```
23=? "quarter2"
23=ALTER DISKFILE QUARTER2, LIKE QUARTER1
23=
```

Executing a Specific Command

The ! command functions like the ? command except that the specified command is executed when it is displayed. For example, the following ! command displays and executes the most recent command that contains the text string “quarter2”:

```
23=! "quarter2"
23=ALTER DISKFILE QUARTER2, LIKE QUARTER1
24=
```

SAFECOM increments the command line number because the ALTER DISKFILE command was executed.

Correcting Mistakes Using the FC Command

The FC command allows you to display and edit a command you entered previously in the current session. This feature is handy for correcting typographical errors or for executing several similar commands.

FC supports the same search options as the ? and ! commands. You can request a command line by line number, relative line number, or text string. If you enter FC by itself, the last command line you entered is displayed.

When you execute FC, the specified command line is displayed, and the cursor is positioned below that command on a command-editing line. You can then use the displayed command line as a guide for creating a new command.

Note. On the command-editing line, use only the spacebar and backspace key to move the cursor. Do not use the arrow keys.

FC has four subcommands that you can use in the command-editing line. Enter these subcommands on the editing line to modify the characters directly above them in the redisplayed command line. FC supports these subcommands:

d

deletes the character directly above **d**.

i*string*

inserts *string* before the character directly above **i**.

r*string*

replaces the characters in the command line with *string.* The first character replaced is the character directly above **r**.

string

replaces the characters in the command line directly above the *string* characters with *string*. This is an implicit replace subcommand. It works the same as the **r** subcommand.

// (2 backslashes)

ends the current string and allows you to enter another subcommand in the editing template.

Note. FC recognizes any string in the editing template line that does not begin with d, i, or r as an implicit replacement string.

The following example illustrates use of the FC command. In this example, the FC command retrieves the command at line number 18 and then displays the editing template on the next line. The d subcommand is then used to delete the characters PROG, and the i subcommand is used to insert the characters 03 so that the file name

PROGFILE is changed to FILE03. After the command has been altered to your satisfaction, press the Return key on the editing line to execute the edited command:

```
=FC 18
=ALTER DISKFILE PROGFILE, PROGID ON
.               dddd
.ALTER DISKFILE FILE, PROGID ON
.                   i03
.ALTER DISKFILE FILE03, PROGID ON
.
=
```

Leaving SAFECOM Without Losing Defaults (Using the Break Key)

You can return to TACL without losing your current SAFECOM default settings by pressing the Break key at the SAFECOM prompt. Break pauses SAFECOM and returns control to TACL. After pausing SAFECOM, you can enter any number of commands at the TACL prompt.

To return to your interrupted SAFECOM session, enter the PAUSE command at the TACL prompt. This pauses TACL and returns control of the terminal to SAFECOM.

For example:

```
=BREAK
5> time
June 21, 1992  8:56:30
6> pause
=
```

Exiting a Long Report Display (Break Key Handling)

You can stop a long report that SAFECOM is displaying by using the BREAK key. When you press BREAK, SAFECOM stops executing the command and displays its command prompt.

Exiting SAFECOM

When the SAFECOM session is completed, return to TACL with the EXIT command:

```
=EXIT
7>
```

Another way to exit SAFECOM is to press the CTRL and Y keys at the same time. SAFECOM interprets CTRL/Y as an end-of-file character (EOF). When SAFECOM reads an EOF from its input file (in this case, your terminal), it closes the input file and stops executing.

Using SAFECOM in Execute-and-Quit Mode

If you need to enter only a few SAFECOM commands, you can use the execute-and-quit mode from TACL. To run SAFECOM in this mode, type "SAFECOM," followed by one or more security commands.

SAFECOM executes the commands and immediately returns control to TACL. If you want to execute another SAFECOM command, you must begin that command by retyping SAFECOM at the TACL prompt.

For example, assume user 3,7 is running TACL and wants to change the access control list for the disk file named $data.sales.report6. The following commands display the status of the protected disk file and grant READ authority to another user:

```
2> VOLUME $data.sales
3> SAFECOM INFO DISKFILE report6
```

```
                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 REPORT6          15JUL05, 13:36       3,7    THAWED          OFF

    003,007     R,W,E,P
```

```
4> SAFECOM ALTER DISKFILE report6, ACCESS mkt.jane READ
5> SAFECOM INFO DISKFILE report6
```

```
                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 REPORT6          22JUL05, 11:57       3,7    THAWED          OFF

   003,007     R,W,E,P
   033,104     R
```

In this example, the TACL VOLUME command (prompt 2) establishes the default volume and subvolume. (The current defaults are passed to SAFECOM when it is run. SAFECOM then uses these default names to expand the partially qualified disk-file name report6 to $data.sales.report6.)

The first SAFECOM command (prompt 3) requests an INFO report on the file $data.sales.report6. After the access list for report6 is displayed, an ALTER DISKFILE command adds a new access control list entry to grant READ authority to the local user MKT.JANE, with user ID 33,104. The last SAFECOM command (INFO DISKFILE at prompt 5) shows that the access control list for report6 was changed correctly.

For additional information about access control lists, see Section 3, Securing Disk Files.

Using SAFECOM in Batch Mode

Batch mode is useful when you want to perform a number of security management tasks more than once. To use SAFECOM in batch mode, you must first create an EDIT file that contains the sequence of SAFECOM commands you want to execute. To

execute the commands in the EDIT file, run SAFECOM and, using the IN option, name the EDIT file as the input file.

For example, suppose this sequence of commands is in an EDIT file called $system.secmgt.saleinfo:

```
INFO VOLUME    $data           , DETAIL
INFO SUBVOLUME $data.sales1    , DETAIL
INFO DISKFILE  $data.sales1.*  , DETAIL
INFO SUBVOLUME $data.sales2    , DETAIL
INFO DISKFILE  $data.sales2.*  , DETAIL
INFO SUBVOLUME $data.sales3    , DETAIL
INFO DISKFILE  $data.sales3.*  , DETAIL
```

These commands produce detailed INFO reports on the $data volume; on the $data subvolumes sales1, sales2, and sales3; and on all the disk files residing on those subvolumes.

The following example uses the INFO command to produce a report:

```
22> VOLUME $system.secmgt
23> SAFECOM /IN saleinfo, OUT $s.#lp1, NOWAIT/
24>
```

Specifying $system.secmgt.saleinfo as the input file directs SAFECOM to open the saleinfo file, execute the commands in the file, and stop after executing the last command. SAFECOM lists the INFO reports on the printer $S.#LP1. Because this example does not use your terminal for input or output, you can use the NOWAIT option to instruct TACL to start SAFECOM and then return to your terminal.

You can include several options in one command. To do so, enclose the option string in slashes and separate each option from the next with a comma.

Placing Comments in a Command File

To place a comment in a command file, use a double hyphen (--) to delimit the comment. The following comments begin lines in a command file:

```
-- Establish the default subvolume for file-name expansion
--
VOLUME $system.secmgt
--
-- Assume DISKFILE as the default object type for the
-- next set of commands
--
ASSUME DISKFILE
```

You can also place comments at the end of a command line:

```
VOLUME $system.secmgt  -- LISTUSER is on this subvol
OBEY listuser          -- reports on all system users
```

You can embed comments within a command by including double hyphens at the beginning and end of the comment:

```
ALTER DISKFILE report1, ACCESS 2,78 -- give ted jones -- READ
```

When SAFECOM encounters a double hyphen (--), it ignores all following characters until it reaches either the end of the line or the next double hyphen.

Do not put a semicolon within a comment because it terminates the line and causes the remainder of the comment to be treated as a SAFECOM command.

Executing a Command File During an Interactive Session

You can execute a command file during an interactive session by entering an OBEY command. OBEY directs SAFECOM to execute the commands stored in a specific file. For example, this command is equivalent to the first batch mode example in this subsection:

```
=OBEY / OUT $s.#lp1 / saleinfo
```

After executing the commands in the file saleinfo, SAFECOM returns control to your terminal in the interactive mode of SAFECOM. However, the SAFECOM OBEY command does not support the NOWAIT option, so executing an OBEY command might result in a delay in getting back control at your terminal.

Using Command Files to Set Up Default Access Control Lists

Command files are useful for establishing default access control lists for disk files or other objects. For example, suppose the following commands are placed in an EDIT file called $system.mgr.tight:

```
ASSUME DISKFILE              -- Build default ACL for DISKFILE
RESET                        -- Clear all current settings
SET ACCESS 255,254 (r,w)     -- 255,254 is security admin
SET ACCESS 3,255    r        -- Company auditor can read
SET ACCESS 255,8  (r,w,e,p) -- I can do anything
SET AUDIT-ACCESS-FAIL ALL    -- Audit failed access attempts
SHOW                         -- Display current defaults
```

Using this command file, you can easily apply tight security constraints to any number of disk files. The following SAFECOM screen display shows an interactive session in

which a batch operation uses the command file $system.mgr.tight to set up current default values for disk-file attributes:

```
=VOLUME $system.mgr
=OBEY tight
=ASSUME DISKFILE          -- Build default ACL for DISKFILE
     .
     .
     .
=SHOW                     -- Display current defaults

TYPE             OWNER
 DISKFILE       255,8

  OBJECT-TEXT-DESCRIPTION=


  AUDIT-ACCESS-PASS = NONE        AUDIT-MANAGE-PASS = NONE
  AUDIT-ACCESS-FAIL = ALL         AUDIT-MANAGE-FAIL = NONE

  LICENSE = OFF  PROGID = OFF  CLEARONPURGE = OFF  PERSISTENT = OFF
  TRUST = OFF

    003,255     R
    255,008     R,W,E,P
    255,254     R,W

=ADD $data.sales3.q3report
```

Only three commands are entered interactively: VOLUME, OBEY, and ADD. The VOLUME command sets the default volume and subvolume. OBEY executes the commands stored in $system.mgr.tight. The ADD command adds a disk file to the Safeguard database and gives it the security settings set up in $system.mgr.tight.

Error Handling in Command Files

When SAFECOM encounters an error while processing a command file, it redisplays the erroneous command and displays an error or warning message describing the nature of the error.

If it is a syntax error, then SAFECOM aborts the processing and causes ABEND. If the error does not cause the OBEY processing to abort, SAFECOM continues processing the command file and causes ABEND at the end. As a result, TACL returns -6 as the MESSAGECODE and a non-zero value as the COMPLETIONCODE.

SAFECOM error and warning messages are described in the *Safeguard Reference Manual*.

Note. ABEND (on any error while processing either OBEY file or IN file) is supported only on systems running H06.28 and later H-series RVUs and J06.17 and later J-series RVUs.

Using Wild-Card Characters in SAFECOM Commands

In most SAFECOM commands, you can use wild-card characters to match characters in an object name. In certain instances, you can also specify wild-card characters in user names. The following wild-card characters are supported:

* Use an asterisk (*) to match any number of characters (zero, one, or more).

? Use a question mark (?) to match a single character.

Wild-card characters make it easy for you to execute commands on sets of objects with similar names, as shown in the following examples. Typical uses of wild-card characters include adding disk files with similar names to the Safeguard database or displaying information about files with similar names.

Wild-card characters differ from pattern wild-card characters. Pattern wild-card characters are specified when you use the diskfile-pattern objecttype. For more information, see Section 9, Working with Patterns.

Examples

The following examples illustrate the use of wild-card characters in SAFECOM commands. It is assumed that the DISPLAY HEADERS ONCE and DISPLAY WARNINGS OFF options are used as described in Section 8, Changing Display Options.

The following command displays attributes of all disk files in the current subvolume whose names begin with the letters ACCT:

```
=INFO DISKFILE acct*
```

```
                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 ACCT            08MAY05, 12;54       2,1    THAWED        OFF

NO ACCESS CONTROL LIST DEFINED

                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 ACCTPAY         18JUN92, 09:22       2,1    THAWED        OFF

NO ACCESS CONTROL LIST DEFINED

                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 ACCTOUT         18JUL92, 09:26       2,1    THAWED        OFF

NO ACCESS CONTROL LIST DEFINED

                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 ACCT12          08MAY05, 13:37       2,1    THAWED        OFF

NO ACCESS CONTROL LIST DEFINED

                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 ACCT4           15JUL05, 11:00       2,1    THAWED        OFF

NO ACCESS CONTROL LIST DEFINED

                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 ACCT9           22JUL05, 10:34       2,1    THAWED        OFF

NO ACCESS CONTROL LIST DEFINED
```

Similarly, this command displays the attributes of all disk files whose names are five characters long and whose first four characters are ACCT:

```
=INFO DISK acct?
```

```
                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 ACCT4           15JUL05, 11:00       2,1    THAWED        OFF

NO ACCESS CONTROL LIST DEFINED

                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 ACCT9           22JUL05, 10:34       2,1    THAWED        OFF

NO ACCESS CONTROL LIST DEFINED
```

Restrictions

These important points apply to the use of wild-card characters:

- Wild cards in ADD commands for disk files, volumes, and subvolumes affect only objects that already exist. For example, the following command protects only files that currently exist on volume $VOL1 and subvolume DATA:

  ```
  =ADD DISKFILE $VOL1.DATA.*
  ```

- You cannot use wild cards in ADD commands for devices, subdevices, processes, subprocesses, and terminals.
- If you are a security administrator, wild cards are allowed in only two instances when you specify a user ID in its number form. The forms *group-number*,* and *,* are valid. All other forms, such as *,124, are invalid.
- Except for two instances, you cannot use wild cards in user names when you alter an access control list. The forms *group-name.** and *.** are the only valid forms.

Abbreviating SAFECOM Commands

You can abbreviate any SAFECOM reserved word, including commands, attributes, and keywords. In most instances, a reserved word can be abbreviated to its first three characters. You can use more than three characters for clarity, but three is the minimum required.

Some abbreviations must be longer than three characters so that the Safeguard software can distinguish between similar reserved words, such as SUBVOLUME and SUBPROCESS.

When a reserved word is hyphenated, do not omit any hyphens. Each component of a hyphenated word must have at least its first three characters.

To understand the use of abbreviations, consider the following command:

```
=ALTER SUBVOLUME star, OWNER 12,8, AUDIT-ACCESS-PASS LOCAL
```

The same command, using abbreviated reserved words, is as follows:

```
=ALT SUBV star, OWN 12,8, AUD-ACC-PAS LOC
```

The following three pairs of reserved words represent a special case in which you can use the same three-character abbreviation for either reserved word:

Reserved Words		Abbreviation
ALL	ALLOCATE	ALL
NAME	NAMED	NAM
REMOTE	REMOTEPASSWORD	REM

Running Other Programs From SAFECOM

You can run another program without exiting from SAFECOM. To do so, execute the RUN command at the SAFECOM prompt. The command syntax and run options of the

SAFECOM RUN command are the same as those of the TACL RUN command. For further details regarding this command, refer to the *Safeguard Reference Manual*.

For example, the following command runs the program TRACKER that resides in the current default subvolume:

```
=RUN TRACKER / IN TRACK1, OUT TRACK2, NOWAIT /
```

This command specifies that the file TRACK1 is the input file for the program, and the file TRACK2 is the output file for the program. The NOWAIT option instructs SAFECOM to redisplay its prompt without pausing for the program TRACKER to complete execution.

Checking Command Syntax Only

SAFECOM allows you to select a syntax-only mode, in which commands are simply checked for syntax and not executed. To select this mode of operation, use the following command:

```
=SYNTAX ON
```

In this mode, SAFECOM reports any syntax errors found in commands as you enter them. The only SAFECOM commands that can be executed in syntax-only mode are ASSUME, EXIT, OBEY, and SYNTAX. Other commands are merely checked for syntax errors.

If you enter a command with correct syntax, SAFECOM issues the following message to remind you that it is in syntax-only mode:

```
* WARNING * SAFECOM IS IN SYNTAX ONLY MODE; COMMAND NOT EXECUTED.
```

If you issue a command with incorrect syntax, SAFECOM issues the following message:

```
ILLEGAL SYNTAX; COMMAND NOT EXECUTED.
```

To return to the normal mode of operation, in which SAFECOM executes commands, use the following command:

```
=SYNTAX OFF
```

8 Changing Display Options

SAFECOM provides a DISPLAY command that allows you to customize your SAFECOM prompt and to control various INFO command options during an interactive session. With the DISPLAY command, you can perform the following actions to alter the characteristics of the INFO command report:

- Turn warning messages on and off
- Turn column headings on and off
- Set the DETAIL option of the INFO command on or off for an entire session
- Identify users by either user IDs or user names
- Display the output of an INFO command as SAFECOM commands

Table 8-1 lists the DISPLAY command options. The examples in this section illustrate the use of these options. For additional details regarding the DISPLAY command, see the *Safeguard Reference Manual*.

Table 8-1. DISPLAY Commands

Command Option	Description
DISPLAY PROMPT	Controls text displayed in your SAFECOM prompt.
DISPLAY WARNINGS	Controls the display of warnings about unprotected files.
DISPLAY HEADERS	Controls the display of column headings in INFO command reports.
DISPLAY DETAIL	Controls the DETAIL option of the INFO command for an entire session.
DISPLAY USER	Displays the identities of users as either user IDs or user names.
DISPLAY COMMANDS	Displays the output of an INFO command as SAFECOM commands.

You can use the ENV command at any time during a SAFECOM session to check the current state of the DISPLAY options.

Editing Your SAFECOM Prompt

The standard SAFECOM prompt is an equal sign (=). With the DISPLAY PROMPT command, you can specify text or predefined items to be included in your SAFECOM prompt. For example, a typical item you might want to include in your SAFECOM prompt is the current command line number.

Like the other DISPLAY commands described in this section, DISPLAY PROMPT remains in effect only during your current session. When you exit SAFECOM, the custom prompt is cleared and replaced by the standard SAFECOM prompt.

Table 8-2 lists the prompt items you can specify in a DISPLAY PROMPT command.

Table 8-2. Prompt Items for the DISPLAY PROMPT Command

Item	Description
string	Displays a user-supplied text string in the prompt.
ASSUME OBJECTTYPE	Displays the currently assumed object type. If no object type is assumed, nothing additional is displayed
COMMAND NUMBER	Displays the current command line number.
CPU	Displays the number of the CPU in which SAFECOM is running.
DATE	Displays the current date.
END	Suppresses display of the equal sign in the SAFECOM prompt.
PROCESS NAME	Displays the current process name.
PROCESS NUMBER	Displays the current process number.
SUBVOLUME	Displays the current subvolume.
SYSTEM NAME	Displays the current system name.
SYSTEM NUMBER	Displays the current system number.
TIME	Displays the current time.
USER NAME	Displays your user name.
USER NUMBER	Displays your user ID.
VOLUME	Displays the current volume.

To understand the use of DISPLAY PROMPT, consider the following examples. The first example shows how to change the prompt so that it includes the command line number:

```
=DISPLAY PROMPT COMMAND NUMBER
2=
```

You can also combine several prompt items in sequence by enclosing them within parentheses. The following example shows how to specify your user name, a space, and the command line number:

```
2=DISPLAY PROMPT (USER NAME, " ", COMMAND NUMBER)
SUPPORT.JANE 3=
```

If you do not want the equal sign to be included in your prompt, enter END as the last prompt item in the DISPLAY PROMPT command:

```
SUPPORT.JANE 3=DISPLAY PROMPT (COMMAND NUMBER, " ", END)
4
```

To reset your prompt to the standard SAFECOM prompt, execute the DISPLAY PROMPT command with no prompt items specified:

```
4 DISPLAY PROMPT
=
```

Controlling INFO Report Warnings

SAFECOM normally displays a warning message if you issue an INFO DISKFILE command for a file that has not been added to the Safeguard database. You can inhibit the display of this message for an entire SAFECOM session by using the DISPLAY WARNINGS command. This feature can be convenient if you are requesting information on all files in a subvolume.

DISPLAY WARNINGS has three forms:

`DISPLAY WARNINGS OFF` turns off warning messages for the session.

`DISPLAY WARNINGS ON` turns on warning messages for the session.

`DISPLAY WARNINGS` turns on warning messages for the session.

For example, assume that the subvolume named sales contains three files, and two of them have not been added to the Safeguard database. To check the authorization records for these files:

```
=INFO DISKFILE $data.sales.*
```

The display shows:

```
                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 REPORT1          18JUL92, 11:00       2,1    THAWED          OFF

 NO ACCESS CONTROL LIST DEFINED!

* WARNING * RECORD FOR DISKFILE $DATA.SALES.REPORT2 NOT FOUND
* WARNING * RECORD FOR DISKFILE $DATA.SALES.REPORT3 NOT FOUND
```

To turn off the warning messages:

```
=DISPLAY WARNINGS OFF
```

Then issue the same INFO command:

```
=INFO DISKFILE $data.sales.*
```

When the warnings are off, the display shows:

```
                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 REPORT1          18JUL92, 11:00       2,1    THAWED          OFF

 NO ACCESS CONTROL LIST DEFINED!
```

The INFO DISKFILE command also has a WARNINGS option that allows you to turn warnings on or off for a single INFO command.

The INFO command WARNINGS option has three forms:

`WARNINGS OFF`	turns off warning messages for this command.
`WARNINGS ON`	turns on warning messages for this command.
`WARNINGS`	turns on warning messages for this command.

For example, even if you turn off warnings for the session, you can use the following INFO command to turn on warnings for the command:

```
=INFO DISKFILE $data.sales.*, WARNINGS ON
```

The display shows:

```
                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 REPORT1          18JUL92, 11:00       2,1    THAWED          OFF

 NO ACCESS CONTROL LIST DEFINED!

* WARNING * RECORD FOR DISKFILE $DATA.SALES.REPORT2 NOT FOUND

* WARNING * RECORD FOR DISKFILE $DATA.SALES.REPORT3 NOT FOUND
```

Controlling INFO Report Headings

SAFECOM normally displays a heading line above each object reported on by an INFO command. You can control the display of this heading line for an entire session with the DISPLAY HEADERS command. This option allows you to either inhibit the display of the heading line or specify that it should appear only once in an INFO report. This feature can be convenient if you are requesting information on many objects in a single INFO command.

DISPLAY HEADERS has four forms:

`DISPLAY HEADERS OFF`	turns off the heading line for the session.
`DISPLAY HEADERS ON`	turns on the heading line for the session.
`DISPLAY HEADERS`	turns on the heading line for the session.
`DISPLAY HEADERS ONCE`	causes the heading line to appear once at the start of the INFO report.

For example, assume that the subvolume sales contains three files that have been added to the Safeguard database. To check the authorization records for these files:

```
=INFO DISKFILE $data.sales.*
```

The display shows:

```
                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 REPORT1          18JUL92, 11:00       2,1    THAWED         OFF

 NO ACCESS CONTROL LIST DEFINED!

                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 REPORT2          18JUL92, 11:02       2,1    THAWED         OFF

 NO ACCESS CONTROL LIST DEFINED!

                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 REPORT3          18JUL92, 11:05       2,1    THAWED         OFF

 NO ACCESS CONTROL LIST DEFINED!
```

To eliminate the multiple heading lines and make the report more legible:

```
=DISPLAY HEADERS ONCE
```

Then issue the same INFO command:

```
=INFO DISKFILE $data.sales.*
```

The display shows:

```
                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 REPORT1          18JUL92, 11:00       2,1    THAWED         OFF

 NO ACCESS CONTROL LIST DEFINED!

$DATA.SALES
 REPORT2          18JUL92, 11:02       2,1    THAWED         OFF

 NO ACCESS CONTROL LIST DEFINED!

$DATA.SALES
 REPORT3          18JUL92, 11:05       2,1    THAWED         OFF

 NO ACCESS CONTROL LIST DEFINED!
```

Controlling the INFO DETAIL Option for a Session

Most INFO commands provide additional detail when you specify the DETAIL option. This option applies to the current command only, not to the entire SAFECOM session. To set the DETAIL option on for the entire session, use the DISPLAY DETAIL command.

DISPLAY DETAIL has three forms:

`DISPLAY DETAIL OFF`	turns off the DETAIL option for the session.
`DISPLAY DETAIL ON`	turns on the DETAIL option for the session.
`DISPLAY DETAIL`	turns on the DETAIL option for the session.

If you use the DISPLAY DETAIL OFF command to turn off the detail option for a session, you can override it for a single INFO command by specifying the DETAIL option in that command. For example, assume you execute the following SAFECOM commands:

```
=DISPLAY DETAIL OFF
=INFO DISKFILE report1, DETAIL
```

Even if you turn off the detail option for the session, the DETAIL option in the INFO command causes details to be displayed by that command.

Displaying User IDs or User Names

By default, SAFECOM identifies users by their user IDs. To identify users by their user names, use the DISPLAY USER command. This command gives you the option of viewing users by either their user IDs or user names for a session.

DISPLAY USER has two forms:

`DISPLAY USER AS NAME`	identifies users by their user names (*`group name.member name`*) during the current session.
`DISPLAY USER AS NUMBER`	identifies users by their user IDs (*`group number,member number`*) during the current session.

The word AS is optional in these commands. You can include it to improve readability of the command.

For example, assume that you use the following INFO command at the start of a SAFECOM session to display the authorization record for the disk file quarter1:

```
=INFO DISKFILE quarter1
```

The display shows:

```
                      LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 QUARTER1          23JUL92, 15:00       8,6    THAWED         OFF

    008,006       R,W,E,P,C,O
    008,012       R,W
    008,*         R
```

By default, the INFO report identifies users by their user IDs. To view user names instead of user IDs, execute the following SAFECOM commands:

```
=DISPLAY USER AS NAME

=INFO DISKFILE quarter1
```

The display shows:

```
                    LAST-MODIFIED      OWNER     STATUS     WARNING-MODE
$DATA.SALES
 QUARTER1          23JUL92, 15:00  ADMIN.BILL  THAWED         OFF

  ADMIN.BILL      R,W,E,P,C,O
  ADMIN.LYNN      R,W
  ADMIN.*         R
```

Note. If a report contains a deleted user, that user is identified by user ID even if you are displaying users as user names.

To return to the default setting of identifying users by their user IDs during this session:

```
=DISPLAY USER AS NUMBER
```

Displaying INFO Output as Commands

The DISPLAY AS COMMANDS command allows you to specify that the output of an INFO command be displayed as SAFECOM commands rather than as a report.

DISPLAY AS COMMANDS has three forms:

`DISPLAY AS COMMANDS OFF`	displays the output of an INFO command in report form. This is the SAFECOM default setting.
`DISPLAY AS COMMANDS ON`	displays the output of an INFO command as SAFECOM commands during the current session.
`DISPLAY AS COMMANDS`	displays the output of an INFO command as SAFECOM commands during the current session.

For example, assume you execute the following INFO command at the start of a SAFECOM session to display the authorization record for the disk file rpt01:

```
=INFO DISKFILE rpt01, DETAIL
```

The display shows:

```
                    LAST-MODIFIED     OWNER    STATUS    WARNING-MODE
$DATA.SALES
 RPT01             26JUL92, 13:04       2,5    THAWED        OFF

    002,005      R,W,E,P,  O
    002,*        R

OBJECT-TEXT-DESCRIPTION = ''Record Created''

  AUDIT-ACCESS-PASS = NONE        AUDIT-MANAGE-PASS = NONE
  AUDIT-ACCESS-FAIL = NONE        AUDIT-MANAGE-FAIL = NONE

  LICENSE = OFF  PROGID = OFF  CLEARONPURGE = OFF  PERSISTENT = OFF
```

By default, the INFO command output is displayed in report form. To view this output as SAFECOM commands, rather than as a report:

```
=DISPLAY AS COMMANDS ON
```

```
=INFO DISKFILE rpt01, DETAIL
```

The display shows:

```
ADD    DISKFILE   $DATA.SALES.RPT01
ALTER  DISKFILE   $DATA.SALES.RPT01                    ,&
          ACCESS    002,005       (R,W,E,P,  0)
ALTER  DISKFILE   $DATA.SALES.RPT01     ,&
          ACCESS    002,*         (R          )
ALTER  DISKFILE   $DATA.SALES.RPT01               ,OWNER       2,5
ALTER  DISKFILE  $DATA.SALES.RPT01,&
OBJECT-TEXT-DESCRIPTION ''Record Created''
```

To return to the default setting of displaying the INFO command output in report form:

```
=DISPLAY AS COMMANDS OFF
```

Specifying a DISPLAY Command List

The DISPLAY command options described in this section can be executed as separate commands or specified in a single command list. The command list is convenient if you want to change several default settings at the start of a session. The following examples show how to specify display options in a single command list.

Assume that you want to turn warnings off, display only a single heading, and list users by their user names:

```
=DISPLAY WARNINGS OFF, HEADERS ONCE, USER AS NAME
```

Similarly, to turn off headings and turn on the detail option for the current session:

```
=DISPLAY HEADERS OFF, DETAIL
```

9 Working with Patterns

Background

The NonStop operating system groups files into subvolumes and volumes. Safeguard provides three levels of access control to files using the volume, subvolume, and file name. If all the files in a subvolume can have the same access requirements, then one subvolume protection record will meet the requirements for many files. Similarly one volume protection record would suffice if all the files and subvolumes on a single volume have the same access requirements. However, as the size of disks increase, the less likely a single volume protection record would suffice. As a result, the number of protection records tends to increase as the capacity of disk drives increase, and the potential number of disk files increases.

A common practice is to use a naming convention for volumes, subvolumes and file names to distinguish domains (application A versus application B), roles (production versus test versus support) and contents (such as hourly or daily log files and queues versus databases versus control files versus support files.)

A naming convention introduces a discernible pattern of characters into the name of a volume, subvolume, or file. As the number of volumes, subvolumes, and file names that require distinct access controls increase, so does the administrative burden required to create and manage the corresponding access control lists.

Patterns reduce administrative burden by allowing one pattern to match many subvolumes or filenames. That is, a pattern will be a template that represents a fully qualified file name. Thus there is no concept of the three levels of searching done with normal protection records: volume, subvolume, and filename.

Searching can involve scanning many patterns, and may result in more than one match. Thus we categorize patterns as to their degree of generality.

Introduction

What is a Pattern?

In the G06.25 release of patterns, a pattern must contain at least one wildcard in either or both the subvolume or filename. A pattern cannot contain a wildcard in the volume name.

Since patterns contain wildcards as part of their name, they do not represent a specific file. Patterns are metadata. When a wildcard is encountered in a pattern, the intent of the command has to be distinguished between using that wildcard as part of the pattern and using the wildcard as a search character.

How do Patterns Differ From What was Used Before?

There are now two types of protection records that can secure disk files:

- Diskfile protection records
- Diskfile-pattern protection records

Diskfile protection records represented a one to one mapping of a protection record to a disk file, or subvolume, or volume. Furthermore, for that diskfile protection record to be legally entered into Safeguard, the disk file or subvolume was required to exist, or at least the PERSISTENT option used.

Diskfile-pattern protection records have a one to many mapping of protection records to diskfiles. Diskfile pattern protection records only represent fully qualified disk file names, and cannot represent just subvolumes or volumes. However, patterns can be used that will match all filenames in a subvolume ($DATA.SUBVOL.*), or all filenames in all subvolumes in a volume ($DATA.*.*).

Pattern Examples

The following examples show some patterns that can be used on a G06.25 system, and some illegal patterns that are not allowed.

Legal Protection Record Patterns

`$D0201.*.*`

A very general protection record that covers all diskfiles on $D0201.

`$D0201.APP*.*`

A pattern protection record that secures all diskfiles in subvolumes on $D0201 that begin with APP.

`$D0201.APPLOG.D*`

A pattern protection record that secures diskfiles in $D0201.APPLOG that begin with D.

`$D0201.APPLOG.D???`

A protection record that secures diskfiles with names that begin with D and are exactly four characters long.

`$D0201.SRC*.*H`

A protection record that secures diskfiles on $D0201 that are in subvolumes that begin with SRC, and filenames that have an H as the last letter.

Illegal Protection Record Patterns

`$D0???.*.*`

Not a legal pattern protection record because it has wildcards in the volume name.

`$D0201.*`

Not a legal pattern because there is only a subvolume component, and not a diskfile component. However, when adding this pattern into Safecom, the current subvolume will be taken from the environment. The pattern will be translated into a legal pattern: `$D0201.subvol.*`.

`$SYSTEM.SYS00.OSIMAGE`

Not a legal pattern because it contains no wildcards.

`SYS??.OSIMAGE`

Not a legal pattern because it does not contain a volume component. However, when adding this pattern into Safecom, the current volume will be taken from the environment.

Pattern Generality

Given a pattern, the farther left a wildcard is in that pattern, the more general it is. Also, the asterisk (*) is more general than the question mark (?).

HP uses that principal to decide which pattern to use when more than one pattern describes a file; for example, $DATA1.A*.* is more general than $DATA1.A*.B*.

Consider these files:

1. $DATA1.APPLPROD.SERVER1
2. $DATA1.APPLTEST.SERVER1
3. $DATA1.APPLCNTL.STARTUP
4. $DATA1.APPLDEVL.BUILD

Files 1,2,3 and 4 all match pattern “$DATA1.A*.*”. However, file 4 is the only match for pattern $DATA1.A*.B*.

Which pattern would be used for file 4?

1. $DATA1.A*.*
2. $DATA1.A*.B*

Since both patterns have the same first 10 characters “$DATA1.A*.”, only look at what is left. “*” and “B*”. The wildcard in “B*” is further to the right, it is more specific and will be the one chosen.

Consider these patterns:

1. $DATA1.APPL*.SERVER?
2. $DATA1.APPL????.SERVER?

Both of these patterns match files 1 and 2. However, only one protection record can be used to protect these files. The more specific pattern is used, which in this case is pattern 2, because the APPL? is more specific than the APPL*.

One-Dimensional Search

A one-dimensional search is a search using the volume only, the subvolume only, or the filename only. A multi-dimensional search is one in which any two or three dimensions are searched. Since patterns contain wildcards as part of their name, they do not represent a specific file. Patterns are metadata. When a wildcard is encountered in a pattern, the intent of the command has to be distinguished between using that wildcard as part of the pattern and using the wildcard as a search character. Since a pattern cannot have a wildcard in the volume name, when a wildcard is encountered in the volume name a one-dimensional search is implied. When you use SAFECOM or SPI to find protection records that have already been added, searches are used with the other commands. When you use the INFO DISKFILE-PATTERN command, wildcards can be interpreted as either pattern characters, or search characters. The application of these wildcards depends on the context of the wildcard, and whether or not the ALL option is used.

Consider the command INFO DISKFILE-PATTERN $DATA*.PROD?.DB*. Safeguard treats the volume wildcard as a search character, and the wildcards in the subvolume and filename as pattern characters. Safeguard will search each volume that matches $DATA* for the specific pattern PROD?.DB*. This search is referred to as a one-dimensional search. At most, one pattern per volume would be returned.

Multi-Dimensional Search

Using the command modifier ALL implies that a multi-dimensional search is requested. It is possible for more than one pattern per volume to be returned. Multi-dimensional searching of patterns can present a problem. How do you indicate which wildcards in “$DATA*.B*.C*” are meant to be used to search for patterns that contain a wildcard? For example, if it is desired to list all patterns that start with the letter C in the filename; for example “C*”, how would the user tell Safeguard that “C*” is a search string and not part of the pattern? The G06.25 release implements a simple command attribute “ALL”, that tells Safeguard that all of the wildcards in the pattern are to be treated as search characters.

For example, “INFO DISKFILE-PATTERN $DATA*.B*.C*,ALL” tells Safeguard to look for all patterns that match “B*.C*” on all volumes that match “$DATA*”. This is a multi-dimensional search, because it is searching multiple volumes, and looking on each volume for multiple patterns that match "B*.C*". On the other hand, "INFO DISKFILE-PATTERN $DATA*.B*.C*" tells Safeguard to look for the pattern "B*.C*" on all volumes that match "$DATA*". This is a one-dimensional search.

Consider the command INFO DISKFILE-PATTERN $DATA*.PROD?.DB*, ALL. The presence of the command modifier ALL tells Safeguard that all the wildcards are to be treated as search characters. Safeguard will search each volume that matches $DATA* for all patterns that can be described by PROD?.DB*.

Safeguard Pattern Configuration

Use the Safeguard configuration attribute CHECK-DISKFILE-PATTERN to enable, disable, and control the search order for pattern and non-pattern protection records.

- OFF

  Specifies no pattern searches will occur. This configuration is equivalent to Safeguard versions prior to G06.25.

- LAST

  Specifies that non-pattern searching will occur first, using non-pattern based protection records, as in Safeguard versions prior to G06.25. If that search returns NORECORD then pattern based protection records will be searched.

- FIRST

  Specifies that pattern based protection records will be searched first. If that search returns NORECORD then non-pattern based protection records will be searched.

- ONLY

  Specifies that only pattern based protection records will be searched. Non-pattern protection records will be ignored.

- MID

  Specifies that pattern based protection records will be searched:

  - After the diskfile protection record search returns NORECORD when Direction-Diskfile is set to Filename-First.
  - Before the diskfile protection record search, when the Direction-Diskfile is set to VOLUME-FIRST, and the VOLUME and SUBVOLUME protection record search returns NORECORD.

Note. The MID option is supported only on systems running J06.08 and later J-series RVUs and H06.19 and later H-series RVUs.

Safeguard searches patterns so that the most specific pattern is used, and behaves similar to Direction-Diskfile = Filename-First and Combination-Diskfile = First-ACL.

Introducing a new method to determine access control impacts the multilevel method used today. Rather than try to merge the pattern method into each level, you will make each method mutually exclusive, but able to coexist. You will provide a global control that will specify which method is to be used first. Only when the primary method returns NORECORD will the secondary method be used. This access result will be combined with the result returned from the SEEP in accordance with existing policy. To maintain backwards compatibility, this control will also disable pattern matching entirely.

The pattern protection records are stored in a new file in each volume's SAFE subvolume. The file name is SAFE.PATGUARD.

The integrity of the existing SAFE.GUARD files must be maintained. Therefore, the existing rules for managing non-pattern protection records will be maintained, even though the access result would be satisfied using a pattern protection record. Therefore, when a file is created, renamed, or deleted, the existing legacy logic will be employed to manage the appropriate SAFE.GUARD file. The exception to this rule is the ONLY option.

Setting CHECK-DISKFILE-PATTERN to ONLY implies that maintaining the integrity of the SAFE.GUARD files is not desired. This would be used by installations that have no need to fall back to using the SAFE.GUARD files, such as installations that have not used SAFEGUARD protection records prior to patterns; for example, installations that required only authentication services. The use of ONLY is not recommended for installations that have a substantial number of non-pattern protection records.

In order to avoid operational issues for installations that do have non-pattern protection records, HP recommends you backup the SAFE.GUARD files, set the configuration to FIRST, add pattern protection records and delete non-pattern protection records, examine the audit trail, and when no accesses have been determined by non-patterns, change the configuration to ONLY.

When ONLY is specified, you should limit use of ADD, ALTER, DELETE, FREEZE, or THAW DISKFILE, SUBVOL, and VOLUME commands. This will preserve the content of the SAFE.GUARD files. If the recommended approach is used, then the SAFE.GUARD files will continue to be empty.

To fall back from ONLY, HP recommends you set the configuration to LAST, add VOLUME, SUBVOL, and DISKFILE protection records, examine the audit trail, and when no accesses have been determined by patterns, change the configuration to OFF. Alternatively, the configuration can change from ONLY to FIRST or LAST rather than OFF, depending upon the user requirements for mixing patterns and non-patterns.

Table 9-1 describes CHECK-DISKFILE-PATTERN settings. The 2 columns Normal and Pattern indicate intermediate results returned from lookups of normal and pattern protection records. The columns OFF, FIRST, LAST, and ONLY indicate the final outcome after considering both outcomes from normal and pattern lookups, based on the CHECK-DISKFILE-PATTERN setting.

Table 9-1. CHECK-DISKFILE-PATTERN settings

Result from:		CHECK-DISKFILE-PATTERN value			
Normal	**Pattern**	**OFF**	**FIRST**	**LAST**	**ONLY**
Y	Y	Y[1]	Y[4]	Y[3]	Y[6]
Y	N	Y[1]	N[4]	Y[3]	N[6]
Y	NR	Y[1]	Y[2]	Y[3]	NR[6]
N	Y	N[1]	Y[4]	N[3]	Y[6]
N	N	N[1]	N[4]	N[3]	N[6]
N	NR	N[1]	N[2]	N[3]	NR[6]
NR	Y	NR[1]	Y[4]	Y[5]	Y[6]
NR	N	NR[1]	N[4]	N[5]	N[6]
NR	NR	NR[1]	NR[2]	NR[5]	NR[6]

N the request is denied (NO)
Y the request is granted (YES)
NR no norecord was found (NORECORD)

Check-Diskfile-Pattern OFF searches only for normal protection records.
Check-Diskfile-Pattern FIRST searches for a pattern protection record, and if the result is NORECORD, then searches for a normal protection record.
Check-Diskfile-Pattern LAST searches for a normal protection record, and if the result is NORECORD, then searches for a pattern protection record.
Check-Diskfile-Pattern ONLY searches only for a pattern protection record.

1 PATTERNOFF Check-Diskfile-Pattern is OFF and the OUTCOME is determined by only searching for a normal protection record.
2 NORMALFIRST Check-Diskfile-Pattern is FIRST and the OUTCOME is determined by a normal protection record because the pattern search resulted in norecord.
3 NORMALLAST Check-Diskfile-Pattern is LAST and the OUTCOME is determined by a normal protection record.
4 PATTERNFIRST Check-Diskfile-Pattern is FIRST and the OUTCOME is determined by a pattern protection record.
5 PATTERNLAST Check-Diskfile-Pattern is LAST and the OUTCOME is determined by a pattern protection record because the normal search resulted in norecord.
6 PATTERNONLY Check-Diskfile-Pattern is ONLY and the OUTCOME is determined by only search for a pattern protection record.

Table 9-2 describes CHECK-DISKFILE-PATTERN settings when it is set to MID and the Direction-Diskfile is set to Filename-First. In this case DISKFILE-PATTERN ACL gets evaluated after the DISKFILE ACL evaluation. If the DISKFILE-PATTERN ACL evaluation results in NORECORD, Normal ACL evaluates SUBVOLUME and VOLUME ACL. The first column indicates the DISKFILE ACL setting and the second column indicates the DISKFILE PATTERN setting. Last three columns indicate the final

access evaluation based on the Safeguard global configuration attribute COMBINATION-DISKFILE values FIRST-ACL, FIRST-RULE, and ALL.

Table 9-2. CHECK-DISKFILE-PATTERN settings when value is MID and Direction Diskfile is Filename-First

Configuration Direction Diskfile:Filename-First		Evaluation (Combination Diskfile)		
DISKFILE ACL	**DISKFILE PATTERN ACL**	**FIRST-ACL**	**FIRST-RULE**	**ALL**
Y	Y	Permit	Permit	Permit
Y	N	Permit	Permit	Deny
Y	NR	Permit	Permit	Normal
N	Y	Deny	Deny	Deny
N	N	Deny	Deny	Deny
N	NR	Deny	Deny	Deny
NM	Y	Deny	Permit	Deny
NM	N	Deny	Deny	Deny
NM	NR	Deny	Normal	Deny
NR	Y	Permit	Permit	Permit
NR	N	Deny	Deny	Deny
NR	NR	Normal	Normal	Normal

Y - ACL evaluates a YES
N - ACL evaluates a NO
NR - No ACL exists (NORECORD)
NM - ACL contains no mention
Permit - Access permitted
Deny - Access Denied
Normal - Normal ACL evaluation for SUBVOL and VOLUME

Note. The MID option is supported only on systems running J06.08 and later J-series RVUs and H06.19 and later H-series RVUs.

Table 9-3 describes CHECK-DISKFILE-PATTERN settings when it is set to MID and the Direction-Diskfile is set to Volume-First. In this case DISKFILE-PATTERN ACL is evaluated after VOLUME and SUBVOLUME ACL evaluation. If the DISKFILE-PATTERN ACL evaluation results in NORECORD, Normal ACL evaluates DISKFILE ACL. The first column indicates the VOLUME ACL setting, the second column indicates the SUBVOLUME ACL setting, and the third column indicates the DISKFILE PATTERN setting. The last three columns depict the final access evaluation based on

the Safeguard global configuration attribute COMBINATION-DISKFILE values FIRST-ACL, FIRST-RULE, and ALL.

Table 9-3. CHECK-DISKFILE-PATTERN settings when value is MID and Direction Diskfile is Volume-First

Configuration Direction Diskfile: Volume-First			Evaluation (Combination Diskfile)		
VOLUME ACL	**SUBVOLUME ACL**	**DISKFILE PATTERN ACL**	**FIRST-ACL**	**FIRST-RULE**	**ALL**
Y	Y	Y	Permit	Permit	Permit
Y	Y	N	Permit	Permit	Deny
Y	Y	NR	Permit	Permit	Normal
Y	N	Y	Permit	Permit	Deny
Y	N	N	Permit	Permit	Deny
Y	N	NR	Permit	Permit	Deny
Y	NM	Y	Permit	Permit	Deny
Y	NM	N	Permit	Permit	Deny
Y	NM	NR	Permit	Permit	Deny
Y	NR	Y	Permit	Permit	Permit
Y	NR	N	Permit	Permit	Deny
Y	NR	NR	Permit	Permit	Normal
N	Y	Y	Deny	Deny	Deny
N	Y	N	Deny	Deny	Deny
N	Y	NR	Deny	Deny	Deny
N	N	Y	Deny	Deny	Deny
N	N	N	Deny	Deny	Deny
N	N	NR	Deny	Deny	Deny
N	NM	Y	Deny	Deny	Deny
N	NM	N	Deny	Deny	Deny
N	NM	NR	Deny	Deny	Deny
N	NR	Y	Deny	Deny	Deny
N	NR	N	Deny	Deny	Deny
N	NR	NR	Deny	Deny	Deny
NM	Y	Y	Deny	Permit	Deny

Y - ACL evaluates a YES
N - ACL evaluates a NO
NR - No ACL exists (NORECORD)
NM - ACL contains no mention
Permit - Access permitted
Deny - Access Denied
Normal - Normal ACL evaluation for DISKFILE

Table 9-3. CHECK-DISKFILE-PATTERN settings when value is MID and Direction Diskfile is Volume-First

Configuration Direction Diskfile: Volume-First			Evaluation (Combination Diskfile)		
VOLUME ACL	**SUBVOLUME ACL**	**DISKFILE PATTERN ACL**	**FIRST-ACL**	**FIRST-RULE**	**ALL**
NM	Y	N	Deny	Permit	Deny
NM	Y	NR	Deny	Permit	Deny
NM	Y	Y	Deny	Deny	Deny
NM	N	N	Deny	Deny	Deny
NM	N	NR	Deny	Deny	Deny
NM	N	Y	Deny	Permit	Deny
NM	NM	N	Deny	Deny	Deny
NM	NM	NR	Deny	Normal	Deny
NM	NM	Y	Deny	Permit	Deny
NM	NR	N	Deny	Deny	Deny
NM	NR	NR	Deny	Normal	Deny
NR	NR	Y	Permit	Permit	Permit
NR	Y	N	Permit	Permit	Deny
NR	Y	NR	Permit	Permit	Normal
NR	Y	Y	Deny	Deny	Deny
NR	N	N	Deny	Deny	Deny
NR	N	NR	Deny	Deny	Deny
NR	N	Y	Deny	Permit	Deny
NR	NM	N	Deny	Deny	Deny
NR	NM	NR	Deny	Normal	Deny
NR	NM	Y	Permit	Permit	Permit
NR	NR	N	Deny	Deny	Deny
NR	NR	NR	Normal	Normal	Normal

Y - ACL evaluates a YES
N - ACL evaluates a NO
NR - No ACL exists (NORECORD)
NM - ACL contains no mention
Permit - Access permitted
Deny - Access Denied
Normal - Normal ACL evaluation for DISKFILE

Note. The MID option is supported only on systems running J06.08 and later J-series RVUs and H06.19 and later H-series RVUs.

Examples

- To set diskfile pattern searches to be performed after NORECORD is returned for non-pattern checking:

```
ALTER SAFEGUARD, CHECK-DISKFILE-PATTERN LAST
```

- To set diskfile pattern searches to be performed first, if the result is NORECORD non-pattern checking will be done:

```
ALTER SAFEGUARD, CHECK-DISKFILE-PATTERN FIRST
```

- To disable diskfile pattern searches (that is, perform only non-pattern checking):

```
ALTER SAFEGUARD, CHECK-DISKFILE-PATTERN OFF
```

- To set diskfile pattern searches to be the only search (that is, to disable non-pattern checking for diskfile protection records):

```
ALTER SAFEGUARD, CHECK-DISKFILE-PATTERN ONLY
```

SAFECOM Diskfile-Pattern Commands

The ALTER, DELETE, FREEZE, INFO, and THAW commands search for existing protection records. Both one-dimensional and multi-dimensional searches are supported for these commands. The ADD command on the other hand, cannot perform a multi-dimensional search. That is, if all of the wildcards were expanded during an ADD operation, the resultant pattern would have no wildcards, which, for the G06.25 release, is an illegal pattern. Therefore, it is illegal to specify “ALL” on the ADD command. However, the ADD command does support one-dimensional searches when wildcards are used in the volume name.

Patterns can be extremely powerful so protection record level warning mode on the patterns are implemented so that they may be tested. Patterns do not represent actual files so they are implicitly “persistent”, that is, they do not go away when a file is deleted because the pattern could possibly represent another file that does exist.

Since pattern protection records are persistent and describe multiple objects they are not deleted when a file is deleted or renamed, nor will a pattern protection record be created when a file is created or renamed. This follows the existing logic of how a persistent non-pattern protection record is managed. A pattern cannot be specified on a Default-Protection-Record.

Table 9-2 lists the SAFECOM diskfile-pattern commands. The examples in this section illustrate the use of these commands. For the detailed syntax of the diskfile pattern

security commands, see the *Safeguard Reference Manual*. Patterns may be used in SPI also.

Table 9-4. Diskfile-Pattern Commands

Command	Action
ADD DISKFILE-PATTERN	Adds a diskfile pattern to the Safeguard database by creating an authorization record for the file.
ALTER DISKFILE-PATTERN	Changes one or more of the security attributes in the diskfile-pattern authorization record.
DELETE DISKFILE-PATTERN	Removes a diskfile pattern from the Safeguard database by deleting the disk-file authorization record.
FREEZE DISKFILE-PATTERN	Suspends access authority to diskfiles described by the diskfile pattern. No one except a diskfile owner, the primary owner's group manager, and the super ID can gain access to the diskfiles described by the frozen pattern.
INFO DISKFILE-PATTERN	Displays the security attributes of the diskfile-pattern authorization record.
RESET DISKFILE-PATTERN	Resets one or more default diskfile-pattern attributes to values predefined by the Safeguard software. Any subsequent ADD DISKFILE-PATTERN commands use these predefined defaults for attributes not specified in the ADD DISKFILE-PATTERN command.
SET DISKFILE-PATTERN	Establishes default diskfile-pattern attributes that you specify. Any subsequent ADD DISKFILE-PATTERN commands use these defaults for attributes not specified in the ADD DISKFILE command.
SHOW DISKFILE-PATTERN	Displays the current default attributes for diskfile-patterns. Any subsequent ADD DISKFILE-PATTERN commands use these defaults for attributes not specified in the ADD DISKFILE-PATTERN command.
THAW DISKFILE-PATTERN	Restores access authorities to diskfiles described by the diskfile pattern for users on the access control list.

ADD DISKFILE-PATTERN

ADD DISKFILE-PATTERN Examples

- To add a protection record that describes all production data base files that reside on $DATA with subvolume names that begin with PROD:

```
ADD DISKFILE-PATTERN $DATA.PROD*.*, &
ACCESS PROD.* (R,W)
```

- To add a diskfile pattern for all files in subvolume $A.B:

```
ADD DISKFILE-PATTERN $A.B.*, ACCESS *.* (R,W)
```

ALTER DISKFILE-PATTERN

ALTER DISKFILE-PATTERN Examples

- To alter a diskfile pattern to give SUPER.SUPER read and write access:

```
ALTER DISKFILE-PATTERN $DATA.APLOGS.LOG*, &
ACCESS SUPER.SUPER (R,W)
```

- To alter all diskfile pattern that match $DATA*.APLOGS.LOG*:

```
ALTER DISKFILE-PATTERN $DATA*.APLOGS.LOG*, ALL, &
ACCESS SUPER.SUPER (R,W)
```

DELETE DISKFILE-PATTERN

DELETE DISKFILE-PATTERN Examples

- To delete the diskfile pattern $ABC.*.*:

```
DELETE DISKFILE-PATTERN $ABC.*.*
```

- To delete all diskfile patterns that match the search pattern $ABC.*.*:

```
DELETE DISKFILE-PATTERN $ABC.*.*, ALL
```

- To delete all diskfile patterns that match the search pattern $AB*.D*.*F

```
DELETE DISKFILE-PATTERN $AB*.D*.*F, ALL
```

FREEZE DISKFILE-PATTERN

FREEZE DISKFILE-PATTERN Example

- To freeze all diskfiles that match all patterns that specify a subvolume name beginning with the characters TEST:

```
FREEZE DISKFILE-PATTERN $*.TEST*.*, ALL
```

  It is valid in a search pattern to have a wildcard in the volume portion of a diskfile name.

INFO DISKFILE-PATTERN

Finding Added Patterns

For example, if you had the following patterns:

1. $DATA1.A*.*
2. $DATA1.A*.B*
3. $DATA2.A*.*

4. $DATA3.A*.B*

   INFO DISKFILE-PATTERN $DATA1.A*.* would return pattern 1.

   INFO DISKFILE-PATTERN $DATA1.A*.*, ALL would return patterns 1 and 2.

   INFO DISKFILE-PATTERN $DATA*.A*.* would return patterns 1 and 3 (one dimensional search).

   INFO DISKFILE-PATTERN $DATA*.A*.*, ALL would return patterns 1, 2, 3, & 4 (a multi-dimensional search).

   If you added this pattern, ADD DISKFILE-PATTERN $*.*.*, to the above patterns, a one-dimensional search that will add the pattern “*.*” to every volume that matches “$*”.

   If you had volumes $DATA1, $DATA2, and $DATA3, the following patterns would be added:

5. $DATA1.*.*
6. $DATA2.*.*
7. $DATA3.*.*

   If you now did INFO DISKFILE-PATTERN $*.*.*, which patterns would be returned? Patterns 1, 2, 3, 4, 5, 6, and 7 are wrong. The answer is 5, 6, and 7.

   That command is a one dimensional search. It is asking for the specific pattern “*.*” on all volumes that match “$*”.

If you use INFO DISKFILE-PATTERN $*.*.*, ALL, you get all patterns. This is a multi-dimensional search, that is asking for any patterns that match “*.*” from all volumes that match “$*”.

“ALL” directs Safeguard to treat all wildcards as search characters. If you omit “ALL”, the wildcards in the subvolume and filename are the actual characters you are looking for.

INFO DISKFILE-PATTERN Examples

- To display the diskfile pattern $DATA.*TEST.* (that is, display a single diskfile pattern) using display user as name:

```
=DISPLAY USER AS NAME

=INFO DISKFILE-PATTERN $DATA.*TEST.*
```

  This output appears:

```
LAST-MODIFIED OWNER STATUS WARNING-MODE
$DATA.*TEST
* 28SEP04, 5:44 MLH1.MGR THAWED OFF

\KONA.PROD.CARLY R
\KONA.TEST.JIMMY R,W
```

```
GROUP TEST R,W,E,P,C
GROUP \KONA.TEST R
\*.*.*
```

- To display the diskfile pattern $A.B.*:

  ```
  INFO DISKFILE-PATTERN $A.B.*
  ```

- To display all diskfile patterns that match the search pattern $A.B.*:

  ```
  INFO DISKFILE-PATTERN $A.B.*, ALL
  ```

  A multi-dimensional search ignores the setting of WARNINGS. Therefore no warning message is displayed.

- To display all diskfile patterns that match the search pattern $A.B.* and suppress warning/error messages:

  ```
  INFO DISKFILE-PATTERN $A.B.*, ALL, WARNINGS OFF
  ```

  A multi-dimensional search ignores the setting of WARNINGS. Therefore no warning message is displayed.

- To display all diskfile patterns that match the search pattern $A.B.*:

  ```
  INFO DISKFILE-PATTERN $A.B.*, WARNINGS OFF
  ```

  A warning message will be displayed if no matching pattern is found.

- To display all diskfile patterns that have the volume name starting with the letter A (that is, display multiple patterns):

  ```
  INFO DISKFILE-PATTERN $A*.*.*, ALL, DETAIL
  ```

- To display multiple diskfile patterns that have warning-mode enabled:

  ```
  INFO DISKFILE-PATTERN $*.*.*, ALL, WHERE WARNING-MODE
  ```

RESET DISKFILE-PATTERN

RESET DISKFILE-PATTERN Example

To reset WARNING-MODE to its predefined value (OFF) for diskfile patterns:

```
RESET DISKFILE-PATTERN WARNING-MODE
```

SET DISKFILE-PATTERN

SET DISKFILE-PATTERN Example

To set the default owner to be PROD.DBA:

```
SET DISKFILE-PATTERN OWNER PROD.DBA
```

SHOW DISKFILE-PATTERN

SHOW DISKFILE-PATTERN Example

To show the current default values for the diskfile pattern:

```
SHOW DISKFILE-PATTERN
```

THAW DISKFILE-PATTERN

THAW DISKFILE-PATTERN Example

To thaw all diskfile patterns that have a volume name ending in the letter P:

```
THAW DISKFILE-PATTERN $*P.*.*, ALL
```

SAFECOM Saved-Diskfile-Pattern Commands

Table 9-5 lists the SAFECOM saved-diskfile-pattern commands. The examples in this section illustrate the use of these commands. For the detailed syntax of the SAFECOM saved-diskfile-pattern security commands, see the *Safeguard Reference Manual*. Patterns may be used in SPI also.

Note. Use the SYNC command to create diskfile-pattern protection records on a volume using the saved-diskfile-pattern protection records. For information on the SYNC command, see the *Safeguard Reference Manual*.

Table 9-5. Saved-Diskfile-Pattern Commands (page 1 of 2)

Command	Action
ADD SAVED-DISKFILE-PATTERN	Adds a saved-diskfile-pattern record.
ALTER SAVED-DISKFILE-PATTERN	Changes one or more security attributes in the saved-diskfile-pattern record.
DELETE SAVED-DISKFILE-PATTERN	Removes a pattern record for a saved-diskfile-pattern.
FREEZE SAVED-DISKFILE-PATTERN	Suspends access authority to patterns described by the disk-file pattern. Only the pattern owner, primary owner's group manager, and the local super ID can access the frozen pattern.
INFO SAVED-DISKFILE-PATTERN	Displays the current attribute values of the specified saved-diskfile-pattern.
RESET DISKFILE-PATTERN	Resets the current saved-diskfile-pattern attribute values to values predefined by the Safeguard software. Any subsequent ADD SAVED-DISKFILE-PATTERN commands use these predefined defaults for attributes not specified in the ADD SAVED-DISKFILE-PATTERN command.

Table 9-5. Saved-Diskfile-Pattern Commands (page 2 of 2)

Command	Action
SET DISKFILE-PATTERN	Establishes default diskfile-pattern attributes that you specify. Any subsequent ADD SAVED-DISKFILE-PATTERN commands use these defaults for attributes not specified in the ADD SAVED-DISKFILE-PATTERN command.
SHOW DISKFILE-PATTERN	Displays the current default attributes for the attributes associated with object type. Any subsequent ADD SAVED-DISKFILE-PATTERN commands use these defaults for attributes not specified in the ADD SAVED-DISKFILE-PATTERN command.
THAW DISKFILE-PATTERN	Restores a frozen saved-diskfile-pattern protection record.

ADD SAVED-DISKFILE-PATTERN

ADD SAVED-DISKFILE-PATTERN Examples

1. To add a saved-diskfile-pattern record that describes all files that reside on $DATA with subvolume names that begin with PROD:

```
ADD SAVED-DISKFILE-PATTERN $DATA.PROD*.*, &
ACCESS PROD.* (R,W)
```

2. To add a saved-diskfile-pattern record for all files in subvolume $A.B:

```
ADD SAVED-DISKFILE-PATTERN $A.B.*, ACCESS *.* (R,W)
```

3. To add a saved-diskfile-pattern record for every disk file named FILE followed by one alphanumeric character that is in a subvolume REPORT on every volume beginning with $DATA:

```
ADD SAVED-DISKFILE-PATTERN $DATA*.REPORT.FILE?
```

ALTER SAVED-DISKFILE-PATTERN

ALTER SAVED-DISKFILE-PATTERN Examples

1. To alter a saved-diskfile-pattern record to enable read and write access for super ID:

```
ALTER SAVED-DISKFILE-PATTERN $DATA.APLOGS.LOG*, &
ACCESS SUPER.SUPER (R,W)
```

2. To alter all the saved-diskfile-pattern records that match $DATA*.APLOGS.LOG*:

```
ALTER SAVED-DISKFILE-PATTERN $DATA*.APLOGS.LOG*, ALL, &
ACCESS SUPER.SUPER (R,W)
```

This command alters the saved-diskfile-pattern for all matching patterns. For example, if the following patterns exist, they are altered:

```
$DATA01.APLOGS.LOGAPR*
$DATA1.APLOGS.LOG*
$DATA123.APLOGS.LOG?
$DATA.APLOGS.LOG????
$DATABLE.APLOGS.LOGON?1A
```

DELETE SAVED-DISKFILE-PATTERN

DELETE SAVED-DISKFILE-PATTERN Examples

1. To delete the saved-diskfile-pattern $ABC.*.*:

   ```
   DELETE SAVED-DISKFILE-PATTERN $ABC.*.*
   ```

2. To delete all saved-diskfile-patterns that match the search pattern $ABC.*.*:

   ```
   DELETE SAVED-DISKFILE-PATTERN $ABC.*.*, ALL
   ```

3. To delete all saved-diskfile-patterns that match the search pattern $AB*.D*.*F:

   ```
   DELETE DISKFILE-PATTERN $AB*.D*.*F, ALL
   ```

FREEZE SAVED-DISKFILE-PATTERN

FREEZE SAVED-DISKFILE-PATTERN Example

To freeze all saved-diskfile-pattern protection records that specify a subvolume name beginning with the characters TEST:

```
FREEZE SAVED-DISKFILE-PATTERN $*.TEST*.*, ALL
```

INFO SAVED-DISKFILE-PATTERN

INFO SAVED-DISKFILE-PATTERN Examples

1. To display the saved-diskfile-pattern $DATA.*TEST.*:

   ```
   =INFO SAVED-DISKFILE-PATTERN $DATA.*TEST.*
   ```

   The display appears as:

   ```
   LAST-MODIFIED  OWNER  STATUS  WARNING-MODE
   $DATA.*TEST
   *              255,255        28SEP04, 5:44 THAWED OFF

   \KONA.PROD.CARLY R
   \KONA.TEST.JIMMY R,W
   GROUP TEST       R,W,E,P,C
   ```

```
GROUP \KONA.TEST R
\*.*.*           R
```

2. To display the saved-diskfile-pattern $DATA.*TEST.*, DETAIL:

```
=INFO SAVED-DISKFILE-PATTERN $DATA.*TEST.*,DETAIL
```

The display appears as:

```
               LAST-MODIFIED   OWNER    STATUS WARNING-MODE
$DATA.*TEST
               * 28SEP04, 5:44 255,255 THAWED      OFF

\KONA.PROD.CARLY R
\KONA.TEST.JIMMY R,W
GROUP TEST       R,W,E,P,C
GROUP \KONA.TEST R
\*.*.*           R

AUDIT-ACCESS-PASS = NONE       AUDIT-MANAGE-PASS = NONE
AUDIT-ACCESS-FAIL = NONE       AUDIT-MANAGE-FAIL = NONE

      CREATION                LAST-MODIFIED

USER NAME SUPER.SUPER           testman
USER TYPE USER (ID 255,255)     ALIAS (ID 164,255)
USER NODE LOCAL                 LOCAL
TIMESTAMP 28SEP2004, 05:28:48.870  28SEP2004, 05:44:22.588
```

3. To display the saved-diskfile-pattern protection records for all volumes starting with “$DATA” with subvolumes starting with “PROD”:

```
INFO SAVED-DISKFILE-PATTERN $DATA*.PROD*.*, ALL
```

4. To display multiple saved-diskfile-pattern protection records with warning-mode enabled:

```
INFO SAVED-DISKFILE-PATTERN $*.*.*, ALL, WHERE WARNING-MODE
```

RESET SAVED-DISKFILE-PATTERN

RESET SAVED-DISKFILE-PATTERN Example

To reset WARNING-MODE to its predefined value (OFF) for saved-diskfile- patterns:

```
RESET SAVED-DISKFILE-PATTERN WARNING-MODE
```

SET SAVED-DISKFILE-PATTERN

SET SAVED-DISKFILE-PATTERN Example

To set the default owner to PROD.DBA:

```
SET SAVED-DISKFILE-PATTERN OWNER PROD.DBA
```

SHOW SAVED-DISKFILE-PATTERN

SHOW SAVED-DISKFILE-PATTERN Example

To display the current default values for the diskfile pattern:

```
SHOW SAVED-DISKFILE-PATTERN
```

THAW SAVED-DISKFILE-PATTERN

THAW SAVED-DISKFILE-PATTERN Example

To thaw all the saved-diskfile-pattern records that have a volume name ending in the letter P:

```
THAW SAVED-DISKFILE-PATTERN $*P.*.*, ALL
```

A Guardian File Security

The Guardian environment automatically provides a basic level of security for all disk files. You can manipulate Guardian file security through TACL and FUP. In particular, you can:

- Display your default security string with the TACL WHO command
- Change your default security string with the DEFAULT program
- Display the security string for a specific file with the TACL FILEINFO command or the FUP INFO command
- Change the security string for a file you own with the FUP SECURE command

You cannot change the security string for files that are protected by the Safeguard subsystem.

This appendix summarizes Guardian security for disk files and reviews the methods you can use to verify and change that security. For complete details on these subjects, refer to the *Guardian User's Guide*.

File Security String

Each disk file has an owner and a Guardian security string. You are the owner of a file if you create that file. When you create a file, it is automatically given the default security string defined for you. You can change your default security string or specify a different security string for an individual file. In addition, you can transfer ownership of a file to another user.

The security string specifies a level of security for each of four types of access to a disk file: read (R), write (W), execute (E), and purge (P). These types of access are similar to the Safeguard authorities defined in an access control list. However, there is no owner authority in a security string. Although you can transfer ownership of a disk file under Guardian security, you cannot share ownership.

The security string consists of four characters. Each position in the string sets the security for one of four disk file operations:

```
RWEP
```

- The first position (R) specifies who can read the file.
- The second position (W) specifies who can write to the file.
- The third position (E) specifies who can execute the file.
- The fourth position (P) specifies who can purge the file.

In each position, you can use one of the seven codes shown in Table A-1 to specify who can perform the associated operation. These codes typically designate groups of users, unlike Safeguard file security, in which individual users can be given specific levels of security.

Table A-1. Guardian File Security Settings

Code	Access
O	Only the owner of the file on the local system can access the file.
U	Only the owner of the file on the local system or on the network can access the file.
G	Any member of the owner's group on the local system can access the file.
C	Any member of the owner's group, either on the local system or on the network, can access the file.
A	Any user on the local system can access the file.
N	Any user on the local system or on the network can access the file.
–	Only the local super ID can perform the designated operation.

For example, a security string of AUAU specifies that any local user can read and execute the file, but only the owner, anywhere on the network, can write to or purge the file.

Displaying Default Security

To display your current default security string, enter WHO at the TACL prompt:

For example, the following command produces a display that includes your default security string:

```
3> WHO
```

Unless you change this default security string, it applies to all files you create.

Changing Default Security

You can change your default security string with the DEFAULT program. When you specify a new default security string, you must enclose it in quotes. For example, the following DEFAULT command changes the default security string to AGOG:

```
4> DEFAULT, "AGOG"
```

When you change your default security string or any default, you are changing the default that will be saved at the end of your current session. Under normal circumstances, the new default value does not take effect until you log off and then log on again to start a new session. If you want the new values to take effect immediately, enter the VOLUME command with no parameters:

```
5> VOLUME
```

Displaying File Security

You can examine the security string for a specific file or all files in your current subvolume. Both the TACL FILEINFO command and the FUP INFO command display security strings for your files.

For example, enter the following command to examine the security string for every file in your current subvolume:

```
6> FILEINFO
```

Another way to examine the security string for every file is to use the FUP INFO command:

```
7> FUP INFO *
```

Similarly, you can display the security string for a specific file by including the file name:

```
8> FILEINFO ACCT4
```

You can also include a file name in the FUP INFO command:

```
9> FUP INFO ACCT4
```

If you use these commands to examine the security string for a file that has been added to the Safeguard database, the security string appears as "****" (four asterisks).

Changing a File's Security String

After you have created a file, you can change its security string with the FUP SECURE command. For example, to change the security setting for the file acct4 to NUNU:

```
10> FUP SECURE ACCT4, "NUNU"
```

If a file has been added to the Safeguard database, you cannot change its security string because the Safeguard software controls access to the file.

Sample Procedures

The following procedures illustrate two different ways to set the security string to GOGO for two disk files named acct4 and acct5. These procedures are intended to serve as basic examples. You could use other combinations of commands and techniques, as described in the *Guardian User's Guide*.

Using the DEFAULT Program to Set the Security String

The first method creates two new files using the default security string. It assumes that you must change the default string before creating the new files.

1. Use the TACL WHO command to check your current default security string:

```
1> WHO
Home terminal: $HOLDEN
TACL process: \MEL.$G633
Primary CPU: 8 (TXP)    Backup CPU: 9 (TXP)
Default Segment File: $BILLS.#5582
  Pages allocated: 12  Pages Maximum: 1024
  Bytes Used:18924 (0%)  Bytes Maximum: 2097152
Current volume: $BILLS.HOLDEN
Saved volume:   $BILLS.HOLDEN
Userid: 7,124  Username: PAY.HOLDEN  Security: "NUNU"
2>
```

2. Execute the DEFAULT command to change the default security string:

```
2> DEFAULT, "GOGO"
THE DEFAULT <file-security> HAS BEEN CHANGED TO "GOGO"
3>
```

3. Log off to save the new default and then log on again. (Or enter a VOLUME command with no parameters.)

4. Create the new files:

```
1> FUP CREATE ACCT4
CREATED - $BILLS.HOLDEN.ACCT4
2> FUP CREATE ACCT5
CREATED - $BILLS.HOLDEN.ACCT5
3>
```

5. Verify the security string for each file.

```
3> FILEINFO ACCT4

$BILLS.HOLDEN

              Code      EOF  Last Modification   Owner   RWEP   PExt  SExt
ACCT4            0        0   5-May-93 10:41:02   7,124 "GOGO"     2     2
4> FILEINFO ACCT5

$BILLS.HOLDEN

              Code      EOF  Last Modification   Owner   RWEP   PExt  SExt
ACCT4            0        0   5-May-93 10:41:02   7,124 "GOGO"     2     2
5>
```

Changing the Security String Through FUP

This method uses FUP to create the files and change their security strings. It does not alter the default string.

1. Create the new files:

```
1> FUP
File Utility Program - T9074C31 - (02AUG93)    System \MEL
Copyright Tandem Computers Incorporated 1981, 1983, 1985-1993
-CREATE ACCT4
CREATED - $BILLS.HOLDEN.ACCT4
-CREATE ACCT5
CREATED - $BILLS.HOLDEN.ACCT4
-
```

2. Change the security string for each file:

```
-SECURE ACCT4, "GOGO"
-SECURE ACCT5, "GOGO"
-
```

3. Verify the security strings and then exit from FUP:

```
-INFO ACCT4
                CODE            EOF   LAST MODIF  OWNER RWEP   TYPE   REC
BLOCK
$BILLS.HOLDEN
 ACCT4                          0        10:52  7,124 GOGO
-INFO ACCT5
                CODE            EOF   LAST MODIF  OWNER RWEP   TYPE   REC
BLOCK
$BILLS.HOLDEN
 ACCT5                          0        10:52  7,124 GOGO
-EXIT
2>
```

B Protecting Your Terminal

As a general user, you need to take certain precautions to protect your terminal and prevent unauthorized access to your system. Namely, you must ensure the secrecy of your password, and you should log off or lock your terminal if you plan to leave it unattended.

Protecting Your Password

To log on to your system, you identify yourself by entering your user name (or user ID) and password. If someone else tries to log on with your user ID or user name, that person must also enter the correct password. Because your user ID and user name are not private, it is important for you to protect the secrecy of your password.

When you are given your initial password, you should change it immediately. If you do not have an initial password, you should create one for yourself. If the Safeguard subsystem is running on your system, you can change your password when you log on. To change a password or create an initial one after you log on, use the PASSWORD program as described in the *Guardian User's Guide*.

With the Safeguard software, you might also be required to change your password at regular intervals. In addition, there might be a restriction on the frequency with which you can change your password. To check for these conditions, display your user authentication record as described in Section 6, Obtaining User and Alias Information. If the Safeguard subsystem is running on your system, you are notified of your password expiration date when you log on.

In general, when you change your password, select one that is easy for you to remember but difficult for someone else to guess. To minimize the risk of discovery, avoid writing down your password.

When you choose a password, do not select a word that could be easily associated with you, such as your nickname. Long passwords are usually better than short passwords, but passwords cannot exceed eight characters. Good passwords frequently contain a mixture of uppercase and lowercase characters.

Logging Off

Always log off or lock your terminal when you plan to leave it unattended. If you do not log off and someone uses your terminal to manipulate sensitive files, an audit trail might implicate you as the intruder.

In addition, you should log off before you allow someone else to use your terminal. TACL allows someone else to log on to your terminal even if you are not logged off. Even though this second log on causes you to be logged off automatically, TACL retains your currently defined variables, such as macros and function-key definitions. Also, several pages of previously displayed screen information might still be available to the new user. This situation might present a potential security breach.

As a final precaution in logging off, always clear your screen. Usually, TACL is configured to handle this automatically. If your terminal screen is not cleared automatically when you log off, be sure that no sensitive data is left on the screen.

C SAFECOM Command Syntax

This appendix summarizes the syntax of the SAFECOM commands presented in this manual. The commands are listed in alphabetical order.

In every command that manages a system object, *object-type* can be omitted if it is the current assumed object type.

Remember that SAFECOM reserved words can be abbreviated. Typically, a reserved word can be abbreviated to its first three characters unless a longer abbreviation is necessary to distinguish between similar reserved words.

For a more thorough coverage of syntax, including examples, see the *Safeguard Reference Manual*.

Common Syntax Elements

The following syntax elements are common to many SAFECOM commands:

user-spec

can be any of the following:

```
group-name . member-name
group-name . *
* . *
group-num , member-num
group-num , *
* , *
```

net-user-spec

can be any of the following:

```
[\node-spec.]group-name . member-name
[\node-spec.]group-name . *
[\node-spec.]* . *
[\node-spec.]group-num , member-num
[\node-spec.]group-num , *
[\node-spec.]* , *
```

node-spec

has the form:

```
* | node-name
```

node-name

specifies the system name.

object-type

can be any of the following:

```
DISKFILE
DISKFILE-PATTERN
SUBVOLUME
PROCESS
SUBPROCESS
```

(DISKFILE can also be spelled as DISCFILE.)

object-list

has the following form:

```
{   object-spec                          }
{ ( object-spec [ , object-spec ] ... ) }
```

object-spec

for disk files, can be either a fully or a partially qualified disk-file name or a disk-file set.

for diskfile patterns, can be fully qualified diskfile-pattern name or set.

for subvolumes, can be either a fully or a partially qualified subvolume name or a subvolume set.

for processes, can be either a fully or a partially qualified process name.

for subprocesses, can be either a fully or a partially qualified subprocess name.

object-name

is the name of an existing protected object of the same type as *object-type*. It is used in the LIKE clause.

object-attribute

is any valid security attribute for the appropriate object type of the command. A complete list of object attributes appears under the SET *object-type* command.

SAFECOM Command Syntax

The following diagrams show the syntax of each SAFECOM command presented in this manual.

```
ADD  object-type  object-list [ , ]

   [ LIKE object-name | object-attribute ]

   [ , object-attribute  ] ...
```

```
ALTER  object-type  object-list [ , ]

   { LIKE object-name | object-attribute }

   [ , object-attribute ] ...
```

```
ASSUME [ object-type ]
```

```
DELETE  object-type  object-list
```

```
DISPLAY command [ , command ] ...
```

command is one of the following DISPLAY commands:

```
[ AS ] COMMANDS [ ON | OFF ]
DETAIL [ ON | OFF ]
HEADERS [ ON | OFF | ONCE ]
PROMPT [ prompt-item ]
       [ ( prompt-item [ , prompt-item ] ) ... ]
USER [ AS ] { NAME | NUMBER }
WARNINGS [ ON | OFF ]
```

prompt-item can be:

```
"string"
ASSUME OBJECTTYPE
COMMAND NUMBER
CPU
DATE
END
PROCESS NAME
PROCESS NUMBER
SUBVOLUME
SYSTEM NAME
SYSTEM NUMBER
TIME
USER NAME
USER NUMBER
VOLUME
```

```
ENV [ / OUT listfile / ] [ env-parm [ , env-parm ] ... ]
```

env-parm is one of the following:

```
SYSTEM
VOLUME
OUT
LOG
ASSUME
WARNINGS
USER
HEADERS
```

```
DETAIL
SUMMARY
```

```
EXIT
```

```
FC [ string   ]
   [ "string" ]
   [ linenum  ]
   [ -linenum ]
```

```
FREEZE  object-type  object-list
```

```
HELP [ / OUT listfile / ]   [ command-name ]
                            [ keyword      ]
                            [ COMMANDS     ]
                            [ ALL          ]
                            [  *           ]
```

```
HISTORY [ lines      ]
        [ RESET LAST ]
        [ RESET ALL  ]
```

```
INFO [ / OUT listfile / ]  ALIAS

   { alias  | ( alias [ , alias ] ... ) }

 [ [ , ] option ] [ , option ] ...
```

option is one of the following:

```
GENERAL
DETAIL
AUDIT
CI
OSS
REMOTEPASSWORD
DEFAULT-PROTECTION
GROUP
OWNER-LIST
TEXT-DESCRIPTION
WHERE expression
```

Note. The OWNER-LIST attribute is supported only on systems running G06.27 and later G-series RVUs and H06.07 and later H-series RVUs.

Note. The TEXT-DESCRIPTION attribute is supported only on systems running G06.27 and later G-series RVUs and H06.06 and later H-series RVUs.

```
INFO [ / OUT listfile / ]  object-type  object-list [ , ]
   [ display-option ] [ , display-option ]
```

```
INFO [ / OUT listfile / ]  USER
   { user-spec  | ( user-spec [ , user-spec ] ... ) }
 [ [ , ] option ] [ , option ] ...
```

option is one of the following:

```
GENERAL
DETAIL
AUDIT
CI
OSS
REMOTEPASSWORD
DEFAULT-PROTECTION
GROUP
OWNER-LIST
TEXT-DESCRIPTION
WHERE expression
```

Note. The OWNER-LIST and TEXT-DESCRIPTION attributes are supported only on systems running H06.06 and later H-series RVUs and G06.27 and later G-series RVUs.

```
LOG [ logfile ]
```

```
O[BEY] [ / OUT listfile / ] command-file
```

```
OUT [ listfile ]
```

```
RESET  object-type  [ [ , ] object-attribute-keyword ]
   [ , object-attribute-keyword ] ...  ]
```

```
SET  object-type [ , ] { LIKE object-name | object-attribute
}
   [ , object-attribute ] ...
```

object-attribute is one of the following:

```
OWNER [owner-id]
OWNER-LIST [[-]user-list]
ACCESS access-spec [ ; access-spec ] ...
AUDIT-ACCESS-PASS [audit-spec]
```

```
AUDIT-ACCESS-FAIL [audit-spec]
AUDIT-MANAGE-PASS [audit-spec]
AUDIT-MANAGE-FAIL [audit-spec]
OBJECT-TEXT-DESCRIPTION "[text]"
```

Disk files also have the following attributes:

```
LICENSE      { ON | OFF }
PROGID       { ON | OFF }
CLEARONPURGE { ON | OFF }
PERSISTENT   { ON | OFF }
TRUST        { ME | SHARED | OFF } (H-series only)
AUDIT-PRIV-LOGON { ON | OFF}
```

access-spec has the following form:

user-list [-] [DENY] *authority-list*

user-list is one of the following:

```
{   net-user-spec                              }
{ ( net-user-spec [ , net-user-spec ] ... ) }
```

authority-list is one of the following:

```
{   authority                          }
{ ( authority [ , authority ] ... ) }
{      *                               }
```

authority is one of the following:

for disk files	R[EAD], W[RITE], E[XECUTE],P[URGE], C[REATE], O[WNER]
for diskfile patterns	R[EAD], W[RITE], E[XECUTE],P[URGE], C[REATE], O[WNER]
for subvolumes	R[EAD], W[RITE], E[XECUTE],P[URGE], C[REATE], O[WNER]
for processes	R[EAD], W[RITE], C[REATE],P[URGE], O[WNER]
for subprocesses	R[EAD], W[RITE], O[WNER]

audit-spec is one of the following:

```
ALL
LOCAL
REMOTE
NONE
```

```
SHOW [ / OUT listfile / ]  object-type
```

```
SYNTAX [ ONLY ] ON | OFF
```

```
SYSTEM [ \system-name ]
```

```
THAW  object-type  object-list
```

```
VOLUME [ $volume           ]
       [ $volume.subvolume ]
       [          subvolume ]
```

```
? [ string   ]
  [ "string" ]
  [ linenum  ]
  [ -linenum ]
```

```
!  [ string   ]
   [ "string" ]
   [ linenum  ]
   [ -linenum ]
```

Note. The OWNER-LIST attribute is supported only on systems running G06.27 and later G-series RVUs and H06.07 and later H-series RVUs.

Note. The TEXT-DESCRIPTION attribute is supported only on systems running G06.27 and later G-series RVUs and H06.06 and later H-series RVUs.

Note. The AUDIT-PRIV-LOGON attribute is supported only on systems running H06.11 and later H-series RVUs and G06.32 and later G-series RVUs.

SAFECOM Command Syntax

Glossary

access control list. A list associated with an object that itemizes the subjects authorized to access that object and shows the access authorities granted to each subject.

ACL. See access control list.

alias. An alternate name for logging on to the system.

attribute. A security characteristic assigned to an object to apply special protection to that object. Examples are CLEARONPURGE and LICENSE.

audit. The Safeguard function that records attempts by subjects to access objects or gain access to the system and attempts by subjects to manage object authorization records.

audit trail. A series of audit records used in tracing the origin of audited events.

authentication. The process of verifying the identity of a user.

authentication record. A type of record maintained by the Safeguard software to validate a user's identity.

authority. An access privilege granted to a subject to access an object. Examples are READ authority and WRITE authority.

authorization. A function performed by the Safeguard software to allow a subject access to an object.

authorization record. A type of record maintained by the Safeguard software to determine the subjects granted access to an object and the security attributes to be applied to the object.

CLEARONPURGE attribute. A security attribute for disk files that causes null characters to be written over a file's residue after the file is purged.

LICENSE attribute. A security attribute for disk files that licenses nonprivileged users to run program files that contain privileged object code.

object. A system resource to which access is controlled by the Safeguard software. Examples are volumes, subvolumes, disk files, diskfile patterns, devices, and processes.

password. A character string associated with a user ID or user name and used to authenticate a user's identity.

PERSISTENT attribute. A Safeguard security attribute for disk files that causes the authorization record for a file to be retained if the file itself is purged.

primary owner. The owner of a Safeguard protection record whose user ID appears as the OWNER attribute in the record.

PROGID attribute. A security attribute for disk files that contain object code. When PROGID is ON, the user running the process obtains the privileges of the file's primary owner.

SAFECOM. The Safeguard command interpreter.

Secondary owners. The owners of a Safeguard user or alias authentication record, in addition to the primary owner, whose user IDs appear as the OWNER-LIST attribute in the record.

subject. A logged-on user.

TRUST attribute. A performance attribute for program files. Setting TRUST to ME or SHARED indicates Safeguard that the program file can be trusted to not access I/O buffers during process execution, resulting in improved performance. The TRUST attribute is valid only on H-series systems.

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