z/OS
2.5

DFSMShsm Managing Your Own Data

SC23-6870-50

Note

Before using this information and the product it supports, read the information in “Notices” on page 239.

This edition applies to Version 2 Release 5 of z/OS® (5650-ZOS) and to all subsequent releases and modifications until otherwise indicated in new editions.

Last updated: 2023-06-26

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About this document

This document helps you manage your data through the use of IBM® z/OS DFSMShsm. This document introduces you to DFSMShsm and what you use DFSMShsm for. The basics of security, as it relates to DFSMShsm, is explained along with the fundamental concepts of space and availability management and how to use DFSMShsm user commands.

For information about the accessibility features of z/OS, for users who have a physical disability, see Appendix C, "Accessibility," on page 237.

Who should read this document

This document is intended for any one who manages their own data.

Major divisions of this document

This document is divided into the following parts:

Part 1, "Introduction," on page 1 describes the major functions of DFSMShsm and introduces the terminology used with DFSMShsm.

Part 2, "DFSMShsm user tasks," on page 43 describes the tasks you can perform on your data sets using DFSMShsm user commands, and explains how to perform those commands.

Part 3, "DFSMShsm application programming interface," on page 193 describes the user macros you can use from application programs to issue DFSMShsm commands.

Appendix A, "DFSMShsm and ISMF line operator reference summary," on page 229 describes the DFSMShsm/ISMF line operators. The tables show the functions and give the minimum abbreviation that you can use when entering line operators in the foreground.

Appendix B, "Return codes from DFSMShsm commands," on page 231 describes the return codes issued by DFSMShsm after processing DFSMShsm commands or requests from DFSMShsm user macros.

Required product knowledge

You should be familiar with the basic concepts of storage management, managing your personal data, and basic diagnostic techniques. You are presumed to have a background in using TSO, understanding of z/OS concepts and terms, and to understand the information in *z/OS DFSMS Introduction*.

z/OS information

This information explains how z/OS references information in other documents and on the web.

When possible, this information uses cross-document links that go directly to the topic in reference using shortened versions of the document title. For complete titles and order numbers of the documents for all products that are part of z/OS, see *z/OS Information Roadmap*.

To find the complete z/OS library, go to IBM Documentation (www.ibm.com/docs/en/zos).

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Summary of changes

This information includes terminology, maintenance, and editorial changes. Technical changes or additions to the text and illustrations for the current edition are indicated by a vertical line to the left of the change.

Note: IBM z/OS policy for the integration of service information into the z/OS product documentation library is documented on the z/OS Internet Library under IBM z/OS Product Documentation Update Policy (www-01.ibm.com/servers/resourcelink/svc00100.nsf/pages/ibm-zos-doc-update-policy?OpenDocument).

Summary of changes for z/OS Version 2 Release 5 (V2R5)

Summary of changes for z/OS Version 2 Release 5 (V2R5)

New

The following content is new.

May 2023 Refresh

New option is added to hbackup. For more information, see “Options” on page 76, “Listing UNIX file entries from the backup control data set” on page 136 and “Format of the hbackup command” on page 76.

October 2022 Refresh

The CPDCLOUD field is added. For more information, see “ARCXTRCT: Extracting data from DFSMShsm” on page 215.

Prior to June 2022 Refresh

The Common Recall Queue (CRQ) is added. For more information, see “ARCXTRCT: Extracting data from DFSMShsm” on page 215.

Changed

The following content is changed.

February 2023 Refresh

- Updates were made to “Explanation” on page 65, “EXCLUDE and EXCLUDEF: Specifying files or directories to be excluded from processing” on page 64, “EXCLUDE and EXCLUDEF: Specifying files or directories to be excluded from processing” on page 177, and “Explanation” on page 177 . (APAR OA60586, which also applies to z/OS V2R3 and V2R4).

April 2022 Refresh

- For APAR OA60564, which also includes z/OS V2R3, and z/OS V2R4, Chapter 16, “HBDELETE: Deleting backup versions,” on page 87 and “Using the UNIX shell (hbdelete)” on page 95 are updated.

Prior to February 2022 Refresh

- For APAR OA60103, “NEWNAME: Specifying a backup version of a specified data set” on page 67 and “Options” on page 76 are updated.

Summary of changes for z/OS Version 2 Release 4 (V2R4)

Summary of changes for z/OS Version 2 Release 4 (V2R4)

The following content is new.

November 2020 refresh

- Information from APAR OA52703, support for UNIX file backup, was added. The updates includes the following new commands, options, and parameters:
  - New commands:
    - Chapter 13, “HALTERU: Changing UNIX file parameters,” on page 53
    - Chapter 15, “HBACKDSU: Backing up data sets,” on page 85
    - Chapter 17, “HBDELETU: Deleting backup versions,” on page 97
    - Chapter 19, “HCANCELU: Canceling a queued request on a Filemode DFSMShsm host,” on page 103
    - Chapter 22, “HLISTU: Listing information from the BCDS and MCDS,” on page 143
    - Chapter 25, “HQUERYU: Listing pending requests on a Filemode DFSMShsm host,” on page 159
    - Chapter 28, “HRECOVU: Recovering data sets or UNIX files,” on page 191
  - New parameters for the HBACKDS command:
    - “DELETE: Specifying whether to delete the UNIX file after a successful backup” on page 64
    - “EXCLUDE and EXCLUDEF: Specifying files or directories to be excluded from processing” on page 64
  - New options for the **hbackup** command (see “Using UNIX shell commands (hbackup)” on page 75:
    - The `-d` option deletes UNIX files after a successful backup.
    - The `-e` option excludes files from processing.
  - New parameters for the HRECOVER command:
    - “EXCLUDE and EXCLUDEF: Specifying files or directories to be excluded from processing” on page 177
    - “NEWDIR: Recovering files to a different directory” on page 180
  - New options for the **`hrecover`** command (see “Using the UNIX shell (exrecover)” on page 186:
    - The `-e` option excludes files from processing.
    - The `-N` option specifies a new directory for the recovered files.

Prior to the November 2020 refresh

- Information from APAR OA57454, support for the `delete` keyword when backing up files was added. See the following sections:
  - “HBACKDS command syntax for UNIX files” on page 60
  - “DELETE: Specifying whether to delete the UNIX file after a successful backup” on page 64
  - “Format of the hbackup command” on page 76
  - “Deleting expired backup versions of UNIX files” on page 81
- Information from APAR OA52703, support for UNIX Files backup and recover, has been added. See the following sections:
  - Chapter 12, “HALTERDS: Changing data set parameters,” on page 45
  - Chapter 14, “HBACKDS: Backing up data sets,” on page 55
  - Chapter 16, “HBDELETE: Deleting backup versions,” on page 87
  - Chapter 21, “HLIST: Listing information from the BCDS and MCDS,” on page 111
  - Chapter 24, “HQUERY: Listing pending requests,” on page 153
  - Chapter 27, “HRECOVER: Recovering data sets or UNIX files,” on page 169
  - Part 3, “DFSMShsm application programming interface,” on page 193
  - “ARCHBACK: Backing up a specific data set” on page 198

- “ARCHBDEL: Deleting a backed up version of data sets” on page 203
- “ARCHRCOV: Recovering a data set” on page 211

The following content is changed.

June 2021 refresh

- In support of APAR OA51622, explanation for CLOUD: Specifying migration of a data set directly to Cloud storage. For more information, see “Explanation” on page 150.

Prior to the November 2020 refresh

- For LCP infrastructure, all references to *cloud construct* were changed to *network connection construct*. All references to *cloudname* and *SMScloudname* were changed to *cloud_network_connection_name*.

Summary of changes for z/OS Version 2 Release 3 (V2R3)

Summary of changes

New

The HMIGRATE command has new options. Refer to Chapter 23, “HMIGRATE: Migrating data sets,” on page 145.

The ARCHMIG macro has new options. Refer to “ARCHMIG: Migrating data sets” on page 206.

Part 1. Introduction

This topic describes the major functions of DFSMShsm and introduces the terminology used with DFSMShsm.

Chapter 1. Introduction to DFSMShsm

DFSMShsm is a licensed program that automatically performs space management and availability management in a storage device hierarchy. DFSMShsm makes sure that space is available on your Direct Access Storage Device (DASD) volumes so that you can extend your old data sets and allocate new ones. DFSMShsm also makes sure that backup copies of your data sets or UNIX files are always available if your working copies are lost or corrupted.

DFSMShsm terminology includes the following:

Term
Meaning

Space management
Functions that ensure space is available for extending and allocating data sets.

Availability management
Functions that make backup copies available.

Authorized user
An authorized user is someone whom the computing center has authorized to issue all of the DFSMShsm commands. Authorized users can issue commands that affect other users data sets.

Unauthorized user
An unauthorized user is someone who can issue only a limited subset of the DFSMShsm commands, called the unauthorized commands. Unauthorized users can affect only their own data sets.

What is space management?

Space management is a process that ensures that there is enough storage space on user volumes for your data.

Space management performs two functions that are visible to you:

- It *expires* data sets that have passed their expiration dates. For non-SMS-managed data sets, you specify the expiration date when you allocate the data set. For SMS-managed data sets, the expiration date is controlled by the management class associated with the data set. To find out if your data sets are SMS-managed and what management classes are associated with your data sets, ask your computing center.
- It *migrates* data sets that have not been used within a specified time. A migrated data set is one that has been moved to a different volume (either DASD or tape) in a special form that saves space on the volume. You cannot use a migrated data set directly. However, as soon as you refer to the data set, either in an interactive or batch use, DFSMShsm returns the data set to a volume that you are authorized to use and in the form in which it originally existed.

You can recognize that a data set has been migrated by the term MIGRAT in the volume field when you list your cataloged data sets. Only cataloged data sets can be migrated.

The amount of time that a data set remains unused before it can migrate automatically is the same for all data sets on a volume when they are non-SMS-managed. For SMS-managed data sets, the management class determines when the data sets are eligible to automatically migrate. Your computing center can tell you what these values are.

Migration occurs to either of two levels: migration level 1 or migration level 2. Migration level 1 (ML1) volumes are always DASD. Migration level 2 (ML2) volumes can be either DASD or tape. Your computing center controls which volumes are to be used as migration volumes.

DFSMShsm creates available space on user volumes by:

- Freeing over allocated space
- Deleting expired data sets

- Moving eligible data sets that you have not used recently to a lower-cost-per-byte storage device

DFSMShsm records the location of each data set that it moves in a control data set.

What is availability management?

Availability management is a process that ensures that there is a current backup version of your data sets from which you can recover your data if it is damaged or accidentally deleted.

The automatic parts of availability management are invisible to you. DFSMShsm automatically makes dumps of complete volumes (that is, it backs up the entire allocated space of a volume) and backup copies of changed data sets. The backup copies of changed data sets are known as incremental backup versions. These dumps and backup copies are made on a regular schedule. When you need to retrieve a backup copy, the copy is there for you. Your computing center can tell you the schedule for making dumps and backup copies.

The feature that DFSMShsm provides is retrieval of your own backup copies. Unless you tell it to do something else, DFSMShsm selects the latest copy that you can retrieve. (Some computing centers may not allow you to retrieve a backup copy from a volume dump. Therefore, you might be able to get only the latest incremental backup version.) Your computing center can tell you if you can get backup copies from dumps. DFSMShsm automatically copies new and changed data sets to DASD or tape. DFSMShsm also dumps all the data sets on DASD volumes to tape volumes.

What is a storage device hierarchy?

A storage device hierarchy consists of a group of storage devices that have different costs for storing data, different amounts of data stored, and different speeds of accessing the data.

DFSMShsm uses the following three-level storage device hierarchy for space management:

- Level 0, including DFSMShsm-managed storage devices at the highest level of the hierarchy, contains data directly accessible to you.
- Level 1 contains data sets that DFSMShsm has moved from level 0 volumes.
- Level 2 contains data sets that DFSMShsm has moved from level 1 or level 0 volumes.

Storage devices at the lower levels of the hierarchy, level 1 and level 2, contain data that DFSMShsm has compressed and optionally compacted into a format that you cannot use. Devices at this level provide lower-cost-per-byte storage and usually slower response time.

Where does DFSMShsm store my data?

DFSMShsm stores data in a device-independent format so it can move data to any of the following devices:

- Tape for the 3480, 3480X, 3490, and 3590-1 Magnetic Tape Subsystems.
- DASD for Models 3380, 3390, and 9345.

DFSMShsm supports the following volume types:

- **Level 0 volumes** are volumes containing data sets that are directly accessible to you and the jobs you run. **DFSMShsm-managed volumes** are those level 0 volumes that are managed by the DFSMShsm automatic functions.

  Level 0 volumes, and DFSMShsm-managed volumes, can be any DFSMShsm-supported DASD. These volumes must be mounted and online when you refer to them with DFSMShsm commands.
- **Migration level 1 volumes** contain data sets that DFSMShsm moved from level 0 volumes and contain the backup versions that were created from a DFSMShsm BACKDS or HBACKDS command.

  Migration level 1 volumes are DFSMShsm-supported DASD on which DFSMShsm maintains your data in DFSMShsm format. Normally, these volumes are permanently mounted and online.

- **Migration level 2 volumes** are volumes containing data sets moved from migration level 1 volumes or level 0 volumes.

  Migration level 2 volumes are DFSMShsm-supported tape, or DASD, on which DFSMShsm maintains your data in DFSMShsm format. Normally, these volumes are not mounted or online.
- **Daily backup volumes** are volumes containing the most current backup versions of data sets copied from level 0 volumes. These volumes may also contain earlier backup versions of these data sets.

  Daily backup volumes are DFSMShsm-supported tape, or DASD, on which DFSMShsm maintains your data in DFSMShsm format. Normally, these volumes are not mounted or online.
- **Spill backup volumes** are volumes containing earlier backup versions of data sets, which were moved from DASD backup volumes.

  Spill backup volumes are DFSMShsm-supported tape, or DASD, on which DFSMShsm maintains your data sets in DFSMShsm format. Normally, these volumes are not mounted or online.
- **Dump volumes** are DFSMShsm-owned magnetic tape volumes. When a volume is dumped, DFSMShsm invokes DFSMSdss to write a copy of the entire allocated space of that volume on a dump volume.

  Dump volumes are DFSMShsm-supported tape. Image copies of volumes are produced by the full volume dump function of DFSMSdss, which is invoked by DFSMShsm.
- **Aggregate backup volumes** contain copies of the data sets of a user-defined group of data sets, along with control information for those data sets. These data sets and their control information are stored as a group so that they can be recovered (if necessary) as an entity by an aggregate recovery process.

  Aggregate backup volumes are DFSMShsm-supported tape and are normally not mounted or online.
- **Fast replication target volumes** contain the fast replication backup copies of DFSMShsm-managed volumes. Fast replication target volumes are contained within SMS copy pool backup storage groups.

What is the storage management subsystem?

DFSMShsm is a member of the DFSMS product family. DFSMS, along with resource access control facility (RACF®, a component of the Security Server for z/OS) and interactive storage management facility (ISMF) licensed programs, provides a system-managed storage environment freeing the user of many time-consuming storage tasks.

The Storage Management Subsystem (SMS) is part of DFSMS. SMS changes the storage management approach from user-managed volumes to SMS-managed data sets residing in SMS-managed storage groups. The system, rather than the user, determines data placement and handles data backup, movement, space, and security.

SMS provides the following storage classes and groups, which are customized by the storage administrator to fit the system environments and policies:

- **Data class**: A list of allocation attributes that the system uses for the creation of data sets.
- **Storage class**: A list of storage performance and availability service requests.
- **Management class**: A list of data set migration, backup, and retention attributes that DFSMShsm uses to manage storage at the data set level.
- **Storage group**: A list of real DASD volumes, or a list of serial numbers of volumes that no longer reside on a system but that end users continue to refer to in their JCL.

Storage administrators also customize SMS automatic class selection (ACS) routines, which automatically assign the SMS classes and storage groups to data sets. This allows the user to create data sets by providing only a small amount of information through ISMF panels.

Because the SMS management class defines the data set migration, backup, and retention parameters for each data set that is SMS-managed, DFSMShsm works with SMS, using the SMS attributes, to provide space and availability management.

There are some differences in the way in which DFSMShsm works in an SMS environment as opposed to a non-SMS environment. Some of those differences are visible to the user when entering explicit

commands, as certain commands and parameters do not apply to SMS-managed data sets. Those differences are defined for the user in the "DFSMShsm User Tasks" section of this publication.

Chapter 2. What you do with DFSMShsm

Although DFSMShsm performs most of its functions automatically, you may at times want to perform some of the functions for your data sets by command. DFSMShsm provides a set of commands that unauthorized users can issue to manage their own data sets. SMS provides controls in the management classes that allow or disallow management of data sets by command. If your data sets are associated with a management class that disallows space management or availability management by command, you cannot issue these commands for those data sets. In addition, DFSMShsm provides a command that authorized users can use to issue DFSMShsm commands from TSO.

Many computing centers use security programs to protect users data sets from being deleted, changed, or read by unauthorized people. DFSMShsm honors both password and RACF protection for data sets.

DFSMShsm provides several ways to perform its tasks but not all ways can be used for every task.

- Using interactive storage management facility (ISMF) panels
- Issuing commands through TSO
- Issuing user macros
- Using the inline backup facility

You can use DFSMShsm to perform the following tasks for your data sets:

- Back up a data set
- Change the data set parameters that affect backup for a particular data set
- Condense the data set. When you condense a data set, you release excess allocated space in a sequential data set or remove all unused space or invalid data from a partitioned data set.
- Cancel a request for DFSMShsm services
- Delete backup versions of a data set
- Delete a migrated data set
- Free storage in the common service area (CSA)
- List DFSMShsm information about your data sets
- Migrate a data set
- List information about your requests for DFSMShsm services.
- Recall a data set
- Recover a data set
- Send an authorized command to DFSMShsm

Chapter 3. Security

DFSMShsm maintains the security of your data sets through the resource access control facility (RACF) or through password protection. Operating as an authorized MVS™ task, DFSMShsm can manage data sets automatically regardless of their RACF or password protection.

DFSMShsm maintains the security of DFSMShsm commands through the use of RACF FACILITY class profiles.

What is RACF protection?

RACF is a program that protects data sets from unauthorized access by enabling you to define who can access your data sets and what functions they can perform on the data sets. RACF uses the information in a data set profile to determine whether a user is authorized to access the data set.

You can protect data sets with either separate RACF generic data set profiles or RACF discrete data set profiles. A RACF generic data set profile describes one or more data sets that have a similar name structure. A RACF discrete data set profile describes a specific data set on a particular volume.

DFSMShsm optionally creates a backup profile for the most recent backup version of a cataloged data set if the data set was protected with a RACF discrete profile at the time of the backup. DFSMShsm maintains only one backup profile for all backup versions of the cataloged data set. When all backup versions of the data set are scratched, the related backup profile is also scratched.

If the data set had a RACF discrete profile when backed up, profile recovery will be done if DFSMShsm finds out that the profile no longer exists when recovery is attempted.

If the data set had a RACF discrete profile when backed up and you specify NEWNAME, DFSMShsm creates a RACF discrete profile for the new name data set.

The following table lists the level of RACF resource access authority that you need to access and perform the DFSMShsm function on a RACF-protected data set. If you are not authorized to manipulate the data, DFSMShsm fails the command.

DFSMShsm User Command	**DFSMShsm Function**	**RACF Resource Access Authority Required**
HALTERDS	Changes the backup frequency and the number of backup versions kept for one or more data sets. Cannot be used on SMS-managed data sets, which are controlled by the data sets management class parameters. If used on SMS-managed data sets, the command fails and an error message is issued.	ALTER
HBACKDS	Creates a backup version of one or more data sets.	UPDATE
HBDELETE	Deletes specific backup versions of one or more data sets.	ALTER
HDELETE	Deletes one or more migrated data sets.	ALTER
HMIGRATE	Migrates one or more data sets.	UPDATE
HRECALL	Recalls one or more migrated data sets.	EXECUTE

DFSMShsm User Command	DFSMShsm Function	RACF Resource Access Authority Required
HRECOVER	Recovers, without the NEWNAME parameter, a backup version of one or more data sets.	ALTER If profile recovery is necessary, you also need authority to create a RACF discrete profile for the recovered data set.
HRECOVER	Recover, with the NEWNAME parameter, a backup version of one or more data sets.	READ authority to the data set being recovered. ALTER authority to the new name data set. If profile recovery is necessary, you also need authority to create a RACF discrete profile for the new name data set.

For more information on the use of RACF, see *z/OS Security Server RACF Security Administrator's Guide*

What is password protection?

Password protection allows you to protect your data set by assigning it a password. Another user cannot read, change, or delete your data set without knowing the password.

MVS implements password protection differently for non-VSAM and VSAM data sets.

Passwords are not supported for SMS data sets or for DFSMShsm user macros.

Non-VSAM data sets

MVS stores passwords for all non-VSAM data sets in one system password data set.

DFSMShsm User Command	Password You Must Supply
HALTERDS	The password in the system password data set that allows you to write to the data set.
HBACKDS	The password in the system password data set that allows you to write to the data set.
HBDELETE	The password in the system password data set that allows you to write to the data set.
HDELETE	The password in the system password data set that allows you to write to the data set.
HMIGRATE	The password in the system password data set that allows you to write to the data set.
HRECALL	The password in the system password data set that allows you to read the data set.

DFSMShsm User Command	Password You Must Supply
HRECOVER	For the data set that you are recovering, supply the password in the system password data set that allows you to write to the data set. NEWNAME is not specified. If you specify the NEWNAME parameter, for the new name data set, supply the password in the system password data set that allows you to write to the data set.

VSAM data sets

The password for each VSAM data set is stored in a catalog record for each specific VSAM data set. Therefore, MVS maintains the VSAM passwords during DFSMShsm processing as a part of the regular catalog creation and updating.

DFSMShsm User Command	Password You Must Supply
HALTERDS	The master password of the base cluster.
HBACKDS	The master password of the base cluster.
HBDELETE	The master password of the base cluster.
HDELETE	The master password of the base cluster.
HMIGRATE	The master password of the base cluster.
HRECALL	The master password of the base cluster.
HRECOVER	If the data set to be recovered exists, supply the current master password of the base cluster. If the data set does not exist, supply the master password of the base cluster that existed when DFSMShsm backed up the data set. If you specify the NEWNAME parameter, supply the master password of the base cluster for the new name data set.

How are DFSMShsm commands protected?

DFSMShsm provides a way to protect all DFSMShsm command access through the use of RACF FACILITY class profiles. An active RACF FACILITY class establishes the security environment, and if active, each user command is protected by a RACF FACILITY class profile. Your installation's Security Administrator must give you user ID authority to the resource that represents the user command you want to use.

Chapter 4. Methods of performing tasks

DFSMShsm provides several ways to perform tasks. You can use ISMF panels to issue commands to DFSMShsm, issue DFSMShsm commands through Time Sharing Option (TSO), or use DFSMShsm user macros from portions of application programs.

This topic provides examples of using ISMF to perform tasks and explains how to use the DFSMShsm user macros.

Using ISMF to perform tasks

Interactive Storage Management Facility (ISMF) is an Interactive System Productivity Facility (ISPF) application that helps you manage data and storage interactively. DFSMShsm/ISMF line operators are used to perform tasks on a specific data set. In this section, the following topics are discussed for ISMF:

- Invoking ISMF
- Building a data set list
- Specifying line operators
- Receiving feedback from ISMF
- Entering line operator modes

The information you supply on DFSMShsm/ISMF panels is used to build TSO commands like those you would enter at your terminal. Using ISMF panels, you no longer have to remember DFSMShsm keywords or syntax. You simply fill in the values on the DFSMShsm/ISMF panels and ISMF automatically generates the DFSMShsm command.

Using ISMF panels, you can also construct a list of data about specific data sets. You identify the selection criteria to ISMF and it builds a list that fits your criteria. Because the list is formatted to provide a variety of information all in one place, you can use it to analyze and manage your data and storage more efficiently.

Invoking ISMF

How you invoke ISMF depends upon your installation. You begin by logging on to TSO and invoking ISPF.

If ISMF is installed as an option on the ISPF Master Application menu or as an option on the ISPF/PDF Primary Option menu, specify the selection option (letter or number) that corresponds to ISMF. The ISMF Primary Option menu appears, and you can begin an ISMF session. For example, in Figure 1 on page 14, you see the ISPF Master Application menu. To select ISMF, enter I (letter i) following the arrow on the command line.

```
--------------------  ISPF MASTER APPLICATION MENU  -------------------
SELECT APPLICATION ===> I_
                                                    USERID   - K665941
  1 SPF        - SPF PROGRAM DEVELOPMENT FACILITY    TIME     - 07:30
  . ...        -           ...                       TERMINAL - 3279
  . ...        -           ...                       PF KEYS  - 12
  . ...        -           ...
  I ISMF       - INTERACTIVE STORAGE MANAGEMENT FACILITY
  . ...        -           ...
  . ...        -           ...
  . ...        -           ...
  P PARMS      - SPECIFY TERMINATION PARAMETERS AND LIST/LOG DEFAULTS
  X EXIT       - TERMINATE USING LIST/LOG DEFAULTS




PRESS THE END KEY TO TERMINATE
```

Figure 1. ISPF Master Application Menu

If you want to invoke ISMF directly from TSO, issue: `ISPSTART PGM(DGTFMD01) NEWAPPL(DGT)`

The ISMF Primary Option menu appears, and you can begin an ISMF session.

Building a data set list

After invoking ISMF and choosing the data set application from the ISMF Primary Option menu, you need to build a data set list to use during the session. To do this:

1. Complete the Data Set Selection Entry panel with the values shown in Figure 2 on page 14 to generate the list from the catalog and acquire data from the VTOC for data sets that have been migrated by DFSMShsm. Verify that pages 2, 3, and 4 of the Data Set Selection Entry panel are blank. If they are not blank, you will receive the short informational message: OTHER VALUES PRESENT.

```
  Panel  Defaults  Utilities  Scroll  Help
------------------------------------------------------------------------------
                        DATA SET SELECTION ENTRY PANEL            Page 1 of 5

For a Data Set List, Select Source of Generated List  . . 2  (1 or 2)

  1  Generate from a Saved List
       List Name  . .

  2  Generate a new list from criteria below
       Data Set Name . . . USER20.*

       Specify Source of the new list  . . 2    (1 - VTOC, 2 - Catalog)
       1 Generate list from VTOC
          Volume Serial Number . . .            (fully or partially specified)
       2 Generate list from Catalog
          Catalog Name . . .
            Catalog Password . . . .            (if password protected)
          Volume Serial Number . . .            (fully or partially specified)
          Acquire Data from Volume . . . . . . . Y  (Y or N)
          Acquire Data if DFSMShsm Migrated  . . Y  (Y or N)
Command ===>
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

Figure 2. Page 1 of the Data Set Selection Entry Panel

2. Press ENTER to generate the data set list. A list that conforms to your selection criteria appears (Figure 3 on page 15). See *z/OS DFSMS Using the Interactive Storage Management Facility* for more information about building a data set list.

```
  Panel  List  Dataset  Utilities  Scroll  Help
------------------------------------------------------------------------------
                              DATA SET LIST
                                                      Entries 1-1 of 1
Enter Line Operators below:                           Data Columns 3-6 of 39

     LINE                                    ALLOC    ALLOC   % NOT  COMPRESSED
     OPERATOR          DATA SET NAME         SPACE    USED    USED   FORMAT
    ---(1)----  ------------(2)------------ --(3)--  --(4)--  -(5)-  ---(6)----
                USER20.CLIST.CLIST              46       46      0  ???
                USER20.DFP220.DGTTLIB           46       46      0  ???
                USER20.ISMF.DGTLLIB             46       46      0  ???
                USER20.ISMF.DGTPLIB             46       46      0  ???
                USER20.ISMF.DUMP              4684     4356      7  ???
                USER20.ISMF.JCL                468       46     90  ???
                USER20.ISPFILE                  46       46      0  ???
                USER20.ISPPROF                  93       93      0  ???
                USER20.SPFLOG1.LIST           2623     1311     50  ???
                USER20.TEMP.DATASET           4684       93     98  ???
    ----------  ------  -----------  BOTTOM OF  DATA  -----------  ------  ----

Command ===>                                                  Scroll ===> HALF
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

Figure 3. Data Set List Panel

Specifying line operators

After you have created a data set list and tailored it to fit your needs, you can use ISMF to perform DFSMShsm tasks. Using line operators, you can perform these tasks against entries in your list. For a list of DFSMShsm line operators, see Appendix A, “DFSMShsm and ISMF line operator reference summary,” on page 229.

Line operators work with the individual entries in a list. You enter line operators in the line operator field, column (1), next to the entry you want to affect. For example, to delete backup versions of data sets, enter the HBDELETE line operator in the line operator field next to the data set you want to delete, as shown in Figure 4 on page 15.

```
  Panel  List  Dataset  Utilities  Scroll  Help
------------------------------------------
                              DATA SET LIST

Enter Line Operators below:

     LINE
     OPERATOR          DATA SET NAME
  ---(1)----  ------------(2)------------
  HBDELETE    USER20.ISMF.JCL
```

Figure 4. Entering the HBDELETE Line Operator

ISMF displays the HBDELETE entry panel, which allows you to view and change processing options for HBDELETE.

Receiving feedback from ISMF

ISMF provides feedback for successful completion or submission of line operators and for error conditions. When a line operator is successful, ISMF inserts an asterisk (*) before the line operator in the line operator field.

If there is an error during the execution of a line operator, ISMF prefixes the line operator with a question mark (?). A short error message appears in the upper right corner of the panel.

Entering line operator modes

There are two ways to enter line operators: normal mode and last-use mode.

In *normal mode*, you enter the line operator by itself in the line operator field. ISMF displays the entry panel associated with the line operator you specify. You can then view or change the processing options on the entry panel.

In *last-use mode*, you enter the line operator followed by an equal sign in the line operator field. ISMF does not display the entry panel for the line operator. Instead, the line operator is processed with the values that were present on the entry panel the last time the line operator was executed in this, or a previous, ISMF session.

Note:

1. The HALTERDS and HBDELETE line operators can only be entered in normal mode.
2. The CONDENSE panel again displays the volume serial number and the device type where the data set resides if the CONDENSE command is reentered.

Using DFSMShsm user macros

DFSMShsm has macros available that allow you to request DFSMShsm service from your application programs. When you provide information to the macro and process it from your application program, the macro builds the required DFSMShsm control information and issues the request for DFSMShsm service. The macros are in *execute* form only. There is no *list* form provided.

The following user macros are currently supported in DFSMShsm:

- ARCFMWE frees up storage in common storage area (CSA)
- ARCHBACK backs up a specific data set
- ARCHBDEL deletes backed up versions of a data set
- ARCHDEL deletes a migrated data set
- ARCHMIG migrates a specific data set
- ARCHRCAL recalls a data set
- ARCHRCOV recovers a data set
- ARCHSEND sends a command to DFSMShsm
- ARCXTRCT extracts data from DFSMShsm

For more information on application programming interfaces or user macros, see Chapter 29, “Using DFSMShsm user macros,” on page 195.

Chapter 5. Space management

The purpose of space management is to manage DASD storage efficiently. This topic explains how DFSMShsm manages space and what commands you can issue to perform space management on your own data sets.

How does DFSMShsm manage space?

DFSMShsm manages space by:

- Freeing overallocated space
- Deleting expired data sets
- Moving eligible data sets that you have not used recently from a DFSMShsm-managed volume to a migration level 1 or migration level 2 volume

DFSMShsm can also move data sets from migration level 1 volumes to migration level 2 volumes or directly from level 0 to migration level 2 volumes. When you refer to a migrated data set, DFSMShsm automatically recalls it to a level 0 volume so you can use it.

DFSMShsm can migrate or delete data sets on volumes either automatically or by command. If you do not want to wait for automatic space management to run, you can use the DFSMShsm user command HMIGRATE to migrate one or more of your data sets. You can also use the DFSMShsm user command HDELETE to delete one or more of your migrated data sets.

DFSMShsm uses the following functions to manage space:

- Space Management
  - Automatic volume space management
    - Primary
    - Interval migration
    - On-demand migration
  - Automatic secondary space management
- Recall
  - Automatic recall
  - Command recall

Automatic volume space management and automatic secondary space management

Automatic volume and automatic secondary space management prepare the computing system for the addition of new data by freeing space on the DFSMShsm-managed volumes and DFSMShsm-owned volumes. Automatic volume space management includes automatic primary space management, interval migration, and on-demand migration.

During **automatic primary** space management, DFSMShsm performs space management on each requested DFSMShsm-managed volume at a specified time of day.

During **interval migration**, DFSMShsm ensures on an hourly basis that a specified amount of space is available on DFSMShsm-managed volumes.

During **on-demand migration**, DFSMShsm performs space management on eligible SMS-managed volumes immediately after the volume exceeds its high threshold.

During **automatic secondary** space management, DFSMShsm performs space management on eligible migrated data sets.

Recall

Recall returns a migrated data set to a user volume (level 0). If you want to recall your own migrated data sets, you can do so without knowing where your data sets reside. To provide interactive terminal users with quick access to their migrated data sets, DFSMShsm allows up to 15 concurrent recall tasks.

Automatic recall returns your migrated data set to a DFSMShsm-managed volume when you refer to it.

Command recall returns your migrated data set to a user volume when you enter the HRECALL command through an ISMF panel or by directly keying in the command.

For both automatic and command recall, DFSMShsm working with SMS invokes the automatic class selection (ACS) routines. Data sets that were not SMS-managed at the time they were migrated may be recalled as SMS-managed data sets. The ACS routines determine whether the data sets should be recalled as SMS-managed, and if so, the routines select the classes and storage groups in which the data sets will reside. The system chooses the appropriate volume for the data sets.

DFSMShsm working without SMS returns a migrated data set to a DFSMShsm-managed non-SMS volume with the most free space.

See Figure 5 on page 19 and Figure 6 on page 20 for an overview of the flow for the automatic migration and the automatic recall functions.

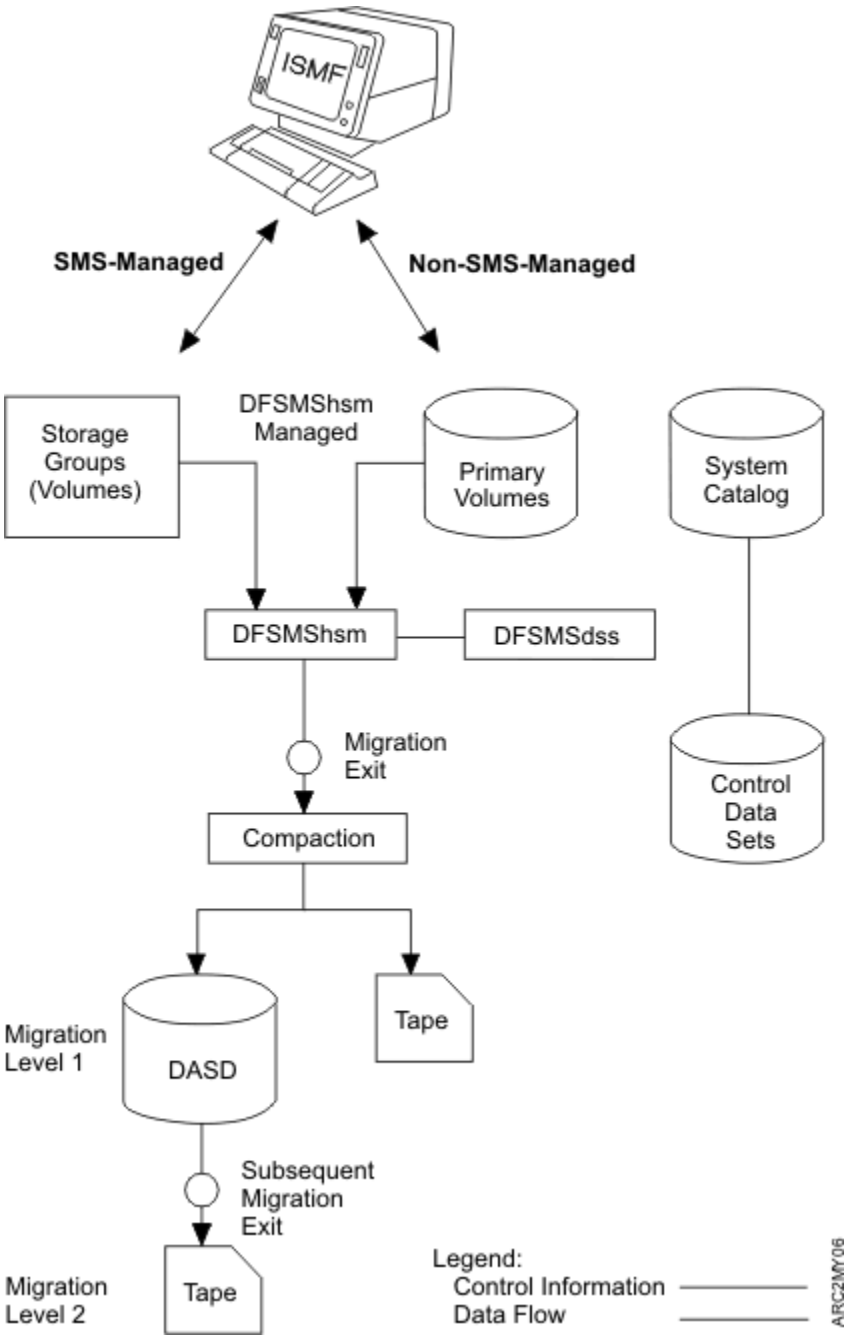


Figure 5. Flow of Automatic Migration

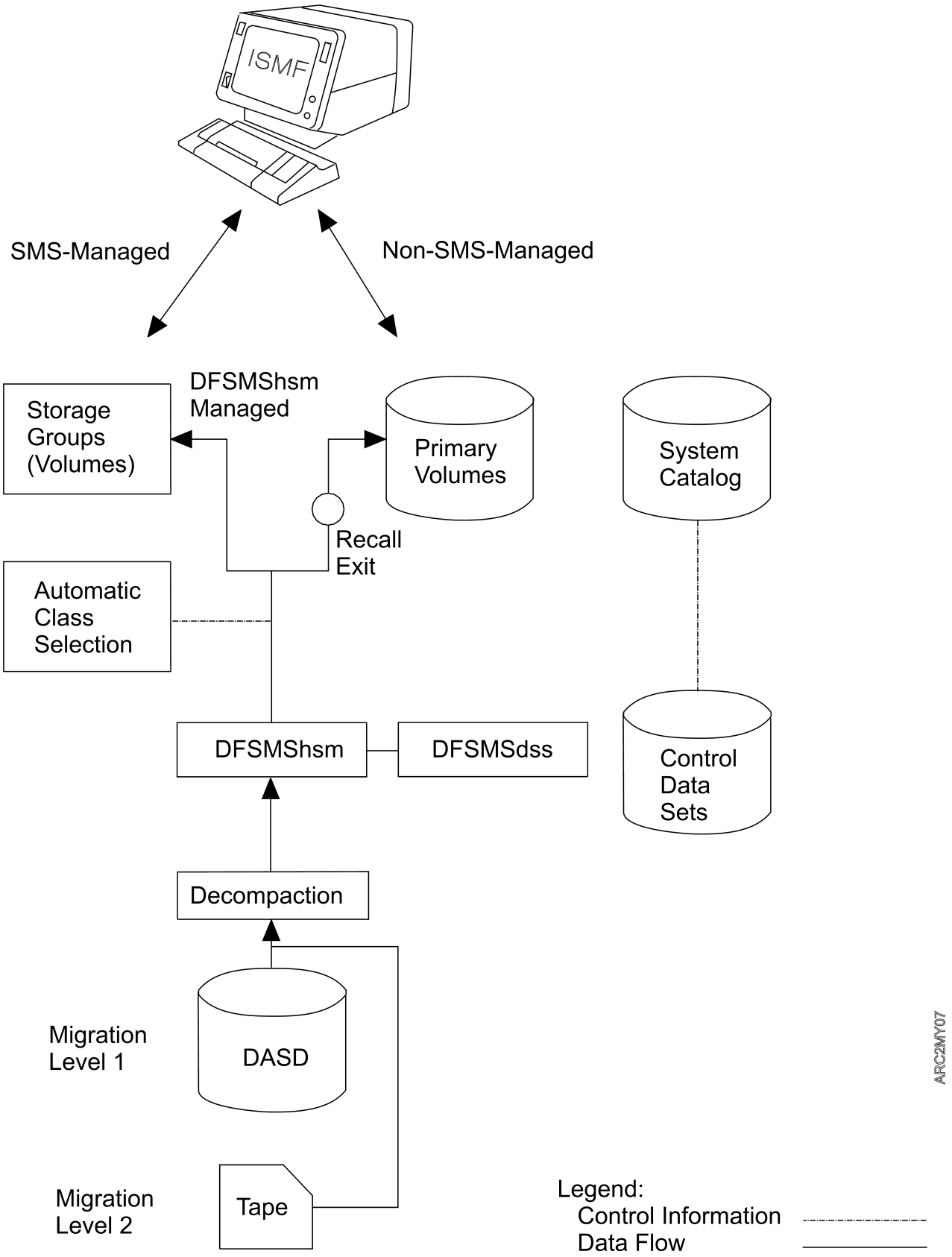


Figure 6. Flow of Automatic Recall

Can I perform space management tasks?

Although DFSMShsm performs space management automatically, you can perform space management tasks on your own data sets by issuing the following DFSMShsm commands through ISMF panels, DFSMShsm space maintenance panels, TSO, TSO/E or a user macro.

Space Management User Commands	DFSMShsm Function
HDELETE	Deletes one or more migrated data sets.
HLIST	Lists information from the migration and backup control data sets.
HMIGRATE	Requests migration of one or more data sets.
HQUERY	Lists outstanding DFSMShsm requests.
HRECALL	Recalls one or more migrated data sets.

For more information on DFSMShsm user commands, see "What tasks can I perform using DFSMShsm user commands?" on page 41.

Chapter 6. Availability management

Availability management ensures that lost or damaged data sets can be retrieved at the most current possible level. This topic describes how DFSMShsm ensures data availability and what commands you can issue to perform availability management on your own data sets.

How does DFSMShsm ensure data availability?

One of the ways in which DFSMShsm ensures data availability is by automatically copying new and changed user data sets to a backup volume. The copy of your data set is called a backup version. The backup version ensures that your data is still available if your original data set is damaged or accidentally deleted.

Another way in which DFSMShsm ensures data availability is by automatically dumping volumes to tape.

Availability management also includes the process of retrieving data from a backup or dump version if you need to recover your data set. DFSMShsm can recover your data set only if you issue the HRECOVER command.

DFSMShsm uses the following functions to ensure that your data is available:

- Backup
  - Automatic backup
  - Command backup
  - Inline backup
- Recovery
  - Data set recovery
  - Volume recovery

Backup

The backup function copies a data set from a level 0 volume or a level 1 migration volume to a backup volume. The result of the backup process is a backup version of the data set, which you can recover with the HRECOVER command.

The **automatic backup** function ensures that a current copy of new and changed data sets exists in case the original data sets are damaged or accidentally deleted. At the time and on the days specified by the storage administrator, DFSMShsm automatically copies new and changed data sets on DFSMShsm-managed volumes to tape or DASD. During automatic backup (also referred to as incremental backup), DFSMShsm backs up only new or changed data sets.

DFSMShsm automatic backup, working **with** SMS, uses storage group and management class attributes to determine which data sets get backed up, how often they get backed up, how many backup versions to maintain, and how long to keep those backup versions.

DFSMShsm automatic backup, working **without** SMS, uses the volume automatic backup attribute to backup volumes on a volume basis. The number of backup versions kept and how often they get backed up are typically the same for all non-SMS data sets in the installation, except where the HALTERDS command has been used to change specific data sets.

When you issue the HBACKDS command, the **command backup** function copies a specific data set to either a migration level 1 volume or to a backup tape. The data set can be cataloged or uncataloged and does not have to reside on a DASD volume that is managed by DFSMShsm. The volume, however, must be mounted.

Command backup of SMS-managed data sets is available for eligible data sets. Eligibility is controlled by an SMS management class attribute.

The **inline backup** function (a program called ARCINBAK) allows you to back up data sets in the middle of a job. If you use the optional TARGET keyword, ARCINBAK allows you to direct a data set to ML1 DASD or to tape.

Recovery

The recovery function recovers a backup version to a level 0 volume. Recovery must be initiated by a command.

The **data set recovery** function refers to the process of recovering a data set to its condition as of a specified date.

You can recover individual data sets by entering an HRECOVER line operator on an ISMF panel or by issuing the HRECOVER command.

DFSMShsm can recover data sets from a DFSMShsm backup version or from a DFSMShsm dump copy. For a data set to be restored from a dump copy, the dump copy must have been made from a dump class that allows data set restore, and a VTOC copy must exist for the dump (except when an authorized user explicitly specifies a dump volume). Dump copies created by the fast replication process are not used for recoveries by the RECOVER nor HRECOVER commands.

DFSMShsm automatically chooses the most recent copy of the data set unless directed otherwise by options you specify with the HRECOVER command, or by options set by your installation's system programmer.

If the data set is SMS-managed at the time of recovery, the target volume is determined by the data sets storage class and storage group. If the data set is not SMS-managed, then the target volume is selected in the following order:

- The target volume specified
- The volume on which the target data set is currently cataloged
- The volume from which the data set was originally backed up or dumped

The **volume recovery** function refers to the process of recovering a level 0 volume to its condition as of a specified date.

DFSMShsm volume recovery can use incremental backups or full-volume dumps, or both. A DFSMShsm-authorized user can issue one RECOVER command that is used to request both a volume restore and an incremental volume recovery.

See Figure 7 on page 25 and Figure 8 on page 26 for an overview of the flow for the automatic incremental backup and the recovery/restore functions.

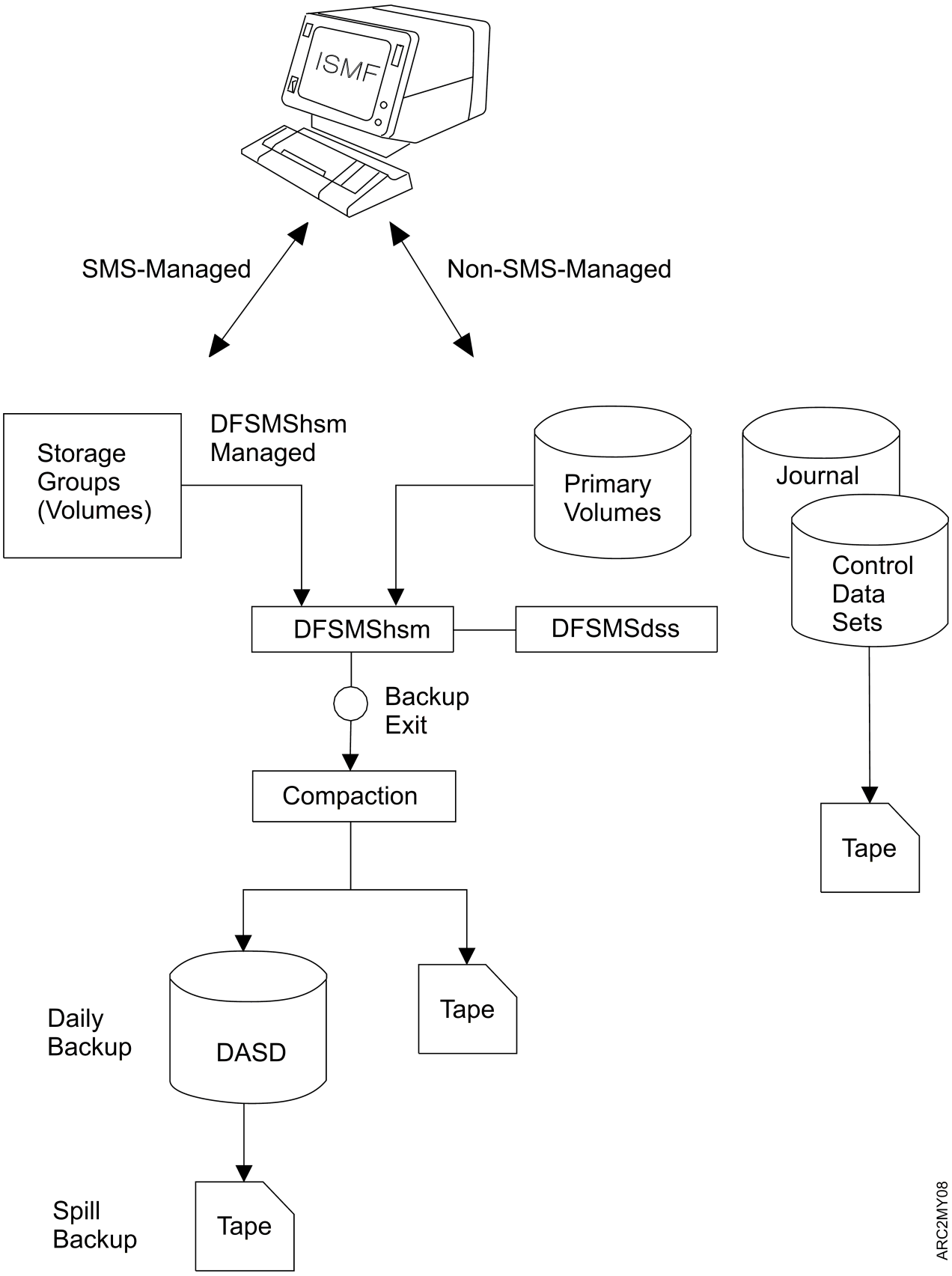


Figure 7. Flow of Automatic Incremental Backup

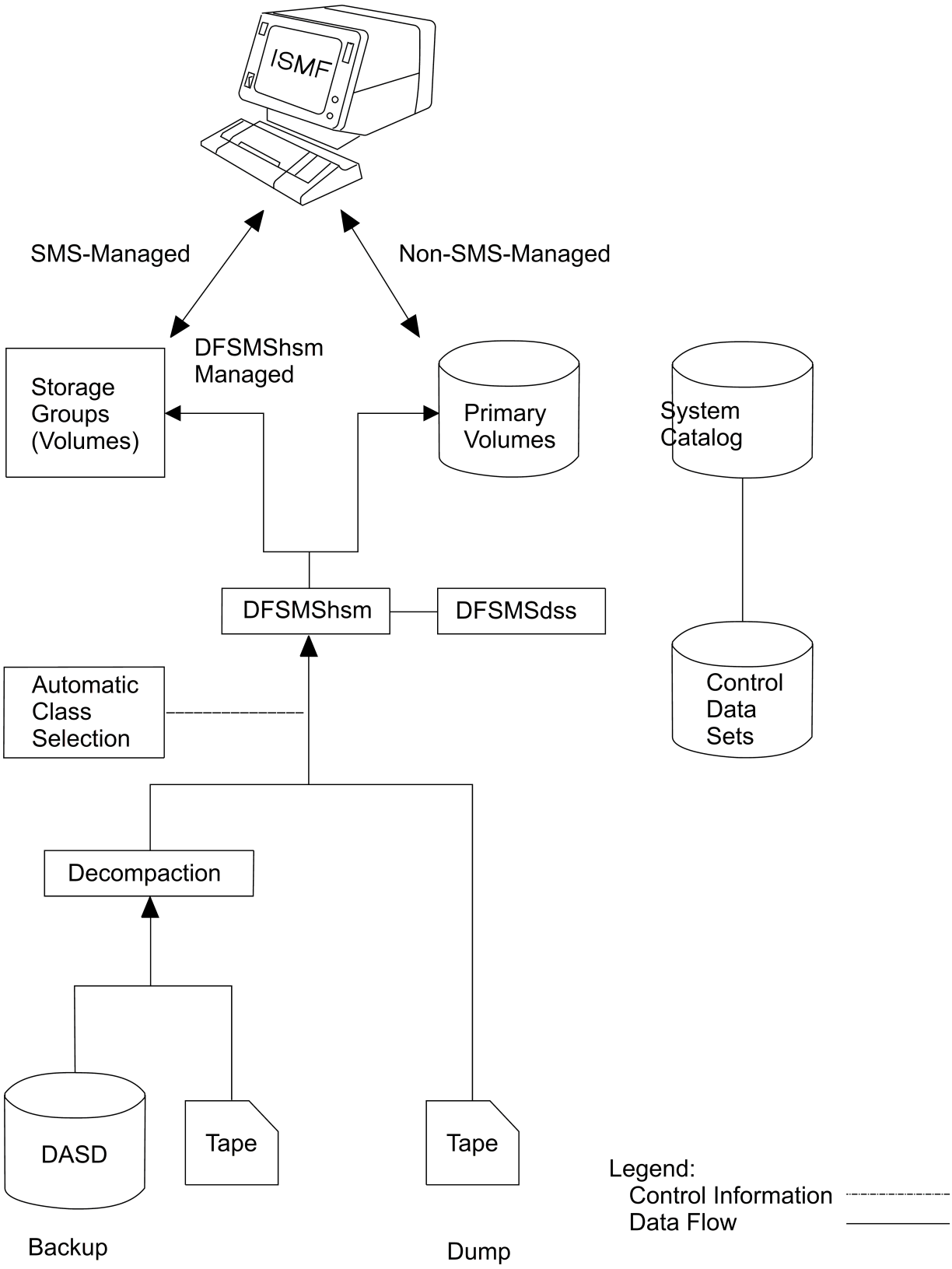


Figure 8. Flow of Recovery/Restore Functions

Can I perform availability management tasks?

Although DFSMShsm performs backup and dump tasks automatically, you can perform availability management tasks on your own data sets by issuing the following DFSMShsm user commands through ISMF online panels, TSO, TSO/E, or a user macro. Inline backup is also available for backing up data sets.

Availability Management User Commands	DFSMShsm Functions
HALTERDS	Changes the minimum backup frequency and number of backup versions kept for one or more data sets. Cannot be used on SMS-managed data sets, which are controlled by the data sets' management class parameters. If used on SMS-managed data sets, the command fails and an error message is issued.
HBACKDS	Creates a backup version of one or more data sets.
HBDELETE	Deletes specific backup versions of one or more data sets.
HLIST	Lists information from the migration and backup control data sets.
HQUERY	Lists outstanding DFSMShsm requests.
HRECOVER	Recovers a backup version of one or more data sets.

For more information on DFSMShsm user commands, see "What tasks can I perform using DFSMShsm user commands?" on page 41.

Chapter 7. Space management and availability management capabilities

This topic describes some of the space saving functions provided by DFSMShsm.

Space-saving functions

Space-saving functions, part of DFSMShsm space management and availability management, allow DFSMShsm to consolidate data while it migrates and backs up data sets and to perform cleanup activities so that the migration volume can store more data or so that the data occupies less space when DFSMShsm returns it to a DFSMShsm-managed volume.

The following items are space saving functions:

- Partitioned data set compression
- Deletion of temporary data sets
- Release of overallocated space
- Deletion of expired data sets
- Extent reduction
- Reblocking
- Expiration of backup versions

Partitioned data set compression

DFSMShsm moves only data and not the entire allocated space when it migrates and recalls or backs up and recovers data sets. If you allocate more space for a partitioned data set than the data requires, DFSMShsm releases both the unused space and the used space that is no longer valid when it migrates and recalls or backs up and recovers the data set. Furthermore, if you have specified secondary extents, when DFSMShsm recalls or recovers the data set to a DFSMShsm-managed volume, it allocates only the amount of space that the data requires. DFSMShsm retains user information in partitioned data set directories.

Deletion of temporary data sets

Temporary data sets are data sets that are unintentionally left at the end of the task. DFSMShsm automatically deletes these data sets as each data set is encountered.

Release of overallocated space

This is space that was allocated for data sets, but is not being used and is not needed. This is a management class option for SMS-managed data sets.

Deletion of expired data sets

During primary space management and secondary space management, DFSMShsm determines if data sets meet the optional expiration criteria. If they do, DFSMShsm deletes them. The expiration and deletion of an SMS-managed data set is controlled by management class attributes. Migrated data sets are included in the expiration checking and deleting process.

Extent reduction

When DFSMShsm recalls or recovers a data set, it requests MVS to reallocate the data set. DFSMShsm requests enough space in the allocation request so it can recall or recover the data set in one extent. If

enough contiguous space is available on the target volume, DFSMShsm automatically reduces the number of extents as it migrates and recalls or backs up and recovers the data set. If you specified secondary extents when you allocated the data set, DFSMShsm releases any unused space during recall or recovery. This process makes a larger contiguous space available for allocation of larger data sets. DFSMShsm can migrate, then recall, a data set specifically to reduce extents.

Reblocking

Reblocking is the process of changing the number of records in a physical block. The purpose of reblocking is to use the space on the DASD volume more efficiently. DFSMShsm can reblock physical sequential data sets during recall and recovery to any DFSMShsm-supported DASD. If DFSMSdss is the data mover, DFSMShsm can reblock partitioned data sets. When recalling or recovering a data set, DFSMShsm does not determine a blocksize for the data set if the data set VTOC entry indicates that the data set is reblockable. Instead, the blocksize is determined by the DFSMS DASD calculation services.

Expiration of backup versions

A DFSMShsm-authorized user can issue a command for DFSMShsm to delete backup versions of data sets when the expiration criteria of those data sets have been reached. Management class attributes control the expiration and deletion of backup versions of SMS-managed data sets. Command parameters control the expiration and deletion of backup versions of non-SMS-managed data sets.

Chapter 8. Associated data sets

This topic describes the control data sets, the journal data set, and the log used by DFSMShsm.

How does DFSMShsm know where my data sets are located?

DFSMShsm keeps track of all migration and backup activity by recording information in the control data sets, the journal data set, and the DFSMShsm log.

Control data sets

The following control data sets contain the location of the data sets that DFSMShsm migrates and backs up:

Control Data Set	Description
Backup Control Data Set (BCDS)	Contains content and location of backup versions and dump copies
Migration Control Data Set (MCDS)	Contains content and location of migrated data sets
Offline Control Data Set (OCDS)	Contains content of tape backup volumes and tape migration level 2 volumes

Journal data set

The journal data set contains the sequential history of updates to the control data sets. If a control data set is damaged, DFSMShsm-authorized users can recover it to its most current status by combining the entries in the journal data set with the restored backup version of the control data set.

How do I know where my data sets are located?

You can list migration and backup control data set information by issuing the following DFSMShsm user command through TSO or TSO/E:

DFSMShsm User Command	Pertaining to Control Data Sets
HLIST	Lists information from the migration and backup control data sets.

For more information on DFSMShsm user commands, see “What tasks can I perform using DFSMShsm user commands?” on page 41.

Chapter 9. Understanding syntax diagrams and using DFSMShsm commands

This topic describes using DFSMShsm commands and the notational conventions used in this publication.

How to read syntax diagrams

This section describes how to read syntax diagrams. It defines syntax diagram symbols, items that may be contained within the diagrams (keywords, variables, delimiters, operators, fragment references, operands) and provides syntax examples that contain these items.

Syntax diagrams pictorially display the order and parts (options and arguments) that comprise a command statement. They are read from left to right and from top to bottom, following the main path of the horizontal line.

For users accessing the Information Center using a screen reader, syntax diagrams are provided in dotted decimal format.

Symbols

The following symbols may be displayed in syntax diagrams:

Symbol
Definition

►►—
Indicates the beginning of the syntax diagram.

—►
Indicates that the syntax diagram is continued to the next line.

►—
Indicates that the syntax is continued from the previous line.

—►◄
Indicates the end of the syntax diagram.

Syntax items

Syntax diagrams contain many different items. Syntax items include:

- Keywords - a command name or any other literal information.
- Variables - variables are italicized, appear in lowercase, and represent the name of values you can supply.
- Delimiters - delimiters indicate the start or end of keywords, variables, or operators. For example, a left parenthesis is a delimiter.
- Operators - operators include add (+), subtract (-), multiply (*), divide (/), equal (=), and other mathematical operations that may need to be performed.
- Fragment references - a part of a syntax diagram, separated from the diagram to show greater detail.
- Separators - a separator separates keywords, variables or operators. For example, a comma (,) is a separator.

Note: If a syntax diagram shows a character that is not alphanumeric (for example, parentheses, periods, commas, equal signs, a blank space), enter the character as part of the syntax.

Keywords, variables, and operators may be displayed as required, optional, or default. Fragments, separators, and delimiters may be displayed as required or optional.

Item type
Definition

Required
Required items are displayed on the main path of the horizontal line.

Optional
Optional items are displayed below the main path of the horizontal line.

Default
Default items are displayed above the main path of the horizontal line.

Syntax examples

The following table provides syntax examples.

Table 1. Syntax examples

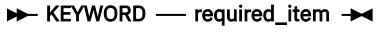
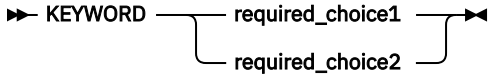
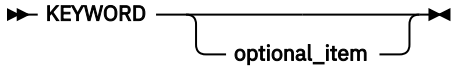
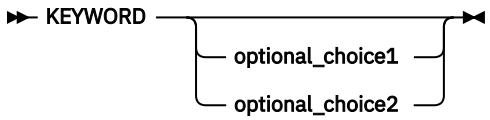
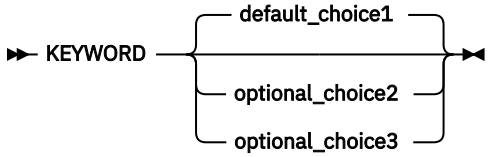
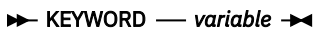
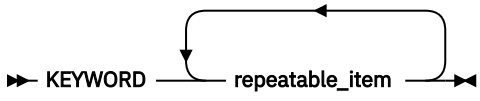
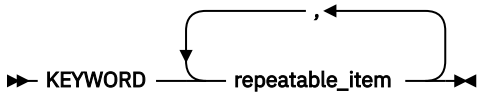
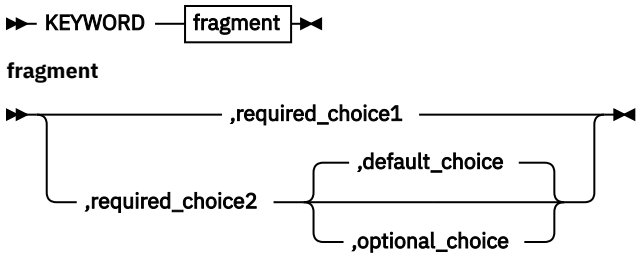
Item	Syntax example
Required item. **Required items appear on the main path of the horizontal line. You must specify these items.**	
Required choice. **A required choice (two or more items) appears in a vertical stack on the main path of the horizontal line. You must choose one of the items in the stack.**	
Optional item. **Optional items appear below the main path of the horizontal line.**	
Optional choice. **An optional choice (two or more items) appears in a vertical stack below the main path of the horizontal line. You may choose one of the items in the stack.**	
Default. **Default items appear above the main path of the horizontal line. The remaining items (required or optional) appear on (required) or below (optional) the main path of the horizontal line. The following example displays a default with optional items.**	
Variable. **Variables appear in lowercase italics. They represent names or values.**	
Repeatable item. **An arrow returning to the left above the main path of the horizontal line indicates an item that can be repeated.** **A character within the arrow means you must separate repeated items with that character.** **An arrow returning to the left above a group of repeatable items indicates that one of the items can be selected,or a single item can be repeated.**	 

Table 1. Syntax examples (continued)

Item	Syntax example
Fragment. **The fragment symbol indicates that a labelled group is described below the main syntax diagram. Syntax is occasionally broken into fragments if the inclusion of the fragment would overly complicate the main syntax diagram.**	

Using DFSMShsm commands

A command consists of a command name usually followed by one or more operands or parameters. All operands are referred to as parameters. Parameters provide the specific information required for the command to perform the function.

DFSMShsm commands use positional and keyword parameters.

Positional parameters

Positional parameters follow the command name in a prescribed sequence.

You must specify required positional parameters immediately after the command name to which they apply. When using optional positional parameters, you must specify them immediately after any required positional parameters or after the command name if no required positional parameter exists. When a positional parameter is a list of items, you must enclose the list within parentheses. However, if you specify only one item, you have the option of using parentheses.

Keyword parameters

Keyword parameters are specific words or symbols that have meaning to DFSMShsm. They follow positional parameters and can occur in any order. The command explanations used in this publication show the keyword parameters in **UPPERCASE BOLDFACE** characters.

You can specify values or variables with some keyword parameters by placing them after the keyword parameter and enclosing them in parentheses. A typical keyword with a value appears in this publication as:

VOLUME (*volser*)

Note: Sometimes keywords can conflict. If you enter conflicting keywords, the last keyword entered overrides the previous ones unless otherwise noted in the explanations of the specific parameters. This publication identifies conflicting keywords with a vertical bar (|) separating them.

Abbreviating commands and parameters

The TSO abbreviation convention applies for all DFSMShsm user commands and parameters. In other words, when you want to abbreviate the DFSMShsm commands and parameters, you must specify enough of the leading characters so that the abbreviation is distinguishable from all the other commands and parameters.

In addition, some DFSMShsm keyword parameters allow unique abbreviations. This publication lists all unique abbreviations of a parameter under the heading "Abbreviations."

Delimiters

When you issue a DFSMShsm command, you must separate the command name from the first parameter by one or more blanks. You must separate parameters by one or more blanks or a comma. Do not use a semicolon (;) as a delimiter because DFSMShsm ignores any characters that follow a semicolon.

Line continuations

When you enter a DFSMShsm user command from a TSO terminal, you do not need to enter line continuation characters for commands that are too long for one line. You can allow the line to wrap around to the next line. If you were entering the same command from the batch reader, you would indicate continuation of the command to the next card image by using a plus or minus sign as the last character of the current card. However, when you use a plus sign, leading delimiters, such as spaces, are removed from the continuation card image. All command examples in this publication show commands entered from a TSO terminal.

Comments

You can add comments to any DFSMShsm user command anywhere that a blank might appear. To distinguish your comments, enter them between the comment delimiters, which are /* and */. You can continue a comment to the next line by using a line-continuation character (+ or -) at the end of the line.

The following is an example of a DFSMShsm command with a comment:

```
HLIST  /*this simple command lists all of my migrated data sets*/
```

Notational conventions

The following list of symbols and type styles defines the format of DFSMShsm commands. Do not use the symbols in the actual command statements:

- A vertical bar (|) separates alternative choices. Unless otherwise stated, you can select only one item. If you enter more than one item, the last choice entered overrides the previous ones. Do not use the vertical bar when you submit the command.
- An ellipsis (...) specifies that you can enter multiple entries of the type immediately preceding the ellipsis. For example, *dsname* ... means that you can enter one or more data set names. Do not use the ellipsis when you submit the command.
- Parentheses, commas, slashes, spaces, and other punctuation specify characters that you must enter exactly as shown.
- *Italic* type specifies fields that you must supply.
- Numeric parameters appear in three possible forms: decimal (EBCDIC), hexadecimal (X'n'), or binary (B'n'), unless specifically restricted in the parameter explanation.

Specifying data set names

When you specify a data set name with a DFSMShsm user command, the data set name must conform to TSO data set naming conventions. The qualified name consists of the following fields:

- Your user prefix (required; defaults to user ID; can be redefined by using the TSO PROFILE command)
- A user-supplied name (required)
- A descriptive qualifier (optional)

The following example shows all three fields:

```
USER.PART.DATA
```

where:

- USER is the user prefix
- PART is the user-supplied name
- DATA is the descriptive qualifier

You may specify a fully qualified name (a name with all three qualifiers) by enclosing it in apostrophes, for example:

```
'USER.PART.DATA'
```

The system does not append the user prefix and descriptive qualifiers to data set names that are enclosed in apostrophes. If you use a fully qualified name without enclosing it in apostrophes, the system appends the user prefix, for example:

```
USER.PART.DATA
```

becomes:

```
USER.USER.PART.DATA
```

For the HBACKDS, HDELETE, HMIGRATE, HRECALL, and HRECOVER commands, you can specify a partly qualified data set name using a filter, which can contain certain symbols (“wild cards”), interpreted as follows:

%
one and only one character in a qualifier

%%...
up to eight percent signs can be specified in each qualifier

*****
one or more characters in one qualifier

******
zero or more qualifiers (the double asterisk cannot precede or follow any characters; it must be preceded and followed by either a period or a blank)

Given such a filter, DFSMShsm uses catalog services to locate all non-VSAM data sets, generation data sets, and VSAM clusters with names that match the pattern specified in the filter. From these data sets, DFSMShsm performs the desired function on those that meet any other qualifications in the command, such as CHANGEDONLY for HBACKDS.

For example, if you specify HBACKDS ‘HLQ.MLQ.DATA%’, DFSMShsm will back up data set HLQ.MLQ.DATA1 but not VSAM cluster HLQ.MLQ.DATA25.

If you specify HDELETE HLQ.MLQ.*.DATA, DFSMShsm will delete migrated data sets USERID.HLQ.MLQ.A.DATA and USERID.HLQ.MLQ.XYZ.DATA, but not USERID.HLQ.MLQ.ABC.

If you specify HRECALL ‘HLQ.MLQ.**’, DFSMShsm will recall migrated data sets HLQ.MLQ.DATA4 and HLQ.MLQ.Z.LIST, but not USERID.HLQ.MLQ.DATA.

If you specify HMIGRATE **.DATA, DFSMShsm will migrate data sets USERID.HLQ.DATA and USERID.DATA, but not USERID.HLQ.LIST.

Note:

1. If you specify a list of data sets in the command, any of the data set names in the list can be filters.
2. Any fully qualified data set name in the list can be an alias for a true data set name. However, the HRECOVER command fails if a user substitutes an alias for the data set name of an ICF catalog, even if the user is DFSMShsm-authorized.
3. If a filter within apostrophes has a wild card as the first character, DFSMShsm asks to search all the user catalogs in the system. This search has a negative effect on system performance.

Specifying data set passwords

When using password-protected data sets, you must specify the password as part of the data set name. You separate the password from the data set name by entering a slash (/), which must immediately follow the data set name and immediately precede the password. Passwords are not supported for SMS data sets or for DFSMShsm user macros.

Example of a DFSMShsm user command

In this example, the parameters associated with the HRECALL command specify the name of the data set that you want to recall:

```
HRECALL 'LHE2104.TEST.CASES.TEXT'
```

where:

- HRECALL is the command name.
- LHE2104.TEST.CASES.TEXT is the name of the data set that you want to recall.

Chapter 10. Interacting with DFSMShsm

This topic describes how you can interact with DFSMShsm by using the TSO HELP command, the TSO attention key, or by submitting commands in batch mode. Some incompatibilities with utilities are also discussed.

TSO HELP command

The TSO HELP command gives you online information about the use, function, syntax, and parameters of DFSMShsm user commands. For example, as a TSO or TSO/E user, you can issue the following command to obtain information about the HMIGRATE command:

===> **HELP HMIGRATE**

TSO Attention key

If you are in a wait state because of DFSMShsm, your terminal is locked while DFSMShsm performs a requested task. You can press the TSO Attention key, which is usually the PA1 key, to receive the following message:

```
ARC1023A  CONVERTING TO A NON-WAIT WILL FAIL THE USER REQUEST,
          BUT WILL ALLOW THE {RECALL | RECOVER | MIGRATE | BACKUP |
          DELETE | HSENDCMD} TO COMPLETE IN THE BACKGROUND.
          CONVERT Y OR N?
```

If you enter Y, you are released from the wait state. If you enter N, you remain in the wait state.

Using the TSO Attention key does not cancel the DFSMShsm command that you have already issued. If you press the TSO attention key to interrupt a RECALL, the RECALL is still performed. If you press the TSO Attention key to interrupt an HLIST command, you receive the information up to the point that you interrupted the command.

Note: If you are in full screen mode when the TSO Attention key is pressed (for example, ISPF browse), the screen that is displayed after the attention interrupt does not show the correct information. Press the Refresh key, which is usually the PA2 key, to get the correct information displayed on your screen.

Incompatibilities caused by DFSMShsm

Although installation of DFSMShsm should not affect your data sets, DFSMShsm can cause incompatibilities if you use the following utilities and commands:

- IEHMOVE utility
- TSO DELETE command and IDCAMS DELETE command
- TSO ALTER command and IDCAMS ALTER command
- TSO Attention key

IEHMOVE utility

An incompatibility can exist between DFSMShsm and the IEHMOVE utility if DFSMShsm has migrated the data set being cataloged, uncataloged, scratched, or renamed. The incompatibility affects only non-SMS-managed data sets.

If the IEHMOVE utility assumes that the data set being copied or moved is cataloged, the volume serial number returned by the catalog locate request for the data set must be associated with a volume allocated to the job step, or the IEHMOVE utility cannot complete the request. The IEHMOVE utility assumes that the data set is cataloged if the FROM=*device=list* parameter has not been specified. Also, in this case, the located volume serial number is MIGRAT, so you would have to use the HRECALL command

to recall the migrated data set or to automatically recall the data set by allocating it in a previous step before running the IEHMOVE utility.

IDCAMS considerations

IDCAMS commands allow either the INFILE or FILE keywords to refer to DD statements. The DD statements specify a data set name or volume serial, or both, to be used for processing the commands.

If a DD statement referred to by either the INFILE or FILE keywords specifies both a data set name and a non-SMS-managed volume and the data set has been migrated by DFSMShsm, the IDCAMS command request may not be performed successfully. If an error occurs in this condition, one of the following actions should be taken prior to reissuing the IDCAMS command:

1. Specify the DD statement without specifying the volume serial and unit names. This causes the data set to be allocated when the job step is initiated, and the migrated data set will be recalled for the allocation request.

   In some cases, such as specification of the AMP = (AMORG) for VSAM data sets, the volume serial number must be specified on the DD statement. In such cases, the second action should be taken, rather than the first.
2. Recall the migrated data set by doing one of the following:
   - Issue a DFSMShsm recall command (RECALL or HRECALL).
   - Cause the data set to be recalled by referring to the data set in a prior step (a step different from the one where the IDCAMS command is being requested) without specifying a volume serial number.

Submitting commands in batch mode

You can submit DFSMShsm commands for processing in batch mode by using JCL. Because you are processing in batch mode, DFSMShsm cannot issue a message to your terminal but notes any exception in its log.

If you are logged onto TSO when you submit a batch job, ALL ERROR messages are sent to your terminal. If you are not logged onto TSO, the DFSMShsm messages are lost.

If RACF is installed and you are processing RACF-protected data sets, you must supply the USER= and PASSWORD= parameters on the job statement.

Example JCL for submitting an DFSMShsm command

The following is an example of JCL for submitting DFSMShsm commands in batch mode. In this example, we want to recall four data sets from a migration volume by using the HRECALL command:

```
//RECALJOB JOB . . .
//STEP1    EXEC PGM=IKJEFT01,REGION=512K
//SYSPRINT DD SYSOUT=A
//SYSTSPRT DD SYSOUT=A
//SYSTSIN  DD *
  HRECALL  CRPA.DATA1
  HRECALL  CRPA.DATA2
  HRECALL  CRPA.DATA3
  HRECALL  CRPA.DATA4
/*
```

Chapter 11. Introduction to DFSMShsm user tasks

This topic tells you what tasks you can perform on your data sets using DFSMShsm user commands.

Note: If your installation is using RACF FACILITY class, you can issue one or more of the DFSMShsm user commands that are described in this publication only if your installation's Security Administrator has given authority for your user ID to issue the command.

What tasks can I perform using DFSMShsm user commands?

As a TSO or TSO/E terminal user, you can use DFSMShsm user commands to perform the following space management and data availability management tasks on your data sets:

User Command	User Task
HALTERDS	Changes the backup frequency and number of backup versions kept for one or more data sets. Cannot be used on SMS-managed data sets, which are controlled by the data sets management class parameters. If used on SMS-managed data sets, the command fails and an error message is issued.
HBACKDS	Creates a backup version of one or more data sets.
HBDELETE	Deletes specific backup versions of one or more data sets.
HCANCEL	Cancels one or more existing queued DFSMShsm command requests.
HDELETE	Deletes one or more migrated data sets.
HLIST	Lists information from the migration and backup control data sets.
HMIGRATE	Migrates one or more data sets.
HQUERY	Lists outstanding DFSMShsm requests associated with your user identification.
HRECALL	Recalls one or more migrated data sets.
HRECOVER	Recovers a backup version of one or more data sets.

How do I perform the task?

To perform a task with a DFSMShsm user command, you need to:

- Identify the DFSMShsm user command
- Identify the name of your data set
- Identify the parameters (positional and keyword) of the DFSMShsm user command

As a general rule, when you enter most of the DFSMShsm user commands, you first type the command name, follow it with the name of your data set, and finally include the necessary parameters. For example:

```
commandname datasetname parameters
or
HRECALL a.b.x
```

For detailed information on the correct syntax of the DFSMShsm user commands, see Chapter 9, “Understanding syntax diagrams and using DFSMShsm commands,” on page 33.

Part 2. DFSMShsm user tasks

This topic describes the tasks you can perform on your data sets using DFSMShsm user commands, and explains how to perform those commands.

Chapter 12. HALTERDS: Changing data set parameters

This topic describes how to change the data set parameters that affect backup of non-SMS-managed data sets or UNIX files using ISMF or TSO.

Using ISMF

The following steps present an example of how to use the HALTERDS line operator to change parameters for a data set that is not SMS-managed. In our example, we have used USER20.ISMF.JCL as a sample data set name.

1. Generate a list of data sets as described in Chapter 4, “Methods of performing tasks,” on page 13.
2. Enter the HALTERDS line operator in the line operator column next to USER20.ISMF.JCL as described in Figure 9 on page 45. The HALTERDS Entry panel appears.

```
  Panel  List  Dataset  Utilities  Scroll  Help
------------------------------------------------------------------------------
                               DATA SET LIST
                                                      Entries 1-1 of 1
Enter Line Operators below:                           Data Columns 3-6 of 39

     LINE                                    ALLOC    ALLOC   % NOT  COMPRESSED
     OPERATOR          DATA SET NAME         SPACE    USED    USED   FORMAT
    ---(1)----  ------------(2)------------ --(3)--  --(4)--  -(5)-  ---(6)----
                USER20.CLIST.CLIST              46       46      0  ???
                USER20.DFP220.DGTTLIB           46       46      0  ???
                USER20.ISMF.DGTLLIB             46       46      0  ???
                USER20.ISMF.DGTPLIB             46       46      0  ???
                USER20.ISMF.DUMP              4684     4356      7  ???
    HALTERDS    USER20.ISMF.JCL                468       46     90  ???
                USER20.ISPFILE                  46       46      0  ???
                USER20.ISPPROF                  93       93      0  ???
                USER20.SPFLOG1.LIST           2623     1311     50  ???
                USER20.TEMP.DATASET           4684       93     98  ???
    ----------  ------  -----------  BOTTOM OF  DATA  -----------  ------  ----

Command ===>                                                Scroll ===> HALF
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

Figure 9. Data Set List Panel with HALTERDS Selected

3. Complete the HALTERDS Entry panel as described in Figure 10 on page 46 for a non-SMS-managed data set.

```
  Panel  Utilities  Help
------------------------------------------------------------------------------
                           HALTERDS ENTRY PANEL

Specify the following to Change Backup Attributes
 of Data Set: USER20.ISMF.JCL
SMS Managed Data Set: NO


Select frequency of creating Backup Versions
2  1. Specific number of days           2. System default frequency

     Number of days  . .      (0 to 999)

Select number of Backup Versions to maintain
2  1. Specific number of versions       2. System default number

     Number of Backup Versions . .      (0 to 100)

 Data Set Password . . .           (if password protected)

Command ===>
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

Figure 10. HALTERDS Entry Panel

The maximum number of backup versions is limited to 29 versions or 100 versions based on the BCDS record length. The following values are the valid maximum allowable number of backup versions for different BCDS record lengths:

- Record length of 2040 to 6543 — 29 versions maximum
- Record length of 6544 or more — 100 versions maximum

Your computing center can tell you the maximum number of backup versions you can specify for your installation.

4. If the HALTERDS command is used on SMS-managed data sets, the command fails and an error message is issued (see Figure 11 on page 46).

```
  Panel  Utilities  Help
------------------------------------------------------------------------------
                           HALTERDS ENTRY PANEL     Invalid HALTERDS request

Specify the following to Change Backup Attributes
 of Data Set: USER20.ISMF.JCL
SMS Managed Data Set: YES


Select frequency of creating Backup Versions
2  1. Specific number of days           2. System default frequency

     Number of days  . .      (0 to 999)

Select number of Backup Versions to maintain
2  1. Specific number of versions       2. System default number

     Number of Backup Versions . .      (0 to 100)

 Data Set Password . . .           (if password protected)

Command ===>
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

Figure 11. HALTERDS Entry Panel with Error Message

5. Press ENTER to alter the data set parameters and redisplay the list (see Figure 12 on page 47).

The asterisk next to the HALTERDS in the line operator column indicates that the alter was successful.

```
  Panel  List  Dataset  Utilities  Scroll  Help
------------------------------------------------------------------------------
                              DATA SET LIST
                                                      Entries 1-1 of 1
Enter Line Operators below:                           Data Columns 3-6 of 39

     LINE                                    ALLOC    ALLOC   % NOT  COMPRESSED
     OPERATOR          DATA SET NAME         SPACE    USED    USED   FORMAT
    ---(1)----  ------------(2)------------ --(3)--  --(4)--  -(5)-  ---(6)----
                USER20.CLIST.CLIST              46       46      0  ???
                USER20.DFP220.DGTTLIB           46       46      0  ???
                USER20.ISMF.DGTLLIB             46       46      0  ???
                USER20.ISMF.DGTPLIB             46       46      0  ???
                USER20.ISMF.DUMP              4684     4356      7  ???
    *HALTERDS   USER20.ISMF.JCL                468       46     90  ???
                USER20.ISPFILE                  46       46      0  ???
                USER20.ISPPROF                  93       93      0  ???
                USER20.SPFLOG1.LIST           2623     1311     50  ???
                USER20.TEMP.DATASET           4684       93     98  ???
    ----------  ------  -----------  BOTTOM OF  DATA  -----------  ------  ----

Command ===>                                                  Scroll ===> HALF
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

Figure 12. Data Set List Panel After Function Completes

For more information on using DFSMShsm/ISMF line operators, see *z/OS DFSMS Using the Interactive Storage Management Facility* or use the online help provided with ISMF.

Using TSO

Task: Alter the parameters that control the number of backup versions kept and how frequently they are eligible for creation. This command cannot be used on SMS-managed data sets or UNIX files that are contained in an SMS-managed zFS, which are controlled by the data sets or UNIX containing zFS management class parameters. If the HALTERDS command is used on SMS-managed data sets or UNIX files, the command fails and an error message is issued (see Figure 11 on page 46).

To make a change, you specify VERSIONS or SYSVERSIONS, FREQUENCY or SYSFREQUENCY, or one from each pair of parameters. If you do not specify at least one with the HALTERDS command, nothing is altered.

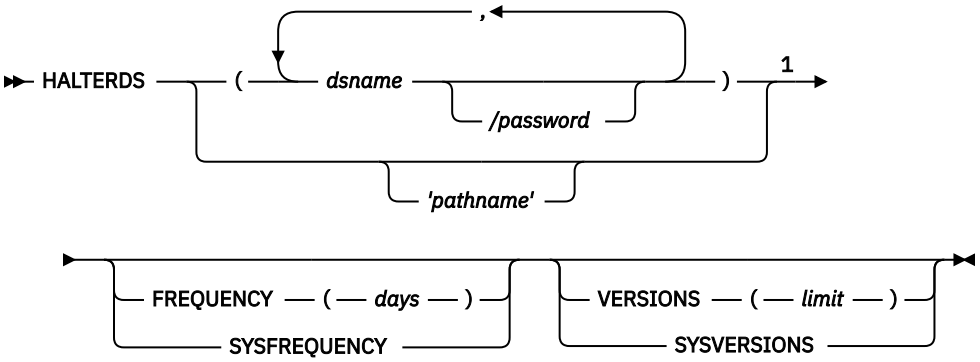
RACF authority: To alter the parameters that affect the backup of a RACF-protected data set, you must have RACF ALTER authority to the data set.

To alter the parameters that affect the backup of a UNIX file you must have WRITE authority to the file as well as SEARCH authority to the directories in the path. If any directories do not currently exist, or the file doesn't exist, you must have had SEARCH authority to the directories and WRITE authority to the file at the time of the backup.

Abbreviation: The minimum abbreviation for the HALTERDS command is HAL.

Syntax

The following diagram presents the syntax of the HALTERDS command. This command only applies to non-SMS data sets and UNIX files.



Notes:

[1] Parentheses around data set names are required only when multiple data set names are specified. You can only specify *pathname* once and it must be surrounded by single quotation marks. For example: HALTERDS `'/unix/pathname'`

Required parameters

name: Specifying the name of the data set or UNIX file being altered

Explanation

(*name*/*password* ...) is a required positional parameter specifying the name of the data set or UNIX file or list of names of data sets for which backup attributes are being changed. The UNIX absolute path name must be enclosed in single quotes. Only one UNIX file name may be specified on the command. A mixture of Data Set names and UNIX files is not supported.

For *password*, substitute the correct password and include the preceding slash (/). TSO does not prompt you for the password.

- For password-protected non-VSAM data sets, you must supply the password that allows you to write to the data set.
- For password-protected VSAM data sets, you must supply the master password of the base cluster.

Abbreviations

None.

Defaults

None.

Restrictions

Because *name* is a required positional parameter, you must specify it immediately after HALTERDS.

You cannot use any wild card (%, *, or **) in a data set name or UNIX file.

DFSMShsm does not process individual partitioned data set members. If you specify a partitioned data set with a member name, DFSMShsm ignores the member name and alters the backup parameters for the entire data set.

Optional parameters

FREQUENCY and SYSFREQUENCY: Specifying the frequency for creation of backup versions for changed data sets

Explanation

FREQUENCY(*days*) | SYSFREQUENCY are mutually exclusive, optional parameters used to specify the minimum number of days between consecutive backup versions of changed data sets during incremental backup. If you have changed a data set since DFSMShsm created the latest backup version and the specified number of days has elapsed, DFSMShsm creates a new backup version of the data set during automatic backup. If the specified number of days has elapsed but you have not changed the data set, DFSMShsm does not create a new backup version of the data set during automatic backup.

FREQUENCY specifies the minimum number of days that must elapse between two consecutive backup versions of the data set during incremental backup. For *days*, substitute a decimal number from 0 through 999. For example, if you specify *days* as 5, DFSMShsm backs up the data set providing you changed the data set since the last backup and the last backup version is at least five days old. If you specify 0, DFSMShsm creates a backup version for a changed data set every day in the backup cycle during automatic backup.

SYSFREQUENCY specifies that you want DFSMShsm to back up the specified data set at the same frequency that the system programmer specified. Use this parameter only if you issued a previous HALTERDS command to change the frequency of backup versions from the frequency specified by the general DFSMShsm parameter value.

Abbreviations

The TSO abbreviation convention applies for FREQUENCY and SYSFREQUENCY. There are no additional abbreviations.

Defaults

None.

Restrictions

You can specify FREQUENCY or SYSFREQUENCY, but not both.

VERSIONS and SYSVERSIONS: Specifying the number of backup versions to maintain

Explanation

VERSIONS(*limit*) | SYSVERSIONS are mutually exclusive, optional parameters you can use to specify the maximum number of backup versions that DFSMShsm is to maintain for the data set or UNIX file.

VERSIONS specifies the number of backup versions that you want DFSMShsm to maintain for the data set. The maximum number of backup versions is limited to 29 versions or 100 versions based on the BCDS record length.

The following values are the valid maximum allowable number of backup versions for different BCDS record lengths:

- Record length of 2040 to 6543 — 29 versions maximum
- Record length of 6544 or more — 100 versions maximum

Your computing center can tell you the maximum number of backup versions you can specify for your installation.

For *limit*, substitute a decimal number from 0 through 100. If you specify 0, DFSMShsm does not maintain any backup versions for the data set. If you reduce the number of backup versions, DFSMShsm does not delete any existing backup versions when it processes the HALTERDS command. DFSMShsm deletes existing excess backup versions for a specified reduced limit at the time the data set is backed up or when an EXPIREBV command is performed.

SYSVERSIONS specifies that you want DFSMShsm to maintain the same number of backup versions for the data set that the system programmer specified or defaulted to. Use this parameter only if you issued a previous HALTERDS command to change the number of backup versions from the number specified by the system programmer.

Abbreviations

The TSO abbreviation convention applies for VERSIONS and SYSVERSIONS. There are no additional abbreviations.

Defaults

The maximum number of backup versions you can have is 29 versions or 100 versions depending on the BCDS record length.

Restrictions

You can specify VERSIONS or SYSVERSIONS, but not both.

Examples of different ways to code the HALTERDS command

The examples below present different ways to code the HALTERDS command. The values are examples only. Do not interpret them as values that you should use for your system.

Altering data set parameters for maximum backup versions and minimum frequency when using a BCDS record length of 6544 or more

In this example, you are issuing the HALTERDS command to change the number of backup versions for the data set CRPA.PARTSTST.CNTL to the maximum allowable number of versions (100) for a BCDS record length of 6544 or more, and the number of days between backup versions to the minimum number of days (0). You are changing the frequency of creation of backup versions of the data set so that DFSMShsm creates a backup version every day during automatic backup, provided you changed the data set.

```
HALTERDS 'CRPA.PARTSTST.CNTL' VERSIONS(100) FREQUENCY(0)
```

Altering data set parameters for maximum backup versions and minimum frequency when using a BCDS record length of 2040

In this example, you are issuing the HALTERDS command to change the number of backup versions for the data set CRPA.PARTSTST.CNTL to the maximum allowable number of versions (29) for a BCDS record length of 2040, and the number of days between backup versions to the minimum number of days (0). You are changing the frequency of creation of backup versions of the data set so that DFSMShsm creates a backup version every day during automatic backup, provided you changed the data set.

```
HALTERDS 'CRPA.PARTSTST.CNTL' VERSIONS(29) FREQUENCY(0)
```

Altering data set parameters for installation-specified versions and maximum frequency

In this example, you are issuing the HALTERDS command to change the number of backup versions of the data set CRPA.COMTEST.CLIST from the number of versions that was previously specified to the number of versions specified by the system programmer. You are changing the maximum frequency of creation of backup versions of the data set so that DFSMShsm creates a backup version every four days during automatic backup, provided you changed the data set.

```
HALTERDS 'CRPA.COMTEST.CLIST' SYSVERSIONS FREQUENCY(4)
```

Altering data set parameters for specified versions and frequencies

In this example, you are issuing the HALTERDS command to change the number of backup versions and the frequency of creation of backup versions of the data set SMITH.VERSION1.TEXT.

```
HALTERDS 'SMITH.VERSION1.TEXT' VERSIONS(7) FREQUENCY(10)
```

Altering parameters for a list of data sets for installation-specified versions and frequency

In this example, you are issuing the HALTERDS command to change the number of backup versions for three data sets CRPA.PARTSTST.CNTRL, CRPA.COMMTEST.CLIST, and CRPA.OUTTESTS.TESTLIST to the number of backup versions and the frequency of creation specified by the system programmer.

```
HALTERDS ('CRPA.PARTSTST.CNTL','CRPA.COMMTEST.CLIST', -
         'CRPA.OUTTESTS.TESTLIST') SYSVERSIONS -
         SYSFREQUENCY
```

Chapter 13. HALTERU: Changing UNIX file parameters

The HALTERU command is an alias to HALTERDS. All parameters that are valid for the HALTERDS command are valid for the HALTERU command.

The abbreviation for HALTERU is HALU.

Chapter 14. HBACKDS: Backing up data sets

You can back up data sets or UNIX files using ISMF, TSO, UNIX shell, or inline backup. This command applies to both SMS-managed and non-SMS-managed data sets and is intended to supplement the automatic functions of DFSMShsm.

Using ISMF

The following steps present an example of how to use the HBACKDS line operator to back up data sets. In our example, we have used USER20.ISMF.JCL as a sample data set name.

1. Generate a data set list as explained in Chapter 4, “Methods of performing tasks,” on page 13.
2. Enter the HBACKDS line operator in the line operator column next to USER20.ISMF.JCL as shown in Figure 13 on page 55.

```
  Panel  List  Dataset  Utilities  Scroll  Help
------------------------------------------------------------------------------
                               DATA SET LIST
                                                        Entries 1-1 of 1
Enter Line Operators below:                             Data Columns 3-6 of 39

     LINE                                    ALLOC    ALLOC   % NOT  COMPRESSED
     OPERATOR          DATA SET NAME         SPACE    USED    USED   FORMAT
    ---(1)----  ------------(2)------------ --(3)--  --(4)--  -(5)-  ---(6)----
                USER20.CLIST.CLIST               46       46      0  ???
                USER20.DFP220.DGTTLIB            46       46      0  ???
                USER20.ISMF.DGTLLIB              46       46      0  ???
                USER20.ISMF.DGTPLIB              46       46      0  ???
                USER20.ISMF.DUMP               4684     4356      7  ???
    HBACKDS     USER20.ISMF.JCL                 468       46     90  ???
                USER20.ISPFILE                   46       46      0  ???
                USER20.ISPPROF                   93       93      0  ???
                USER20.SPFLOG1.LIST            2623     1311     50  ???
                USER20.TEMP.DATASET            4684       93     98  ???
    ----------  ------  -----------  BOTTOM OF  DATA  -----------  ------  ----

Command ===>                                                 Scroll ===> HALF
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

Figure 13. Data set list panel with HBACKDS selected

The HBACKDS entry panel appears.

3. Complete the HBACKDS entry panel as shown in Figure 14 on page 56. You can choose to use a TARGET option or leave the field blank. Likewise, you may choose to use a concurrent copy option or leave the field blank. Specify Y in the `Wait for Completion` field if you want to wait for HBACKDS to complete before you return to ISMF.

```
  Panel  Utilities  Help
------------------------------------------------------------------------------
                            HBACKDS ENTRY PANEL
Command ===>

Optionally Specify one or more for
 Data Set:

  Target . . . . . . . . . . . .          (D=DASD, T=TAPE or blank)

  Concurrent copy  . . . . . . . .        (P, R, S, VP, VR, CP, CR or blank)
    For P, R, VP, VR, CP or CR,
                enter CC option           (P=PHYSICAL, L=LOGICAL or blank)

  Wait for Completion  . . . . . . N      (Y or N)

  Data Set Password . . . . . . .         (if password protected)

  Retain Days . . . . . . . . . .         (0 to 50000, or 99999 or blank)

  Note: Dataset Password ignored when in ADMIN mode.

Use ENTER to Perform Hbackds;
Use HELP Command for Help; Use END Command to Exit.
```

Figure 14. HBACKDS entry panel

4. Press ENTER to perform the backup and redisplay the list (see Figure 15 on page 56).

The asterisk next to the HBACKDS in the line operator column indicates that the backup was successful if you specified *wait for completion=Y*, or that the backup task was successfully issued to DFSMShsm if you specified `wait for completion=N`.

```
  Panel  List  Dataset  Utilities  Scroll  Help
------------------------------------------------------------------------------
                               DATA SET LIST
                                                    Entries 1-1 of 1
Enter Line Operators below:                         Data Columns 3-6 of 39

     LINE                                 ALLOC    ALLOC   % NOT  COMPRESSED
     OPERATOR          DATA SET NAME      SPACE    USED    USED   FORMAT
    ---(1)----  ------------(2)------------ --(3)--  --(4)--  -(5)-  ---(6)----
                USER20.CLIST.CLIST             46       46      0  ???
                USER20.DFP220.DGTTLIB          46       46      0  ???
                USER20.ISMF.DGTLLIB            46       46      0  ???
                USER20.ISMF.DGTPLIB            46       46      0  ???
                USER20.ISMF.DUMP             4684     4356      7  ???
    *HBACKDS    USER20.ISMF.JCL               468       46     90  ???
                USER20.ISPFILE                 46       46      0  ???
                USER20.ISPPROF                 93       93      0  ???
                USER20.SPFLOG1.LIST          2623     1311     50  ???
                USER20.TEMP.DATASET          4684       93     98  ???
    ----------  ------  -----------  BOTTOM OF  DATA  -----------  ------  ----

Command ===>                                                Scroll ===> HALF
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

Figure 15. Data Set List panel after function completes

Using TSO commands

The commands for backing up SMS-managed and non-SMS-managed data sets or UNIX files are different. When you are backing up SMS-managed data sets, the SMS management class attributes that are used in your computing center direct whether DFSMShsm creates your backup version. With the TARGET keyword, you can direct the backup to a specific device when you are backing up either SMS or non-SMS data sets. The CC keyword also works for both SMS and non-SMS data sets.

All allocations to a data set are freed before requesting service from DFSMShsm when HBACKDS is issued from your TSO address space. This includes REXX programs that invoke the HBACKDS command.

Backing up a data set

Task: Create a backup version for a specific data set, a list of data sets, or a filter specification. You can back up a data set to either DASD or tape.

Only eligible data sets are backed up. Whether an SMS-managed data set is eligible to be backed up by command is determined by SMS management class attributes. For a non-SMS-managed data set, eligibility for backup is determined by the VERSIONS parameter of the HALTERDS command.

If the data set to be backed up is currently allocated, DFSMShsm attempts to deallocate it. DFSMShsm does not try to reallocate the data set at the end of HBACKDS processing.

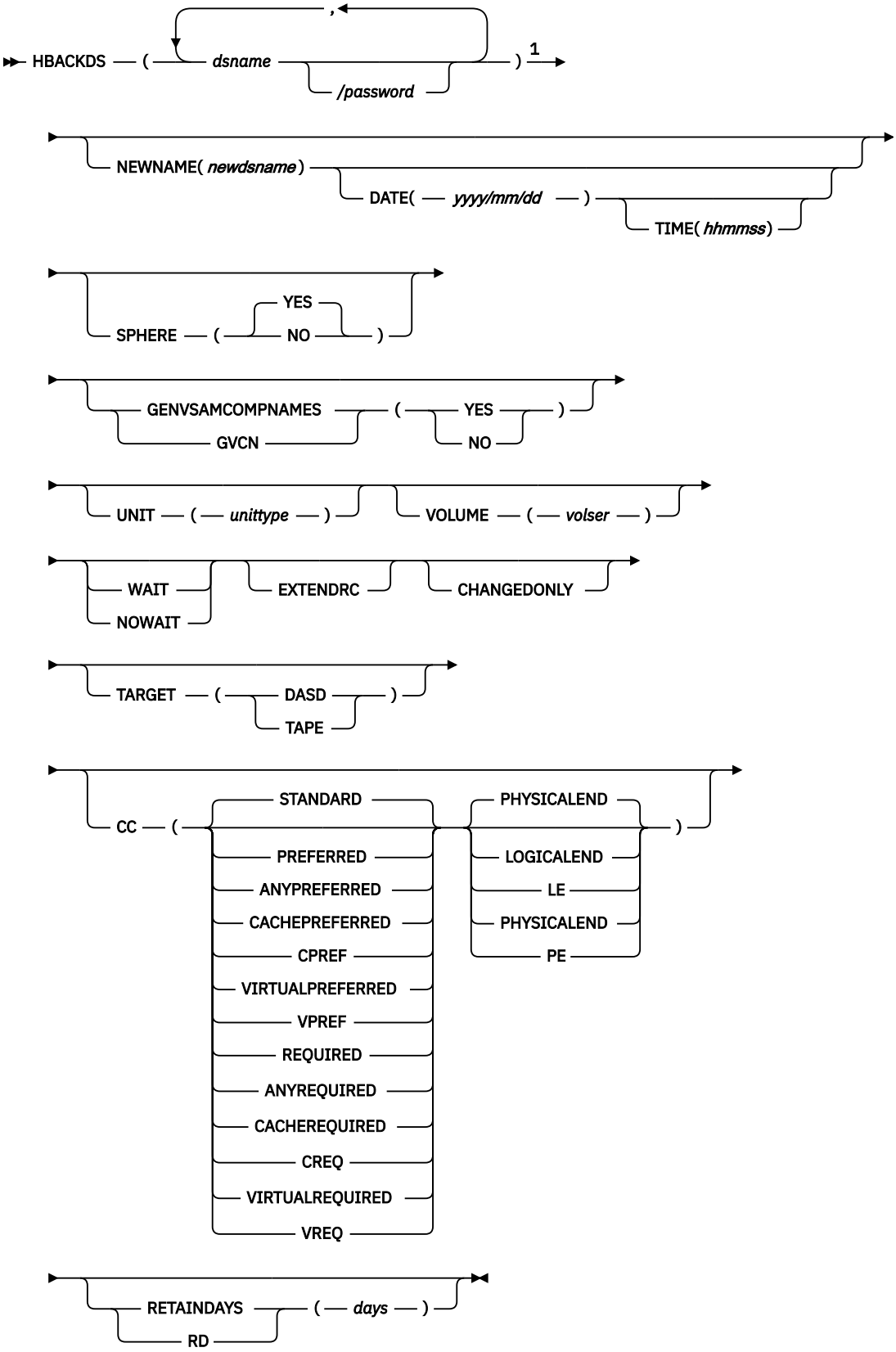
Note: When you back up a data set to DASD, it must fit on a migration level 1 volume. If it does not, the command fails.

RACF authority: To back up a RACF-protected data set, you must have RACF UPDATE authority to the data set.

Abbreviation: The minimum abbreviation for the HBACKDS command is HBACK.

Syntax for SMS-managed data sets

The following diagram presents the syntax of the HBACKDS command for **SMS-managed** data sets:

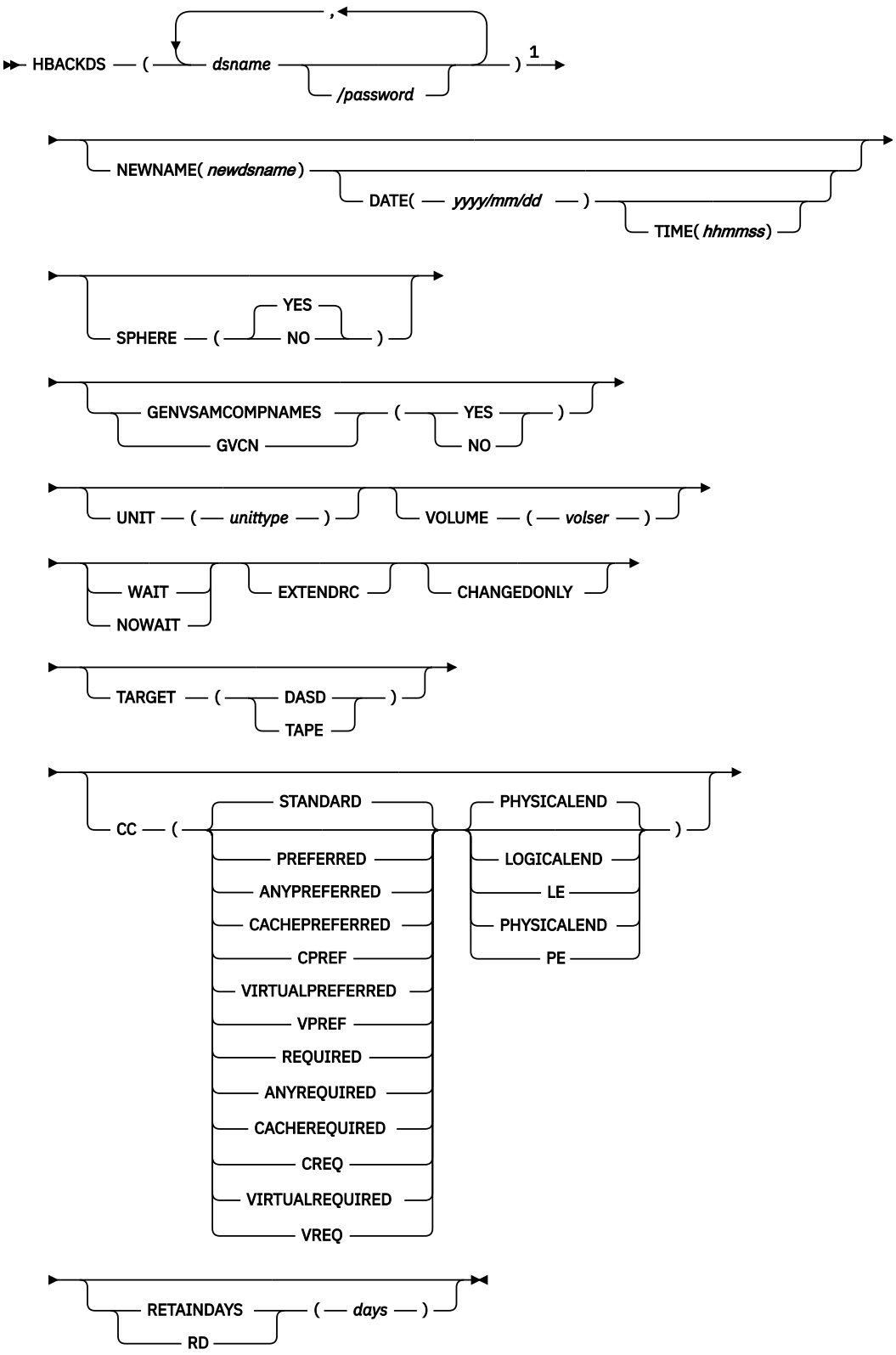


Notes:

[1] Parentheses around data set names are required only when multiple data set names are specified.

Syntax for non-SMS-managed data sets

The following diagram presents the syntax of the HBACKDS command for **non-SMS-managed** data sets:



Notes:

[1] Parentheses around data set names are required only when multiple data set names are specified.

Backing up a UNIX file

Task: Create a backup version for a specific UNIX file, a list of UNIX files, or a filter specification. You can back up a UNIX file to either DASD or tape.

Only eligible UNIX files are backed up. Whether a UNIX file that resides in an SMS-managed zFS is eligible to be backed up by command is determined by the SMS management class attributes of this system data set. For a UNIX file in a non-SMS-managed zFS, eligibility for backup is determined by the VERSIONS parameter of the HALTERDS command.

Restriction: When you back up a UNIX file to DASD, it must fit on a migration level 1 volume. If it does not, the command fails.

Any files that reside in an encrypted zFS will be decrypted as they are written to the backup.

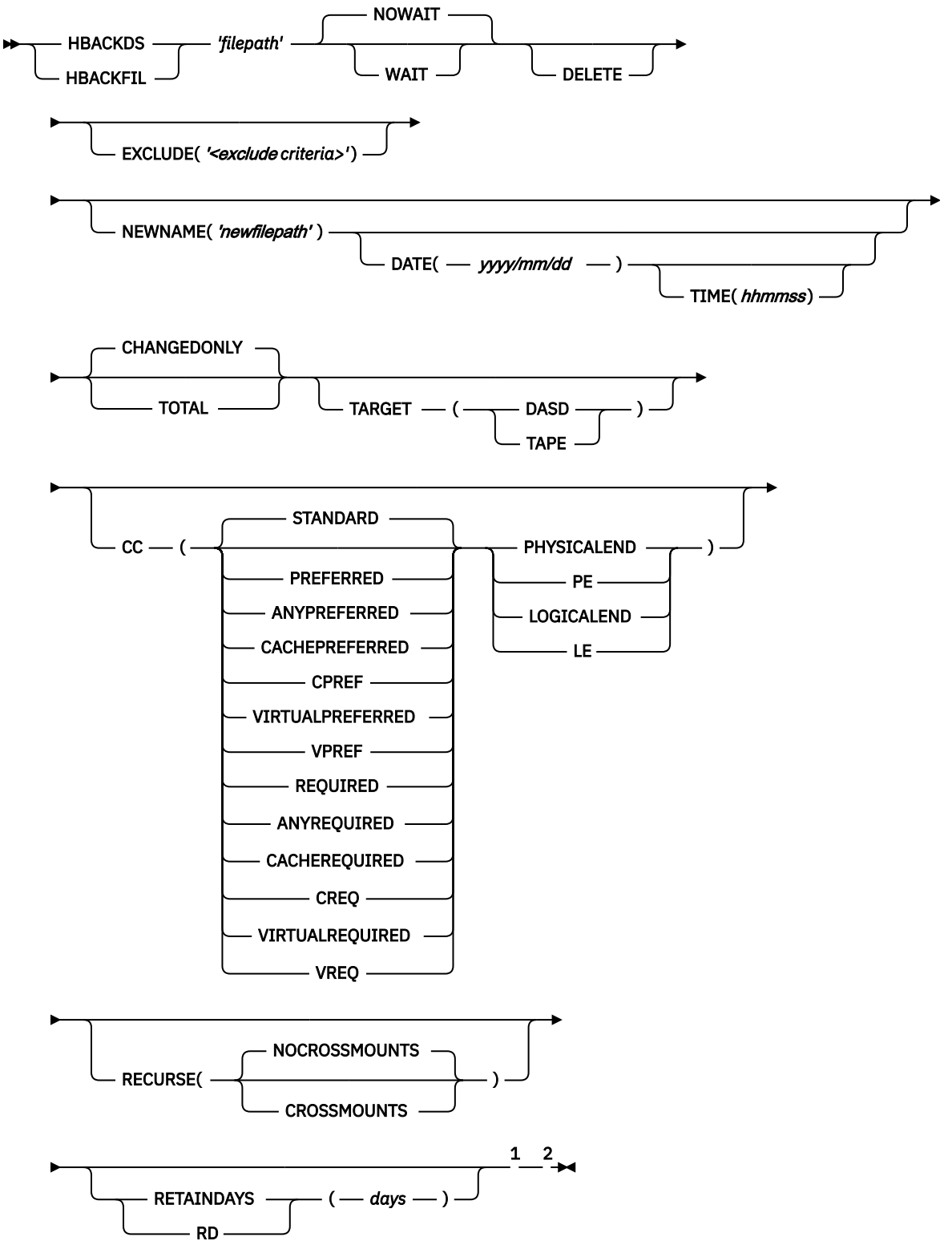
Security: When a user issues the HBACKDS command for a UNIX file, his authorization to the directories in the path as well as to the file will be checked. The user must have at least Search permissions on the directories that make up the path, as well as have read permission to the file. If a user does not have read permission to the file, but is the file owner, the backup can be created.

Alias: The alias HBACKDS command for UNIX files is HBACKFIL.

Abbreviation: The minimum abbreviation for the HBACKDS command is HBACK.

HBACKDS command syntax for UNIX files

The following diagram presents the syntax of the HBACKDS command for **UNIX** files:



Notes:

[1] Parentheses around data set names are required only when multiple data set names are specified.
[2] Only one UNIX file name can be specified on the command. A mixture of Data Set names and UNIX file names is not supported.

Required parameters

dsname: Specifying the name of one or more data sets to be copied for backup

This parameter applies to both SMS-managed and non-SMS-managed data sets.

Explanation

(*dsname*) or (*dsname*/*password* ...) is a required positional parameter that specifies the name of the data set or list of data set names that you want to back up. Passwords are not supported for SMS-managed data sets.

For *dsname*, substitute the name of the data set or list of data set names you want to back up. You can use a data set filter for any dsname in a list. For a discussion of how to specify data set names, see "Specifying data set names" on page 36.

For non-SMS data sets, specifying a filter requests only cataloged, not uncataloged, data sets. If you want to back up an uncataloged data set, you must specify its data set name explicitly.

For *password*, substitute the correct password and include the preceding slash (/). TSO does not prompt you for the password.

- For password-protected non-VSAM data sets, you must supply the password that allows you to write to the data set.
- For password-protected VSAM data sets, you must supply the master password of the base cluster.

Abbreviations

None.

Defaults

None.

Restrictions

- Because *dsname* is a required positional parameter, you must specify it immediately after HBACKDS.
- The volume on which the data set resides must be mounted before you issue the command.
- DFSMShsm does not process individual partitioned data set members. If you specify a partitioned data set name with a member name, message ARC1065I is issued and nothing is backed up.
- If *dsname* is fully qualified and refers to a VSAM data set, specify the base cluster name. The entire VSAM data set will be backed up.
- When you specify a password with a filter, all the password-protected data sets affected must have the same password. Otherwise, DFSMShsm authorization checking fails the backup of those password-protected data sets that are protected by some other password.

filepath: Specifying the name of one or more UNIX files to be copied for backup

This parameter specifies the name of the UNIX file that you want to back up.

Explanation

('*filepath*') is a required positional parameter that specifies the name of the UNIX file that you want to back up.

The specified name must be enclosed in single quotation marks and is considered to be made up of two parts: an absolute directory path that ends in a forward slash, followed by a *pattern* (`/directory/path/pattern`):

- The directory path must begin with a forward slash and indicates the directory where DFSMShsm should begin its search for file or empty directory to back up.
- The *pattern* can contain any valid file name characters. It can also contain wildcard characters question mark (?) and asterisk (*). If the file name contains the question mark (?), asterisk (*), or backslash (\) characters, the backslash character (\) must be used to escape that character. (for example, \?, *, or \\).
- If the *pattern* does not contain any wildcard characters, this is treated as an absolute path to a file – (`/u/dir1/file1.txt`) The single file is backed up.
- If the *pattern* doesn't contain any characters at all, or is only a single asterisk, this is treated as an absolute path to a directory - (for example, `/u/dir1/`). All files and empty directories that are found within the directory are backed up.
- Wildcard in *pattern* - An asterisk (*) can be used to match any number of characters within a file name. The asterisk can be used at any position in the pattern. A second asterisk can also be used at the end of the pattern to indicate any number of characters following specific text. A question mark (?) can be used to represent any single character in the file name. Multiple question mark characters are allowed.

Abbreviations

None.

Defaults

None.

Restrictions

None.

Optional parameters

CHANGEDONLY: Specifying whether to back up only changed data sets or UNIX files

This parameter applies to both SMS-managed and non-SMS-managed data sets or UNIX files.

Explanation

CHANGEDONLY is an optional parameter that specifies whether DFSMShsm backs up only those data sets specified (explicitly or by a filter) that have their change bits on in their data set VTOC entries.

This parameter specifies that UNIX files that have changed since their last backup by DFSMShsm be backed up. A change in the modification date or the metadata modification date will be sufficient to count as a change. A change in the meta-data modification date, but not the modification date, can be caused by truncation of the file, as well as a change to the number of hard links to the file. Files without a previous backup will also be backed up regardless of the modification dates. Additionally, if the most recent backup version in the DFSMShsm inventory is older than the change dates of the file, a backup copy will be created. The CHANGEDONLY keyword is overridden if specified or defaulted when NEWNAME is specified.

Abbreviations

The TSO abbreviation convention applies for CHANGEDONLY. There are no additional abbreviations.

Defaults

DFSMShsm backs up all the data sets specified, regardless of the state of the change bits. When processing a UNIX file, DFSMShsm only backs up the file if it has changed.

Note: The HBACKDS command will not back up a migrated data set if CHANGEDONLY is specified.

DATE: Specifying the address of a field containing the date

This parameter applies to both SMS-managed and non-SMS-managed data sets or UNIX files.

Explanation

DATE is an optional parameter that can be specified with NEWNAME. For *yyyy/mm/dd*, substitute the date to assign to the backup version. If DATE is specified without the NEWNAME parameter, the HBACKDS command will fail.

Abbreviations

None.

Defaults

None.

Restrictions

None.

DELETE: Specifying whether to delete the UNIX file after a successful backup

Explanation

DELETE is an optional parameter that specifies whether DFSMShsm should remove the UNIX file after a successful backup has been performed. Directories are not removed. If the RETAINDAYS keyword is not specified, a default RETAINDAYS value of 365 (patchable **MCVT_ARCHIVE_RD_DEFAULT** field value) is used as the period to retain the backup of this file regardless of other backup versions that are subsequently taken. If the RETAINDAYS keyword is specified, then the specified value is used as the retention period.

Backup versions are not automatically rolled off by DFSMShsm, even after the end of the retention period. To remove backup versions that have passed the RETAINDAYS criteria, issue the EXPIREBV command. Then the backup versions will be removed in compliance with the EXPIREBV logic.

Abbreviations

The TSO abbreviation convention applies for DELETE. There are no additional abbreviations.

Defaults

DFSMShsm does not delete a UNIX file after backup processing has been performed.

EXCLUDE and EXCLUDEF: Specifying files or directories to be excluded from processing

This parameter applies to both SMS-managed and non-SMS-managed data sets or UNIX files.

Explanation

EXCLUDE | EXCLUDEF are mutually exclusive, optional parameters that are used to specify files and directories that are to be excluded during Unix File backup processing.

EXCLUDE (<*exclude_criteria*>) - specifies a comma-separated list of exclude criteria directly on the command. The criteria is applied to the UNIX files examined during the Unix File backup processing.

The exclude criteria list specified on the command with the EXCLUDE keyword has the following restrictions and rules unique to the keyword:

- The <*exclude_criteria*> list must be specified in single quotes
- The <*exclude_criteria*> list cannot exceed 1023 characters

EXCLUDEF('<*filepath*>') - specifies the UNIX path to a file that contains the exclude criteria to be applied to the UNIX files examined during the Unix File backup processing. The file path must be specified in single quotes and must be an absolute path. Any imbedded single quotes in the filename must be specified with a second single quote, e.g. the filename exclude'criteria.txt would be specified as: 'excluded''criteria.txt'. (optional)

The exclude criteria file specified using the EXCLUDEF keyword has the following restrictions and rules unique to the keyword:

- Line starting with a blank character is a comment.
- Each line can only contain one criterion.
- A single line cannot be longer than 1023 characters.
- Total length of all exclude criteria with added commas to separate them cannot exceed 32767 characters. For 'n' number of criteria, 'n-1' number of COMMA should also be accounted for to calculate the total size.

Exclude criteria, whether specified on the command in a comma separated list using the EXCLUDE keyword or specified within a file using the EXCLUDEF keyword, must conform to the following rules:

- Absolute directory path, beginning and ending with a forward-slash character.
- Partial directory path, ending with a forward-slash character. If the directory name begins with a forward slash character, then it is considered an absolute path. If the directory name does not begin with a forward slash character, it is considered a relative path that begins at the directory requested on the command. A directory name that is a relative path is considered relative to the directory request on the command only, even when the command requests recursion.
- Filename pattern (does not contain forward slashes). Can contain * or ? wildcard. An asterisk (*) can match with 0 or more characters in a filename. A question mark (?) can match with a single character. Wildcard characters may be escaped with the backslash character if desired.
- A filename pattern can begin with an absolute or relative path, however wildcard characters can only be used in the filename pattern. A directory path containing an asterisk (*) or question mark (?) is considered an invalid pattern.
- If a filename contains special characters that are not to be treated as wildcard or escape characters i.e. an asterisk (*), question mark (?), or backslash (\), these characters must be escaped using a backslash (\). If these characters are not escaped, they will be treated as wildcard or escape characters.
- A directory wildcard may be specified in the directory portion of a criterion by specifying /.../ (<forward slash><period><period><forward slash>). A directory wildcard can match with 0 or more directories.
- If a criterion begins with a directory wildcard (/.../) then it is treated as a relative path.
- A comma cannot be used within the exclude criterion.
- A single criterion cannot exceed 1023 characters.
- A single forward slash or a single asterisk are treated as invalid patterns.
- A directory path cannot contain consecutive forward slashes.

The example below shows sample criteria in a file specified by the EXCLUDEF keyword. The same criteria could be specified on the command using the EXCLUDE keyword where each criterion is separated by a comma.

```
 Useful comment (maybe with commas) <= blank in 1st position - ignored
                                    <= empty line - ignored
/a/b/c/                             <= absolute directory
/a/b/c/x1.txt                       <= absolute directory with filename
/a/.../d/.../g/syslog1.txt          <= absolute directory with wildcards
/a/.../d/.../g/*log?.txt            <= absolute directory and filename with wildcards
e/f/g                               <= relative directory
e/f/g/mvs.log                       <= relative directory with filename
d/e/f/g/*log?.txt                   <= relative directory with filename wildcard
d/.../g/sys*.*                      <= relative directory and filename with wildcards
/.../d/.../g/sys*.*                 <= relative directory and filename with wildcards
*.log                               <= filename with wildcards
 *.log2                              <= blank in 1st position makes a comment, ignored
\*abc                               <= escaping wildcards - files with exact name *abc
\\abc                               <= escaping wildcards - files with exact name \abc
```

Restrictions

This parameter only applies when a file path is specified on the request. A maximum of 1023 characters can be specified in the list. Do not use the comma (,) character in filename patterns or directory names.

Defaults

No files are excluded from processing.

EXTENDRC: Requesting an extended set of return and reason codes

This parameter applies to both SMS-managed and non-SMS-managed data sets.

Explanation

EXTENDRC is an optional parameter that specifies that DFSMShsm return an extended set of return and reason codes while you are running DFSMShsm commands in a truly interactive mode (TSO or foreground). This option returns only the return and reason codes that are mapped into DFSMShsm messages that are issued to the users terminal. For detailed information on return codes that DFSMShsm returns for this command, see “Return codes from the extended set” on page 232.

Abbreviations

The TSO abbreviation convention applies for EXTENDRC.

Defaults

None.

Restrictions

The WAIT option must be specified with the EXTENDRC parameter when you are running DFSMShsm commands in a truly interactive mode (TSO or foreground).

GENVSAMCOMPNAMES: Overriding SETSYS DSBACKUP(GENVSAMCOMPNAMES)

This parameter applies to both SMS-managed and non-SMS-managed data sets.

Explanation

The GENVSAMCOMPNAMES specified setting overrides the SETSYS DSBACKUP(GENVSAMCOMPNAMES) setting.

- If GVCN=YES is specified, and *newdsname* represents a VSAM base cluster that is either migrated or uncataloged, DFSMShsm processes the request, and default names are assigned to the VSAM data and index components (`.data` and `.index`).
- If GVCN=NO is specified, and *newdsname* represents a VSAM base cluster that is either migrated or uncataloged, the HBACKDS command will fail because DFSMShsm is not able to assign the proper names to the data and index components.
- If the *newdsname* is uncataloged or has been migrated outside of DFSMShsm and the data set to be backed up is VSAM and has an associated AIX/PATH, the SPHERE(NO) keyword must be specified on the command.
- If GVCN is specified and the data set to back up is non-VSAM or is VSAM and is cataloged and not migrated, the GVCN keyword is ignored.

Abbreviations

GVCN

Defaults

None.

Restrictions

None.

NEWNAME: Specifying a backup version of a specified data set

This parameter applies to both SMS-managed and non-SMS-managed data sets.

Explanation

NEWNAME is an optional parameter that specifies the data set name to assign to the new backup version that is created by specifying the BACKDS command. The NEWNAME parameter must be fully qualified and in the standard data set name format.

newpath is a new directory path for the UNIX file backups. When a UNIX file is being processed, this subparameter requests DFSMShsm to create a backup of the requested UNIX files as if it had come from the specified directory *newpath*. The specified *newpath* must be a subset of the request directory path, and must start and end with a forward slash. When processing a request with the *newpath* parameter, the *newpath* value is checked against the request directory path starting at the end of the path, moving to the higher directory levels to ensure that the specified *newpath* is a subset matching the requirements above. If an intermediate directory of the request directory path is specified as the *newpath*, the remaining lower directory portions of the request directory path are appended (see example 1.4). The resulting new directory should not be equal to the request directory path (see examples 1.5 - 1.7 below which result in ARC1381I REAS=10). If the *newpath* is not a subset of the request directory, then the ARC1334I BACKUP VERSION NOT CREATED with REAS=23 is issued (see example 1.8).

The NEWNAME keyword assists with migrating backups from a previous product into DFSMShsm. Backups are recovered into a temporary directory and then those files are backed up by DFSMShsm, specifying the new root directory of the files using the NEWNAME keyword. DFSMShsm matches the last directory subset of the request. The CHANGEDONLY keyword is overridden if specified or defaulted when NEWNAME is specified.

Examples:

```
BACKDS '/tmp/2017-07-08/prod/webapp1/*' RECURSE NEWNAME('/prod/webapp1/') DATE(2017/07/08)
```

```
BACKDS ‘/tmp/2017-07-08/* RECURSE NEWNAME(‘/’) DATE(2017/07/08)
```

Incorrect:

```
BACKDS ‘/tmp/2017-07-08/prod/webapp1/*’ RECURSE NEWNAME(‘/user/myapp/’)
```

Examples showing the resulting backup if different paths are specified in the NEWNAME keyword.

- BACKDS '/x/y/z/file.txt'
- 1.1. NEWNAME('/') - is backed up as /file.txt
- 1.2. NEWNAME('/z/') - is backed up as /z/file.txt
- 1.3. NEWNAME('/y/z/') - is backed up as /y/z/file.txt
- 1.4. NEWNAME('/x/y/z/') - is an error
- 1.5. NEWNAME(‘/y/’) - is backed up as /y/z/file.txt

Note: It is best if the NEWNAME directory exists at the time of the backup. DFSMShsm will store the name of the containing ZFS data set in the backup record for future SMS-management checks. (This attribute is used for the number of versions to keep for roll-off processing, ALTERDS checking, and whether the Recover processing should end due to a No-Crossmounts condition on a recursive file request. If the NEWNAME directory doesn’t exist, DFSMShsm cannot store the containing ZFS name, and some functions, such as ALTERDS may be unable to be performed.

HBACKDS '/x/y/z/file.txt' with various *newpath* values:

1.1. NEWNAME('/') - is backed up as /file.txt.

1.2. NEWNAME('/z/') - is backed up as /z/file.txt.

1.3. NEWNAME('/y/z/') - is backed up as /y/z/file.txt.

1.4. NEWNAME('/y/') - is backed up as /y/z/file.txt, since '/z/' of the source path is appended to '/y/', and 'file.txt' is backed up as if it came from '/y/z/' directory.

1.6. NEWNAME('/x/') - is an error with ARC1381I REAS=10 issued.

1.7. NEWNAME('/x/y/') - is an error with ARC1381I REAS=10 issued.

1.8. NEWNAME('/not_subset/') - is an error with ARC1334I REAS=23 issued.

Abbreviations

None

Defaults

None.

Restrictions

None.

RETAINDAYS: Specifying a number of days to retain a backup copy

This parameter applies to both SMS-managed and non-SMS-managed data sets or UNIX files.

Explanation

RETAINDAYS is an optional parameter that specifies the number of days to retain a specific backup copy of a data set or UNIX file.

- If you specify RETAINDAYS, number of retain days is a required parameter that specifies a minimum number of days (0–50000) that DFSMShsm retains the backup copy.
- If you specify 99999, the data set backup version never expires. Any value that is given on the command line greater than 50000 (and other than 99999) causes a failure with an ARC1605I error message. When a value is specified via the ARCBDEXT, any value greater than 50000 is changed to

50000. A decimal value of 99999 indicates that the backup copy should never expire. Any value less than 0 is changed to 0. A RETAINDAYS value of 0 indicates that:

- The backup version might expire within the same day that it was created if EXPIREBV processing takes place,
- The backup version is kept as an active copy before roll-off occurs,
- The backup version is not managed as a retained copy.

SPHERE: Specifying whether components of a VSAM data set will be backed up with the base cluster

This parameter applies to both SMS-managed and non-SMS-managed data sets.

Explanation

SPHERE is an optional parameter that can be specified with NEWNAME. If YES is specified, a backup of the entire VSAM SPHERE is performed. If N0 is specified, a backup of the base cluster is performed and any associated AIXs or PATHs will not be backed up. If SPHERE is specified without a parameter, or if SPHERE is not specified at all, DFSMShsm attempts to back up the entire SPHERE. If SPHERE is specified without NEWNAME, the HBACKDS command fails. The default is YES.

Abbreviations

None.

Defaults

SPHERE(YES)

Restrictions

In order to backup the entire sphere, the following restrictions apply:

- No more than one PATH can be defined for the data set to back up, and no more than one PATH can be defined for the NEWNAME data set.
- No more than one AIX can exist for the data set to back up, and no more than one AIX can exist for the NEWNAME data set.

If multiple AIXs and/or PATHs exist for one or both of the data sets, specify SPHERE(NO) to back up the base cluster.

TIME: Specifying the address of a field containing the time

This parameter applies to both SMS-managed and non-SMS-managed data sets or UNIX files.

Explanation

TIME is an optional parameter that can be specified with NEWNAME and DATE keywords. For *hhmmss*, substitute the time to assign to the backup version. Specify '00' for *ss* if the seconds are unknown. If TIME is specified without DATE, the HBACKDS command will fail. If DATE is specified and TIME is not specified, DFSMShsm will set a time of 120000 (12 noon).

Abbreviations

None.

Defaults

120000

Restrictions

None.

TOTAL: Requesting a backup regardless of last backup date

This parameter only applies to UNIX files (not data sets).

Explanation

Specifying TOTAL indicates that a backup should be attempted regardless of the last backup date of the UNIX file.

Abbreviations

The TSO abbreviation convention applies for TOTAL. There are no additional abbreviations.

Defaults

DFSMShsm backs up all the UNIX files that have changed since the last backup date.

UNIT: Specifying the type of device

This parameter applies only to non-SMS-managed data sets.

Explanation

UNIT(*unittype*) is an optional parameter that specifies the type of unit on which the volume can be allocated for an uncataloged data set. For *unittype*, substitute the type of unit. The valid types of units are 3380, 3390, and 9345.

Abbreviations

The TSO abbreviation convention applies for UNIT. There are no additional abbreviations.

Defaults

None.

Restrictions

You must specify the UNIT parameter with the VOLUME parameter if any data set to be backed up is uncataloged. Do not specify the UNIT parameter if the data set to be backed up is a cataloged data set. If you specify the UNIT parameter, you must also specify the VOLUME parameter.

NEWNAME cannot be specified with UNIT and VOLUME.

VOLUME: Specifying the volume where the data set resides

This parameter applies only to non-SMS-managed data sets.

Explanation

VOLUME(*volser*) is an optional parameter used to specify the volume where the uncataloged data set to be backed up resides. For *volser*, substitute the serial number of the volume where the uncataloged data set to be backed up resides.

Abbreviations

The TSO abbreviation convention applies for VOLUME. There are no additional abbreviations.

Defaults

None.

Restrictions

You must specify the VOLUME parameter if any data set to be backed up is uncataloged. Do not specify the VOLUME parameter if the data set to be backed up is a cataloged data set. If you specify VOLUME, you must also specify UNIT and *unittype*.

WAIT and NOWAIT: Specifying whether to wait for the HBACKDS command to be completed

These parameters apply to both SMS-managed and non-SMS-managed data sets or UNIX files.

Explanation

`WAIT | NOWAIT` are mutually exclusive, optional parameters that are used to specify whether you want to wait for the HBACKDS command to complete.

WAIT specifies that you want to wait for the HBACKDS command to complete. When DFSMShsm successfully completes the HBACKDS process, the ARC1000I message is issued. If the HBACKDS process does not complete successfully, the ARC1001I message is issued. If you press the TSO Attention key before DFSMShsm completes the command, DFSMShsm issues the ARC1800I message and does not issue the ARC1000I message.

NOWAIT specifies that you do not want to wait for the HBACKDS command to complete. When DFSMShsm successfully receives the request, the ARC1007I message is issued. After DFSMShsm successfully completes the HBACKDS command, the ARC1000I message is issued. If the HBACKDS command does not complete successfully, the ARC1001I message is issued.

Abbreviations

The TSO abbreviation convention applies for WAIT and NOWAIT. There are no additional abbreviations.

Defaults

The default is NOWAIT.

Restrictions

You can specify WAIT or NOWAIT, but not both.

TARGET: Specifying the media target of the backup data set

This parameter applies to both SMS-managed and non-SMS-managed data sets or UNIX files.

Explanation

TARGET is an optional parameter that specifies that you want backup data sets or UNIX files targeted to either DASD or a backup tape.

DASD indicates that you want the data set or UNIX file initially backed up to ML1 DASD.

TAPE indicates that you want the data set or UNIX file backed up to tape.

Abbreviations

The TSO abbreviation convention applies for TARGET. There is no additional abbreviation.

Defaults

None. If you do not specify the TARGET keyword, DFSMShsm selects the output target device type.

Restrictions

You can specify either DASD or TAPE, but not both.

CC: Tailoring concurrent copy backups for SMS and non-SMS data sets or UNIX files

This parameter applies to both SMS-managed and non-SMS-managed data sets or UNIX files.

Explanation

CC is an optional parameter with which you can tailor concurrent copy backups, or UNIX File Snapshot. The parameters of CC are:

STANDARD
Indicates that you want to use standard backup methods without using concurrent copy, or UNIX File Snapshot.

REQUIRED
ANYREQUIRED
Indicates that you want to use concurrent copy as the backup method. Virtual concurrent copy is attempted first, if the storage subsystem on which the data set resides is capable of virtual concurrent copy and working-space data sets have been defined. Otherwise, cache-based concurrent copy is attempted if the storage subsystem is capable of it. If both types of concurrent copy are not possible or fail, the data set backup will fail.

When processing a UNIX file, DFSMShsm will attempt to create a UNIX File Snapshot of the file. If the UNIX File Snapshot cannot be successfully created, the backup will fail. Note: Some files such as hardlinks cannot be processed with Clone. If backing up a directory or many files, the overall request will fail if one of these types is encountered and is unable to be processed.

PREFERRED
ANYPREFERRED
indicates that you want to use concurrent copy as the preferred backup method. Virtual concurrent copy is attempted first, if the storage subsystem on which the data set resides is capable of virtual concurrent copy and working-space data sets have been defined. Otherwise, cache-based concurrent copy is attempted if the storage subsystem is capable of it. If both types of concurrent copy are not possible or fail, the data set backup continues as if the CC parameter was not specified. PREFERRED is the default if CONCURRENT is specified without a parameter.

When processing a UNIX file, DFSMShsm will attempt to create a UNIX File Snapshot of the file and take the backup from the UNIX File Snapshot after releasing serialization on the original. If the UNIX File Snapshot cannot be successfully created. Serialization will be obtained on the file and will be processed as if STANDARD was requested.

CACHEPREFERRED
CPREF
indicates that you want to use cache-based concurrent copy as the preferred backup method. If cache-based concurrent copy is not available, the data set backup continues as if the CC keyword was not specified.

When processing a UNIX file, DFSMShsm will attempt to create a UNIX File Snapshot of the file and take the backup from the UNIX File Snapshot after releasing serialization on the original. If the UNIX File Snapshot cannot be successfully created. Serialization will be obtained on the file and will be processed as if STANDARD was requested.

VIRTUALPREFERRED
VPREF
indicates that you want to use virtual concurrent copy as the preferred backup method. If virtual concurrent copy is not available the data set backup continues as if the CC keyword was not specified.

When processing a UNIX file, DFSMShsm will attempt to create a UNIX File Snapshot of the file and take the backup from the UNIX File Snapshot after releasing serialization on the original. If the UNIX File Snapshot cannot be successfully created. Serialization will be obtained on the file and will be processed as if STANDARD was requested.

CACHEREQUIRED
CREQ
indicates that you want to use cache-based concurrent copy as the backup method. The data set backup will fail if cache-based concurrent copy is not available.

DFSMShsm will attempt to create a UNIX File Snapshot of the file. If the snapshot cannot be successfully created, the backup will fail. Some files such as hard links cannot be processed with Clone. If backing up a directory or many files, the overall request will fail if one of these types is encountered and is unable to be processed.

VIRTUALREQUIRED
VREQ
indicates that you want to use virtual concurrent copy as the backup method. The data set backup will fail if virtual concurrent copy is not available.

DFSMShsm will attempt to create a UNIX File Snapshot of the file. If the UNIX File Snapshot cannot be successfully created, the backup will fail. Note that UNIX File Snapshot is not supported for hard links. Some files such as hard links cannot be processed with Clone. If backing up a directory or many files, the overall request will fail if one of these types is encountered and is unable to be processed.

PHYSICALEND
PE
Indicates that you want control returned to the application only after the backup has physically completed.

LOGICALEND
LE
Indicates that you want control returned to the application when the concurrent copy or UNIX File Snapshot initialization has completed.

Abbreviations

The TSO abbreviation convention applies for the CC subparameters CACHEPREFERRED, VIRTUALPREFERRED, CACHEREQUIRED, VIRTUALREQUIRED, LOGICALEND and PHYSICALEND. There are no additional abbreviations.

Defaults

If you do not specify any subparameters with the CC parameter, the defaults are STANDARD and PHYSICALEND.

Restrictions

By default, all users can use the CC options. However, if RACF indicates a lack of authority, DFSMShsm fails the backup request if concurrent copy is a requirement. If concurrent copy is not required and RACF indicates a lack of authority, DFSMShsm backs up the data set or UNIX file as if the concurrent copy keyword were not specified on the backup command.

You cannot use the CC option with the EXTENDRC parameter. EXTENDRC is an optional parameter that directs DFSMShsm to return an extended set of return and reason codes. These codes may not be completed until after physical completion of the backup. The HBACKDS command fails if you use both the CC and EXTENDRC keywords together.

If you use the CC option with LE or PE, you must also specify the option WAIT=YES.

The CC keyword applies to all data sets and UNIX files that result from filter resolution.

UNIX File Snapshot can only be initiated from the owning system for files located in a zFS that is mounted NORWSHARE. If the zFS is mounted RWSHARE, UNIX file Snapshot can be used from any system in the sysplex. The zFS **zfsadm fsinfo** command can be used to see details about the attributes of a filesystem:

```
zfsadm fsinfo -owner file_system_name
```

For more information about the command, see zfsadm fsinfo in *z/OS File System Administration*.

Examples of different ways to code the HBACKDS command

The following examples present different ways to code the HBACKDS command. The values are examples only. Do not interpret them as values that you should use for your system.

Backing up a data set and not waiting for completion

In this example, you are issuing the HBACKDS command to create a backup version of the cataloged data set PAC1234.LEVELMST.OUTLIST. The NOWAIT parameter indicates that you do not want to wait for the HBACKDS command to complete.

```
HBACKDS 'PAC1234.LEVELMST.OUTLIST' NOWAIT
```

Backing up a password-protected cataloged data set and waiting for completion

In this example, you are issuing the HBACKDS command to create a backup version for the uncataloged data set WIDRR.MSTLEVEL.LINKLIST protected with the password WRITE. A 3380 is the type of unit that volume GRAVU1 can reside on. The WAIT parameter indicates that you want to wait for the HBACKDS command to complete.

```
HBACKDS 'WIDRR.MSTLEVEL.LINKLIST'/WRITE VOLUME(GRAVU1) -
        UNIT(3380) WAIT
```

Backing up data sets with the same user prefix using an asterisk in the data set name and not waiting for completion

In this example, you are issuing the HBACKDS command to create backup versions for all cataloged data sets that have the same user prefix and descriptive qualifier. The NOWAIT parameter indicates that you do not want to wait for the HBACKDS to complete.

```
HBACKDS 'RRDIW.*.TEXT' NOWAIT
```

Backing up a data set and requesting the extended return and reason codes

In this example, you are issuing the HBACKDS command from a TSO session to create a backup version of the cataloged data set RPA5678.LEVELMST.OUTLIST. The WAIT EXTENDRC parameter indicates that you want to see the extended return and reason codes.

```
HBACKDS 'RPA5678.LEVELMST.OUTLIST' WAIT EXTENDRC
```

Backing up a data set that is targeted to DASD and waiting for completion

In this example, you are issuing the HBACKDS command to create a backup version of the cataloged data set PAC5678.LEVELMST.OUTLIST. The WAIT parameter indicates that you want to wait for the HBACKDS

process to complete before you receive notice of the completion. The TARGET(DASD) parameter indicates that you want to direct the backup data set to DASD, rather than to tape.

```
HBACKDS 'PAC5678.LEVELMST.OUTLIST' WAIT TARGET(DASD)
```

Backing up a data set that is targeted to tape and that uses concurrent copy as the preferred backup method

In this example, you are issuing the HBACKDS command to create a backup version of the cataloged data set PAC1234.LEVELMST.OUTLIST. The TARGET(TAPE) parameter indicates that you want to direct the backup data set to tape, rather than to DASD. The CC(PREFERRED) parameter indicates that you want concurrent copy to be the backup method, if it is available. If concurrent copy is not available, the data set will be backed up as if this keyword were not specified. Because the default is PHYSICALEND, control returns to the application when the data set has completed the backup operation.

```
HBACKDS 'PAC1234.LEVELMST.OUTLIST' TARGET(TAPE) CC(PREFERRED)
```

Backing up a data set with a specified retention period

In this example, you are backing up data sets with a specified retention period by specifying the RETAINDAYS keyword on the HBACKDS command. RETAINDAYS controls the minimum number of days that a backup copy of a data set is maintained. DFSMShsm uses the RETAINDAYS value to determine when a backup version expires.

```
HBACKDS (dsname1, dsname2, dsname3,..... dsnamen) RETAINDAYS(days)
```

Using UNIX shell commands (hbackup)

DFSMShsm provides a program, **hbackup**, to give UNIX shell users a way to create backups of their own UNIX files.

Description of the hbackup command

The **hbackup** command sends a request to DFSMShsm to create a backup copy of the matching file and empty directories. You can back up a UNIX file to either DASD or tape.

Only eligible UNIX files are backed up. Whether an SMS-managed UNIX file is eligible to be backed up by command is determined by the SMS management class attributes of the zFS that contains the file. For a UNIX file contained in a non-SMS-managed zFS file system, eligibility for backup is determined by the VERSIONS parameter of the HALTERDS command.

You can create backup copies of:

- One UNIX file.
- A list of UNIX files.
- All files within a directory.
- All files within subdirectories.
- A set of files based on a pattern specification that filters the selection of files to process.

Restriction: When you back up a UNIX file to DASD, it must fit on a migration level 1 volume. If it does not, the command fails.

RACF authority: To back up a UNIX file, you must be either the owner, or have read permission to the file.

Format of the hbackup command

hbackup [-cfhRXqwvd] [-t DASD|Tape] [-r *rdays*] -N [*path*] -D [*yyyy*/*mm*/*dd*] -T [*hhmmss*] [-C STD REQ PREF] [-p *max_sub_tasks*] [-e exclude_list|file] [-I retry=*nn*, delay=*min*, serialization=PREF|REQ] *file directory*/

You can specify a relative path, or an absolute path for the file name. A directory name that ends in a forward slash can also be specified to indicate that all files within that directory should have backup copies created. Additionally, you can specify wildcards if you enclose the `/path/pattern` in single quotation marks or double quotation marks. Without the quotation marks, the UNIX shell will expand the matching file names for the **hbackup** program and you will be limited in the usage of the DFSMShsm backup tasking levels.

You can use asterisks or question marks as wildcards.

- An asterisk (*) can be specified once within the pattern meaning to match any number of characters in a possible file name. It can also be specified a second time as the last character of the pattern meaning to match any number of trailing characters.
- A question mark (?) can be specified any number of times within the pattern, meaning to match exactly any one character.

Note: If the file name contains an actual asterisk (*), question mark (?), or backslash (\) character, the backslash character must be used preceding it, in addition to enclosing the file name in quotation marks.

You can specify multiple file or directory names to the command.

Options

-c
Only files that have changed since their last backup are processed. A change in the modification date or the metadata modification date is sufficient to count as a change. A change in the metadata modification date, but not the modification date, can be caused by file truncation or by a change to the number of hard links to the file. Files without a previous backup are also backed up regardless of the modification dates. If the most recent backup copy in the DFSMShsm inventory is older than the changed dates, a backup copy is created. This processing mode is the default. The CHANGEDONLY processing is overridden if specified or defaulted when NEWNAME (-N) is specified.

-f
Backs up the file regardless of whether the file has changed since the last backup date.

-C

An optional parameter with which you can tailor backups that use UNIX File Snapshot processing.

- STANDARD STD uses the standard backup methods.
- REQUIRED uses the UNIX File Snapshot processing as the backup method. A UNIX File Snapshot is established. Serialization on the file is only held long enough to create a temporary UNIX File Snapshot of the file. The file can continue to be updated and the clone is unaffected. The UNIX File Snapshot of the file lasts only as long as the time it takes to create the backup. If the UNIX File Snapshot cannot be created, the backup does not complete successfully.
- PREFERRED uses UNIX File Snapshot processing as the preferred backup method. If processing a UNIX file, a UNIX File Snapshot is established. If the UNIX File Snapshot cannot be successfully created, serialization is obtained on the file and is processed as if STANDARD was requested. Control is returned after physical end of processing when -C is in effect. Otherwise, if the UNIX File Snapshot processing is being done, control is returned after logical end of processing.

Restriction: UNIX File Snapshot can only be initiated from the owning system for files in a zFS that is mounted NORWSHARE. If the zFS is mounted RWSHARE, UNIX File Snapshot can be used from any system in the sysplex. Use the zFS **zfsadm fsinfo** command to see details about the attributes of a file system:

```
zfsadm fsinfo -owner file_system_name
```

-D *yyyy/mm/dd*
Requests DFSMShsm substitute the date to assign to the backup version. Can only be specified with -N (*newname*).

-h
Specifies that the list of acceptable options is printed to stdout. No further processing is performed.

-I

UNIX files that are in use at the time of backup will have their backup retried up to a specified maximum number of times, delaying a specified number of minutes in between each retry. On retry, an attempt to obtain exclusive serialization to the UNIX file will be made. If on retry exclusive serialization is obtained then a normal backup of the UNIX file will be made. If exclusive serialization cannot be obtained, then additional retries of the backup will be made until the maximum number of retries has been made. If after the maximum number of retries exclusive serialization cannot be obtained, the backup request will either fail or a backup of the file will be taken anyway, depending on if the command specified serialization was required or preferred.

The -I option has suboptions retry, delay, and serialization that enable the user to specify the maximum number of retries, the time to delay in between retries, and whether exclusive serialization is required or preferred. The -I option and its associated suboption has the following syntax.

```
-I retry=nn,delay=min,serialization=PREF|REQ
```

retry - Specifies the maximum number of retries. DFSMShsm will retry a maximum of *nn* times to back up a UNIX file after the first attempt fails because of the UNIX file is in use. For *nn*, specify a value 0 to 99. The default value is 0.

delay - Specifies the number of minutes to delay in between retries. DFSMShsm delays for *min* minutes before retrying a backup attempt which failed because the UNIX file is in use. For *min*, specify a value from 0 to 999. The default value is 15.

serialization - Specifies whether exclusive serialization of the UNIX file is required or preferred to make the backup. The default is serialization is required. The following are the possible values for the serialization suboption:

- PREF - Serialization is preferred. If the UNIX file is still in use after the max number of retries for the backup have been made, the UNIX file will be backed up anyway. A message indicating a fuzzy backup was made will be issued. If the UNIX file is not in use at that time, a normal backup will be made. If retry=0 is in effect and exclusive serialization could not be obtained on the first attempt then a fuzzy backup will be made.
- REQ - Serialization is required. If the UNIX file is still in use after the max number of retries for the backup have been made, the backup request will fail.

The -I suboptions can be specified in any order and any omitted suboption will have their default values used. However, at least one suboption must be specified.

zFS File Snapshot is not supported for in use UNIX files. If serialization=PREF and -C PREF or -C REQ are specified on the command and the UNIX file is in use at the time of backup, the backup request will still fail.

-N *path*
Requests DFSMShsm to create a backup of the files that are requested as if it had come from the specified path. The specified path must be a subset of the requested file or directory. The parameter is the absolute path of the directory name that the files should have after the backup is complete, and must start and end with a forward slash. When processing a request with the *newpath* parameter, the *newpath* value is checked against the request directory path starting at the end of the path, moving to the higher directory levels to ensure that the specified *newpath* is a subset matching the requirements above. If an intermediate directory of the request directory path is specified as the *newpath*, the remaining lower directory portions of the request directory path are appended (see example 1.4). The resulting new directory should not be equal to the request directory path (see examples 1.5 - 1.7

below which result in ARC1381I REAS=10). If the *newpath* is not a subset of the request directory, then the ARC1334I BACKUP VERSION NOT CREATED with REAS=23 is issued (see example 1.8).

The -D and -T are optional parameters that are only valid with the -N parameter.

hbackup -N {*newpath*} **'/x/y/z/file.txt'** with various *newpath* values:

1.1. **hbackup -N '/' '/x/y/z/file.txt'** - is backed up as `/file.txt`.
1.2. **hbackup -N '/z/' '/x/y/z/file.txt'** - is backed up as `/z/file.txt`.
1.3. **hbackup -N '/y/z/' '/x/y/z/file.txt'** - is backed up as `/y/z/file.txt`.
1.4. **hbackup -N '/y/' '/x/y/z/file.txt'** - is backed up as `/y/z/file.txt`, since `'/z/'` of the source path is appended to `'/y/'`, and `'file.txt'` is backed up as if it came from `'/y/z/'` directory.
1.5. **hbackup -N '/x/y/z/' '/x/y/z/file.txt'** - is an error with ARC1381I REAS=10 issued.
1.6. **hbackup -N '/x/' '/x/y/z/file.txt'** - is an error with ARC1381I REAS=10 issued.
1.7. **hbackup -N '/x/y/' '/x/y/z/file.txt'**- is an error with ARC1381I REAS=10 issued.
1.8. **hbackup -N '/not_subset/' '/x/y/z/file.txt'** - is an error with ARC1334I REAS=23 issued.

The NEWNAME keyword is intended to assist migrating backups from a previous product into DFSMShsm. Backups are recovered into a temporary directory, and then those files are backed up by DFSMShsm, specifying the new root directory of the files using the NEWNAME keyword. The `-c` option is overridden if specified or defaulted when NEWNAME is specified

For example:

```
hbackup -N /prod/webapp1/ -D 2017/07/08 '/tmp/2017-07-08/prod/webapp1/*'
hbackup -R -N / -D 2017/07/08 ‘/tmp/2017-07-08/*’
```

The following example shows incorrect syntax: :

```
hbackup -R -N /user/myapp/ ‘/tmp/2017-07-08/prod/webapp1/*’
```

The following examples show the backups that result when different paths are specified in the NEWNAME keyword.

BACKDS '/x/y/z/file.txt' NEWNAME('/') is backed up as `/file.txt`.
BACKDS '/x/y/z/file.txt' NEWNAME('/z/') is backed up as `/z/file.txt`.
BACKDS '/x/y/z/file.txt' NEWNAME('/y/z/') is backed up as `/y/z/file.txt`.
BACKDS '/x/y/z/file.txt' NEWNAME('/x/y/z/') is an error.
BACKDS '/x/y/z/file.txt' NEWNAME('/y/') is backed up as `/y/z/file.txt`.

It is best if the NEWNAME directory exists at the time of the backup. DFSMShsm stores the name of the containing zFS data set in the backup record for future SMS management checks. (This attribute is used for the number of versions to keep for roll off processing, ALTERDS checking, and whether the Recover processing should end due to a **No-Crossmounts** condition on a recursive file request. If the NEWNAME directory does not exist, DFSMShsm cannot store the containing zFS name and some functions, such as ALTERDS might be unable to be performed.

-p *max_sub_tasks*
Requests the DFSMShsm **hbackup** client to start up to *max_sub_tasks* processes to process file names passed on the command line. The default number of tasks is 4 and the maximum allowable is 32. This value does not impact the number of backup tasks the DFSMShsm address space uses.

-q
Requests quiet mode, where no messages are written to stdout.

-d
After a successful backup, the UNIX file is deleted. Directories are not deleted. If the `-r` option is not specified, a default value of 365 is used as the number of days to keep the backup even though newer backup versions have been created.

-e

Requests files or directories to be excluded from processing. Filename patterns that are specified in the exclude list can contain any valid filename characters and may contain the question mark (?) and asterisk (*) wildcard characters. The forward slash character is not allowed in the filename pattern.

- If the pattern file contains any of the specific ?, *, or \ characters, the backslash character (\) must be used to escape that character to indicate it is not a wildcard. For example, \?, *, or \\).
- An asterisk (*) can be used to match any number of characters within a file name. It can also be used at any position in the pattern.
- A second asterisk may also be used at the end of the pattern to indicate any number of characters following the pattern is acceptable.
- A question mark (?) can be used to represent any single character in the file name. Multiple question mark characters are allowed.
- A directory wildcard may be specified in the directory portion of a criterion by specifying /../ (<forward slash><period><period><period><forward slash>). A directory wildcard can match with 0 or more directories.
- A filename pattern can begin with an absolute or relative path, however wildcard characters can only be used in the filename pattern. A directory path containing an asterisk (*) or question mark (?) is considered an invalid pattern.

If the requested filename pattern does not include any wildcard characters, then that exact name is used to compare with files that are found in the subdirectories processed.

Directory names that are specified in the exclude list must end in a forward slash character. If the directory name begins with a forward slash character, then it is considered to be an absolute path. If the directory name does not begin with a forward slash character, it is considered to be a relative path that begins at the directory requested on the command.

A maximum of 1023 characters can be specified in the list. Do not use the comma (,) character in filename patterns or directory names.

-E

This specifies the UNIX path to a file that contains the exclude criteria to be applied to the UNIX files examined during the Unix File backup processing. The file path can be an absolute path or a path relative to the current working directory. Double quotes may need to be used to avoid additional processing buy the UNIX shell.

This option is mutually exclusive with the -e option.

The contents of the exclude criteria with the -e option:

- Line starting with a blank character is a comment.
- Each line can only contain one criterion.
- A single line cannot be longer than 1023 characters.
- Total length of all exclude criteria with added commas to separate them cannot exceed 32767 characters. For 'n' number of criteria, 'n-1' number of COMMA should also be accounted for to calculate the total size.
- Absolute directory path, beginning and ending with a forward-slash character.
- Partial directory path, ending with a forward slash character, then it is considered an absolute path. If the directory name does not begin with a forward slash character, it is considered a relative path that begins at the directory requested on the command. A directory name that is a relative path is considered relative to the directory requested on the command only, even when the command requests recursion.
- Filename pattern (does not contain forward slashes). Can contain * or ? wildcards. An asterisk (*) can match with 0 or more characters in a filename. A question mark (?) can match with a single character. Wildcard characters may be escaped with the backslash character if desired.

- A filename pattern can begin with an absolute or relative path however, wildcards characters can only be used in the filename pattern. A directory path containing an asterisk (*) or question mark (?) is considered an invalid pattern.
- If a filename contains special characters that are not to be treated as wildcards or escape characters i.e. an asterisk (*), question mark (?), or backslash (\), these characters must be escaped using a backslash (\). If these characters are not escaped, they will be treated as wildcards or escape characters.
- A directory wildcard may be specified in the directory portion of a criterion by specifying /.../ (<forward slash><period><period><period><forward slash>). A directory wildcard can match with 0 or more directories.
- If a criterion begins with a directory wildcard (/.../) then it is treated as a relative path.
- A comma cannot be used within the exclude criterion.
- A single criterion cannot exceed 1023 characters.
- A single forward slash or a single asterisk are treated as invalid patterns.
- A directory path cannot contain consecutive forward slashes.

The example below shoes sample criteria in a file specified by the EXCLUDEF keyword. The same criteria could be specified on the command using the EXCLUDE keyword where each criterion is separated by a comma.

```
Useful comment (maybe with commas) <= blank in 1st position - ignored
                                        <= empty line - ignored
/a/b/c/                                 <= absolute directory
/a/b/c/x1.txt                           <= absolute directory with filename
/a/.../d/.../g/syslog1.txt              <= absolute directory with wildcards
/a/.../d/.../g/*log?.txt                <= absolute directory and filename with
wildcards
e/f/g                                   <= relative directory
e/f/g/mvs.log                           <= relative directory with filename
d/e/f/g/*log?.txt                       <= relative directory with filename wildcard
d/.../g/sys*.*                          <= relative directory and filename with
wildcards
/.../d/.../g/sys*.*                     <= relative directory and filename with
wildcards
*.log                                   <= filename with wildcards
*.log2                                  <= blank in 1st position makes a comment,
ignored
\*abc                                   <= escaping wildcards - files with exact name
*abc
\\abc                                   <= escaping wildcards - files with exact name
\abc
```

-r *rdays*

rdays, is a number between 0 and 50000 indicating the minimum number of days that DFSMShsm is to retain the backup of the file. If you specify 99999, then the backup never expires. A value of 0 indicates that:

- The backup might expire on the same day it was created if EXPIREBV processing takes place,
- The backup version is kept as an active copy before roll-off occurs,
- The backup version is not managed as a retained copy.

-R

Specifies that DFSMShsm examine all files in the current directory and within subdirectories for files that match the requested pattern. If some subdirectories are within another file system, they are also examined.

-T*hhmmss*

Requests DFSMShsm substitute the time to assign to the backup version. If `-D` is specified, but `-T` is not, DFSMShsm assigns a time of 120000 (12 noon). This option can only be specified with `-n` and `-D` (*Newname*).

-w

The **hbackup** command does not wait for DFSMShsm to finish processing before it exits. If this option is specified, no messages are returned. This option is equivalent to the NOWAIT keyword for HBACKDS.

If this option is not specified, then you want to wait for the **hbackup**command to complete. After DFSMShsm successfully completes the **hbackup** command, the ARC1000I message is issued. If the **hbackup** command does not complete successfully, the ARC1001I message is issued. Because the default is WAIT, this affects the target (DASD or Tape) that DFSMShsm chooses.

The resulting target device can be different than what is chosen for an equivalent HBACKDS command due to the WAIT/NOWAIT default.

-v

Requests verbose output as processing is performed.

-X

Specifies that DFSMShsm processes all files that match the pattern in the directory tree. It starts at the specified directory and includes within subdirectories, and continues processing until another file system mount point is found. Processing is similar to -R with the difference being that subdirectories in a different file system are not examined.

Deleting expired backup versions of UNIX files

Retained backup versions that have met their retention period are not automatically deleted. To find and delete them, use the storage administrator EXPIREBV command.

Using inline backup

The inline backup function allows you to request a backup of a data set or UNIX file in a batch environment. Inline backup is a way of overcoming the problems of invoking the terminal monitor program (TMP) in the background in order to issue HBACKDS commands.

When you are invoking TMP, the HBACKDS command requires that you specify the fully qualified data set names or a filter name. In the case of a generation data group (GDG), you may not know this fully qualified data set name, and TMP does not allow you to specify a relative generation number. Also, in executing a batch job with TMP, if a data set is created (DISP=NEW), an exclusive enqueue is done on the data set name, and the enqueue is not released until the last job step referring to that data set has ended. If a job step backward references a newly created data set after the TMP job step is processed, the HBACKDS command fails.

Inline backup also allows you to back up data sets in the middle of a job. You can add a new step to a job by specifying the inline backup module as the program to start. You specify in specially named DD statements the data sets that are being backed up. Inline backup extracts the data set names associated with these DDNAME statements and then performs the backup.

The results of each data set backup attempt can be written to a specially named output data set. SNAP dumps of storage relating to inline backup can be written to a specially named output data set for certain error conditions.

Uncataloged data sets are not supported for inline backup.

Invoking inline backup

To invoke inline backup, perform the following tasks:

1. Include a step at the correct place in the job to execute a program called ARCINBAK. The PARM parameter allows you to specify the options TARGET and CC, from which you can target data set backups and concurrent copy support, respectively. These TARGET and CC parameter values apply to all backups in this job step.
2. For each UNIX file to be backed up, specify the name of the UNIX file to be processed by including a valid DD statement with a DDNAME of BACKxxxx, using the PATH= keyword.

Note:

a. Only cataloged data sets and SMS-managed open VSAM data sets are supported for inline backup. If volume and unit information is specified on the DD statement, an uncataloged data set is assumed, and the data set is not processed.

b. ARCINBAK does not support data sets allocated with any of the following three dynamic allocation options: XTIOT, UCB NOCAPTURE, and DSAB above the line, except when the calling program supplies an open DCB.

Any form of the data set name is acceptable to ARCINBAK. Specification of a relative generation number for a GDG or a reference to a DDNAME in a previous step is acceptable. You can also specify a VSAM cluster, or data or index components, or both.

3. A DD statement with a DDNAME of ARCPRINT can be optionally included in the ARCINBAK program job step. This DD statement defines a SYSOUT data set to contain messages about data sets for which a backup has been attempted.

   The possible messages are as follows:

```
BACKUP FOR (DSNAME) SUCCESSFUL
DDNAME (DDNAME) NOT BACKED UP, UNABLE TO GET ASSOCIATED JFCB
BACKUP FOR (DSNAME) FAILED, DATA SET NOT CATALOGED
BACKUP FOR (DSNAME) FAILED, RC = (RETURN CODE), REAS = (REASON CODE)
```

   At the completion of the ARCINBAK module job step, you will receive a return code as shown in Table 2 on page 82

Table 2. ARCINBAK return codes

CC=	Explanation
CC=0	All backups were successful.
CC=4	No DDNAMEs prefixed with BACK were found or the JFCB associated with a DDNAME could not be found.
CC=8	Backup of an uncataloged data set was attempted. Uncataloged data sets are not supported by inline backup.
CC=12	Backup of a data set failed. If the return code equals: **RC=0100** DFSMShsm is not active; request rejected. **RC=0001-0099** For message return codes and reason codes, see message ARC*nnnn*I using the REAS field, where *nnnn* is the return code. For RC=0004, see message ARC13*nn*I, where *nn* is the reason code.
CC=16	Parameter error.
CC=806	Link error.

4. You can specify the RETAINDAYS keyword with the ARCINBAK program. RETAINDAYS specifies a number of days to retain a specific backup copy of a data set. A single RETAINDAYS value applies to all of the data sets that are backed up under this job step. RETAINDAYS specifies a minimum number of days (0–50000) that DFSMShsm retains the backup copy. If you specify 99999, the data set backup version never expires. Any value greater than 50000 (and other than 99999) causes failure. A retain days value of 0 indicates, that:

   - The backup version might expire within the same day that it was created if EXPIREBV processing takes place,
   - The backup version is kept as an active copy before roll-off occurs,
   - The backup version is not managed as a retained copy.

5. A DD statement with a DDNAME of ARCSNAP can be included in the ARCINBAK program job step. This DD statement defines a SYSOUT data set for the output from a SNAP macro. The following storage areas are dumped to the SNAPDCB data set when the inline backup fails for any reason:
   - MWE storage can be dumped when an error occurs in issuing the service call.
   - A complete image of the task storage can be dumped when no DDNAMEs or data sets are processed.

Figure 16 on page 83 shows a job stream example of data sets that can or cannot be backed up by ARCINBAK in a batch environment. In this example, each data set backup is targeted to tape, and each data set will be backed up using the specified concurrent copy and RETAINDAYS options. For a description of the TARGET options, see “TARGET: Specifying the media target of the backup data set” on page 71. For a description of the CC options, see “CC: Tailoring concurrent copy backups for SMS and non-SMS data sets or UNIX files” on page 72.

```
//JOBNAME  JOB . . . ,USER=USERID,PASSWORD=USERPSWD
//STEP1    EXEC PGM=USERPGM
//SYSPRINT DD SYSOUT=A
//DSET1    DD DSN=USERID.N03.GDG(-1),DISP=OLD
//DSET2    DD DSN=USERID.N03.PSFB,DISP=OLD
//DSET3    DD DSN=USERID.N04.PSFB,DISP=OLD
//DSET4    DD DSN=USERID.N03.KSDS,DISP=OLD
/*
//STEP2    EXEC PGM=ARCINBAK,PARM=('RETAINDAYS(00365),
//              TARGET(TAPE),CC=(PREFERRED,PHYSICALEND)')
//ARCPRINT DD  SYSOUT=A
//ARCSNAP  DD  SYSOUT=A
//* ---------------------------------------------------------------
//*        BACKUP OF GDG DATA SET SHOULD BE SUCCESSFUL.
//* ---------------------------------------------------------------
//BACK01   DD  DSN=*.STEP1.DSET1,DISP=SHR
//* ---------------------------------------------------------------
//*        BACKUP OF NON-VSAM DATA SET SHOULD BE SUCCESSFUL.
//* ---------------------------------------------------------------
//BACK02   DD  DSN=*.STEP1.DSET2,DISP=SHR
//* ---------------------------------------------------------------
//*        BACKUP OF VSAM DATA SET SHOULD BE SUCCESSFUL.
//* ---------------------------------------------------------------
//BACK03   DD  DSN=*.STEP1.DSET4,DISP=SHR
//* ---------------------------------------------------------------
//*        BACKUP OF GDG DATA SET SHOULD BE SUCCESSFUL.
//* ---------------------------------------------------------------
//BACK04   DD  DSN=USERID.N01.GDG.G0001V00,DISP=SHR
//* ---------------------------------------------------------------
//*        BACKUP OF NON-VSAM DATA SET SHOULD BE SUCCESSFUL.
//* ---------------------------------------------------------------
//BACK05   DD  DSN=USERID.N01.PSFB,DISP=SHR
//* ---------------------------------------------------------------
//*        BACKUP OF UNCATALOGED DATA SET SHOULD FAIL.
//* ---------------------------------------------------------------
//BACK06   DD  DSN=USERID.N02.UNCAT,VOL=SER=VOL003,UNIT=3390,DISP=SHR
//* ---------------------------------------------------------------
//*        BACKUP OF VSAM DATA SET SHOULD BE SUCCESSFUL.
//* ---------------------------------------------------------------
//BACK07   DD  DSN=USERID.N01.KSDS,DISP=SHR
//* ---------------------------------------------------------------
//*        BACKUP OF OPEN IN-USE VSAM DATA SET SHOULD FAIL.
//* ---------------------------------------------------------------
//BACK08   DD  DSN=USERID.N02.KSDS,DISP=SHR
//* ---------------------------------------------------------------
//*        BACKUP OF RACF PROTECTED NON-VSAM DATA SET
//*        BY AN UNAUTHORIZED USER SHOULD FAIL.
//* ---------------------------------------------------------------
//BACK09   DD  DSN=USERXX.N02.PSFB,DISP=SHR
//* ---------------------------------------------------------------
//*        DDNAME PREFIX OTHER THAN BACK IS NOT PROCESSED.
//* ---------------------------------------------------------------
//BAK01    DD  DSN=*.STEP1.DSET3,DISP=SHR
//* ---------------------------------------------------------------
//*        DDNAME PREFIX OTHER THAN BACK IS NOT PROCESSED
//* ---------------------------------------------------------------
//BAK02    DD  DSN=USERID.N02.PSFB,DISP=SHR
/*
```

Figure 16. Example of inline backup job stream

The return code from processing the inline backup job stream example of the ARCINBAK program is 12, and the resulting messages for each DDNAME prefixed with BACK are described in Figure 17 on page 84.

```
BACKUP FOR USERID.N03.GDG.G0001V00      SUCCESSFUL
BACKUP FOR USERID.N03.PSFB              SUCCESSFUL
BACKUP FOR USERID.N03.KSDS              SUCCESSFUL
BACKUP FOR USERID.N01.GDG.G0001V00      SUCCESSFUL
BACKUP FOR USERID.N01.PSFB              SUCCESSFUL
BACKUP FOR USERID.N02.UNCAT             FAILED, DATA SET NOT CATALOGED
BACKUP FOR USERID.N01.KSDS              SUCCESSFUL
BACKUP FOR USERID.N02.KSDS              FAILED, RC = 056, REAS = 016
BACKUP FOR USERXX.N02.PSFB              FAILED, RC = 039, REAS = 008
```

Figure 17. Example of messages resulting from inline backup job stream

Chapter 15. HBACKDSU: Backing up data sets

The HBACKDSU command is an alias to the HBACKDS command. All parameters that are valid for the HBACKDS command are valid for HBACKDSU command.

The abbreviation for HBACKDSU is HBACKU.

Chapter 16. HBDELETE: Deleting backup versions

This topic describes how to delete backup versions of data sets or UNIX files using ISMF or TSO. This command applies to both SMS-managed and non-SMS-managed data sets or UNIX files and is intended to supplement the automatic functions of DFSMShsm.

Using ISMF

The following steps present an example of how to use the HBDELETE line operator to delete backup versions of a data set. In our example, we have used USER20.SAMPLE.DATASET as a sample data set name.

1. Generate a list of data sets as explained in Chapter 4, “Methods of performing tasks,” on page 13.
2. Enter the HBDELETE line operator in the line operator column next to USER20.SAMPLE.DATASET as described in Figure 18 on page 87.

```
  Panel  List  Dataset  Utilities  Scroll  Help
------------------------------------------------------------------------------
                               DATA SET LIST
                                                      Entries 1-1 of 1
Enter Line Operators below:                           Data Columns 3-6 of 39

     LINE                                  ALLOC    ALLOC   % NOT  COMPRESSED
     OPERATOR          DATA SET NAME       SPACE    USED    USED   FORMAT
    ---(1)----  ------------(2)------------ --(3)--  --(4)--  -(5)-  ---(6)----
                USER20.CLIST.CLIST              46       46      0  ???
                USER20.DFP220.DGTTLIB           46       46      0  ???
                USER20.ISMF.DGTLLIB             46       46      0  ???
                USER20.ISMF.DGTPLIB             46       46      0  ???
                USER20.ISMF.DUMP              4684     4356      7  ???
                USER20.ISPFILE                  46       46      0  ???
                USER20.ISPPROF                  93       93      0  ???
    HBDELETE    USER20.SAMPLE.DATASET          468       46     90  ???
                USER20.SPFLOG1.LIST           2623     1311     50  ???
                USER20.TEMP.DATASET           4684       93     98  ???
    ----------  ------  -----------  BOTTOM OF  DATA  -----------  ------  ----

Command ===>                                                  Scroll ===> HALF
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

Figure 18. Data Set List Panel with HBDELETE Selected

The HBDELETE Entry panel appears.

3. Complete the HBDELETE Entry panel as described in “HBDELETE Entry Panel” on page 88. Up to five panels can be displayed. In each panel, the backup version, date, and time of the backup are displayed as two lists with headers. If Y is entered for the DELETE ALL VERSIONS field, only one HBDELETE Entry panel is displayed.

   Note: Retained backup versions are not displayed on these panels. Entering Y for the DELETE ALL VERSIONS field will delete all active and retained backup copies. To delete an individual retained backup copy, use the DFSMShsm HLIST DSNAME(dsname) BCDS command to obtain a complete list of the active and retained backup copies of this data set. Then issue the HBDELETE command with the DATE and TIME keywords.

HBDELETE Entry Panel

```
  Panel  Utilities  Scroll  Help
------------------------------------------------------------------------------
                           HBDELETE ENTRY PANEL                 Page 1 of 5

Specify Y to Delete all or individual Backup Versions for
 Data Set: USER20.SAMPLE.DATASET
 Delete All Versions  . . N  (Y or N)
 Data Set Password  . . .           (if password protected)

Version  Date    Time    Delete(Y/N) |  Version  Date    Time    Delete(Y/N)
-------------------------------------|-------------------------------------
  100    94100   00:58       N       |    099    94099   12:36       N
  098    94098   00:58       N       |    097    94097   12:36       N
  096    94096   00:58       N       |    095    94095   12:36       N
  094    94094   00:58       N       |    093    94093   12:36       N
  092    94092   00:58       N       |    091    94091   12:36       N
  090    94090   00:58       N       |    089    94089   12:36       N
  088    94088   00:58       N       |    087    94087   12:36       N
  086    94086   00:58       N       |    085    94085   12:36       N
  084    94084   00:58       N       |    083    94083   12:36       N

Command ===>
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

```
  Panel  Utilities  Scroll  Help
------------------------------------------------------------------------------
                           HBDELETE ENTRY PANEL                 Page 2 of 5

Specify Y to Delete individual Backup Versions for
 Data Set: USER20.SAMPLE.DATASET

Version  Date    Time    Delete(Y/N) |  Version  Date    Time    Delete(Y/N)
-------------------------------------|-------------------------------------
  082    94082   00:58       N       |    081    94081   12:36       N
  080    94080   00:58       N       |    079    94079   12:36       N
  078    94078   00:58       N       |    077    94077   12:36       N
  076    94076   00:58       N       |    075    94075   12:36       N
  074    94074   00:58       N       |    073    94073   12:36       N
  072    94072   00:58       N       |    071    94071   12:36       N
  070    94070   00:58       N       |    069    94069   12:36       N
  068    94068   00:58       N       |    067    94067   12:36       N
  066    94066   00:58       N       |    065    94065   12:36       N
  064    94064   00:58       N       |    063    94063   12:36       N
  062    94062   00:58       N       |    061    94061   12:36       N

Command ===>
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

```
  Panel  Utilities  Scroll  Help
------------------------------------------------------------------------------
                           HBDELETE ENTRY PANEL                 Page 3 of 5

Specify Y to Delete individual Backup Versions for
 Data Set: USER20.SAMPLE.DATASET

Version  Date    Time    Delete(Y/N) |  Version  Date    Time    Delete(Y/N)
-------------------------------------|-------------------------------------
  060    94060   00:58       N       |    059    94059   12:36       N
  058    94058   00:58       N       |    057    94057   12:36       N
  056    94056   00:58       N       |    055    94055   12:36       N
  054    94054   00:58       N       |    053    94053   12:36       N
  052    94052   00:58       N       |    051    94051   12:36       N
  050    94050   00:58       N       |    049    94049   12:36       N
  048    94048   00:58       N       |    047    94047   12:36       N
  046    94046   00:58       N       |    045    94045   12:36       N
  044    94044   00:58       N       |    043    94043   12:36       N
  042    94042   00:58       N       |    041    94041   12:36       N

Command ===>
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

```
  Panel  Utilities  Scroll  Help
------------------------------------------------------------------------------
                           HBDELETE ENTRY PANEL                 Page 4 of 5

Specify Y to Delete individual Backup Versions for
 Data Set: USER20.SAMPLE.DATASET

Version  Date    Time    Delete(Y/N) |  Version  Date    Time    Delete(Y/N)
-------------------------------------|-------------------------------------
  040    94040   00:58       N       |    039    94039   12:36       N
  038    94038   00:58       N       |    037    94037   12:36       N
  036    94036   00:58       N       |    035    94035   12:36       N
  034    94034   00:58       N       |    033    94033   12:36       N
  032    94032   00:58       N       |    031    94031   12:36       N
  030    94030   00:58       N       |    029    94029   12:36       N
  028    94028   00:58       N       |    027    94027   12:36       N
  026    94026   00:58       N       |    025    94025   12:36       N
  024    94024   00:58       N       |    023    94023   12:36       N
  022    94022   00:58       N       |    021    94021   12:36       N

Command ===>
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

```
  Panel  Utilities  Scroll  Help
------------------------------------------------------------------------------
                           HBDELETE ENTRY PANEL                 Page 5 of 5

Specify Y to Delete individual Backup Versions for
 Data Set: USER20.SAMPLE.DATASET

Version  Date    Time    Delete(Y/N) |  Version  Date    Time    Delete(Y/N)
-------------------------------------|-------------------------------------
  020    94020   00:58       N       |    019    94019   12:36       N
  018    94018   00:58       N       |    017    94017   12:36       N
  016    94016   00:58       N       |    015    94015   12:36       N
  014    94014   00:58       N       |    013    94013   12:36       N
  012    94012   00:58       N       |    011    94011   12:36       N
  010    94010   00:58       N       |    009    94009   12:36       N
  008    94008   00:58       N       |    007    94007   12:36       N
  006    94006   00:58       N       |    005    94005   12:36       N
  004    94004   00:58       N       |    003    94003   12:36       N
  002    94002   00:58       N       |    001    94001   12:36       N

Command ===>
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

On the DATA SET LIST panel, the asterisk next to the HBDELETE in the line operator column (Figure 19 on page 90) indicates that the deletion was successful.

```
  Panel  List  Dataset  Utilities  Scroll  Help
------------------------------------------------------------------------------
                              DATA SET LIST
                                                      Entries 1-1 of 1
Enter Line Operators below:                           Data Columns 3-6 of 39

     LINE                                    ALLOC    ALLOC   % NOT  COMPRESSED
     OPERATOR          DATA SET NAME         SPACE    USED    USED   FORMAT
    ---(1)----  ------------(2)------------ --(3)--  --(4)--  -(5)-  ---(6)----
                USER20.CLIST.CLIST              46       46      0  ???
                USER20.DFP220.DGTTLIB           46       46      0  ???
                USER20.ISMF.DGTLLIB             46       46      0  ???
                USER20.ISMF.DGTPLIB             46       46      0  ???
                USER20.ISMF.DUMP              4684     4356      7  ???
                USER20.ISPFILE                  46       46      0  ???
                USER20.ISPPROF                  93       93      0  ???
    *HBDELETE   USER20.SAMPLE.DATASET          468       46     90  ???
                USER20.SPFLOG1.LIST           2623     1311     50  ???
                USER20.TEMP.DATASET           4684       93     98  ???
    ----------  ------  -----------  BOTTOM OF  DATA  -----------  ------  ----

Command ===>                                                 Scroll ===> HALF
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

Figure 19. Data Set List Panel After Function Completes

For more information on using DFSMShsm/ISMF line operators, see *z/OS DFSMS Using the Interactive Storage Management Facility* or use the online help provided with ISMF.

Using TSO

The commands for deleting backup versions of SMS-managed and non-SMS-managed data sets or UNIX files are different.

With SMS-managed data sets, you only need to specify the backup version you want to delete. With non-SMS-managed data sets, you can delete the backup versions DFSMShsm created from uncataloged data sets.

Deleting backup versions of a data set or UNIX file

Task

Delete all backup versions of a specific cataloged or uncataloged data set or UNIX file, specific backup versions by version number, or delete backup versions that were created on a specified date and at a specific time. A retired version is a specially marked backup version that DFSMShsm created before it deleted the original data set during the data set retirement space management process. The only way you can delete a retired version is to specify its version number, or the date and time when the backup version was created.

RACF authority

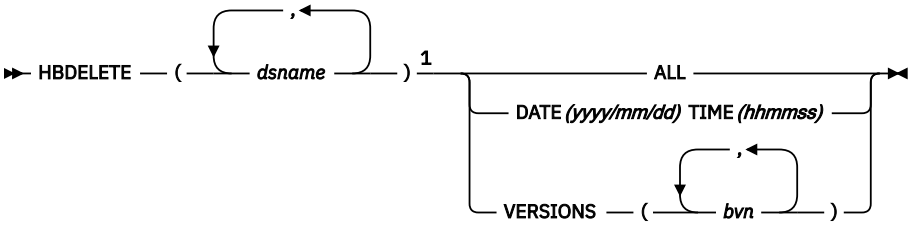
To delete specific backup versions of a RACF-protected data set, you must have RACF ALTER authority to the data set from which the backup version was created. A user must have Write permission to the UNIX file, or be the owner in order to delete a backup of the UNIX file. If the UNIX file currently exists, DFSMShsm will check for write permission to the current UNIX file, including Search permission to the directories in the path. If the UNIX file does not currently exist, DFSMShsm will check for write permission to the UNIX file using the permissions that existed at the time of the last backup.

Abbreviations

The minimum abbreviation for the HBDELETE command is HBDEL.

Syntax for SMS-managed data sets

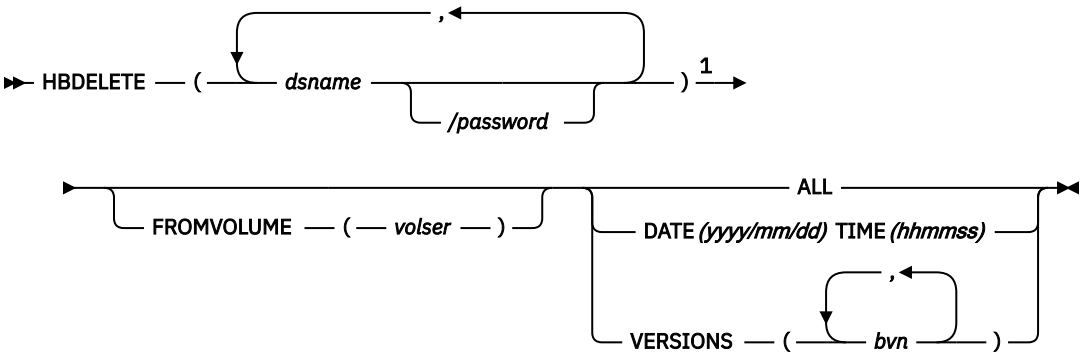
The following diagram presents the syntax of the HBDELETE command for **SMS-managed** data sets:



Notes:

[1] Parentheses around data set names are required only when multiple data set names are specified.

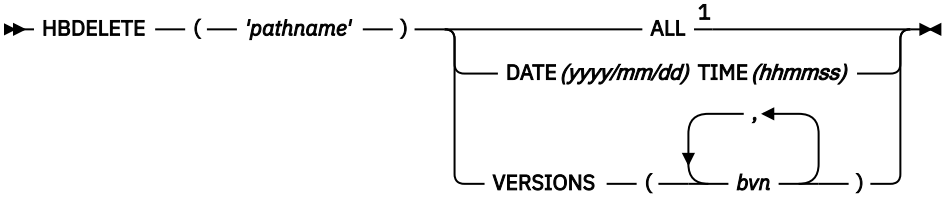
The following diagram presents the syntax of the HBDELETE command for **non-SMS-managed** data sets:



Notes:

[1] Parentheses around data set names are required only when multiple data set names are specified.

The following diagram presents the syntax of the HBDELETE command for **UNIX** files:



Notes:

[1] Parentheses around data set names are required only when multiple UNIX file set names are specified.

Required parameters

The follow parameters are required parameters of the HBDELETE command. If you do not specify any of these parameters, the HBDELETE fails with a parse error.

ALL: Deleting all backup versions

ALL specifies that all of the backup copies of a data set or UNIX file are to be deleted, including active and retained copies. You can specify ALL for one or more data sets or UNIX files. If you specify ALL for multiple data sets or UNIX files, all backup copies for all specified data sets or UNIX files are deleted. If you specify a partially qualified data set, all data sets that meet the filter criteria are deleted. ALL is mutually exclusive with DATE TIME and VERSIONS

Abbreviations

None.

Default

None.

SMS relationship

This parameter applies to SMS-managed and non-SMS-managed data sets or UNIX files.

Restrictions

ALL does not delete retired versions.

DATE TIME: Deleting a backup version that was created on a specific date and time

DATE(*yyyy/mm/dd*) and TIME(*hhmmss*) specify that a backup version that was created on a specified date and at a specified time is to be deleted.

yyyy/mm/dd
The date when the backup version to be deleted was created.

hhmmss
The time when the backup version to be deleted was created.

You can use DATE and TIME to delete both active and retained backup copies that match the specified criteria. DATE TIME is mutually exclusive with ALL and VERSIONS.

Abbreviations

None.

Default

None.

SMS relationship

This parameter applies to SMS-managed and non-SMS-managed data sets.

Restrictions

The following restrictions apply to the DATE TIME parameter:

- You must specify DATE and TIME together, otherwise the HBDELETE command fails.
- If you specify FROMVOLUME with the DATE and TIME keywords, the command fails. The command also fails if you specify VERSIONS(0).

VERSIONS: Specifying the number of the backup versions to be deleted

VERSIONS(*bvn ...*) specifies that DFSMShsm is to delete specific backup versions of a data set or UNIX file. You can specify multiple backup version numbers. If you specify multiple data set or UNIX file names and multiple version numbers, DFSMShsm applies each number you specified with VERSIONS to each data set or UNIX file name that you specified with *dsname*.

bvn
The one-to-three digit decimal number of a particular backup version that is to be deleted. You can obtain backup version numbers by issuing an HLIST command and specifying the data set name or UNIX file name and the BACKUPCONTROLDATASET parameter.

VERSIONS is mutually exclusive with ALL and DATE TIME.

Abbreviations

The TSO abbreviation convention applies for VERSIONS. There are no additional abbreviations.

Default

None.

SMS relationship

This parameter applies to both SMS-managed and non-SMS-managed data sets or UNIX files.

Restrictions

You cannot delete retained backup copies with the VERSIONS keyword.

dsname: Specifying the name of the data set backup versions to be deleted

(*dsname*...) or (*dsname*/*password* ...) is a required positional parameter you use to specify the name of the data set or list of data set names whose backup versions you want to delete.

dsname
The data set name or list of names of the data set whose backup versions are to be deleted. The data sets can be either cataloged or uncataloged. To delete all the backup versions of a cataloged data set, you specify only the data set name.

/password
The password including the preceding slash (/). TSO does not prompt you for the password.

- For a password-protected non-VSAM data set, you must supply the password that allows you to write to the data set.
- For a password-protected VSAM data set, you must supply the master password of the base cluster.

Abbreviations

None.

Default

None.

SMS relationship

This parameter applies to both SMS-managed and non-SMS-managed data sets.

Restrictions

The following restrictions apply to the *dsname* parameter:

- Because *dsname* or *pathname* is a required positional parameter, you must specify it immediately after HBDELETE.
- A mixture of UNIX file names and data set names may be specified on one HBDELETE request.

- DFSMShsm does not process individual partitioned data set members. If you specify a partitioned data set name with a member name, DFSMShsm rejects the request.
- You cannot use any wild card (%, *, or **) in a data set name.

pathname: Specifying the name of the UNIX file whose backup versions are to be deleted

Explanation

('*pathname*') is a required positional parameter that specifies the absolute path name of the UNIX file or list of absolute path UNIX file names whose backup versions you want to delete. UNIX path names must be enclosed in single quotes starting with the forward slash character. If the UNIX file name has a single quotation mark as part of the file name, specify two single quotation marks in the path name instead of one.

Some special characters that are allowed by UNIX cannot be processed by the HBDELETE command. Instead, the UNIX shell command, *hbdelete*, might be used to delete backup versions of files with these characters by using the backslash character. For more information, see "Using the UNIX shell (hbdelete)" on page 95.

Default

None.

Optional parameters

The follow parameters are optional parameters of the HBDELETE command.

FROMVOLUME: Specifying the volume on which the data set resided when the backup versions were created

FROMVOLUME(*volser*) is an optional parameter that you should include only if DFSMShsm created the specified backup versions from an uncataloged data set. FROMVOLUME specifies the volume on which an uncataloged data set or data sets resided when DFSMShsm created the backup versions. For *volser*, substitute the serial number of the volume where the uncataloged data set resided when DFSMShsm created the backup versions. To delete all the backup versions of an uncataloged data set, specify the data set name and the serial number of the volume from which the data set was backed up.

Abbreviations

The TSO abbreviation convention applies for FROMVOLUME. There are no additional abbreviations.

Default

None.

SMS relationship

This parameter applies only to non-SMS-managed data sets.

Restrictions

The following restrictions apply to the FROMVOLUME parameter:

- The data sets listed should have been either all cataloged or all uncataloged at the time DFSMShsm created the specified backup versions. If uncataloged, the data sets should have been on the same volume.

- If you specify FROMVOLUME, DFSMShsm only deletes backup versions of uncataloged data sets. If you do not specify FROMVOLUME, DFSMShsm only deletes backup versions of cataloged data sets.

Examples of different ways to code the HBDELETE command

The examples below present different ways to code the HBDELETE command. The values are examples only. Do not interpret them as values you should use for your system.

Deleting all backup versions of a cataloged data set

In this example, you are issuing the HBDELETE command to delete all backup versions of the cataloged data set USER1.CMD.CLIST.

```
HBDELETE 'USER1.CMD.CLIST' ALL
```

Deleting specific backup versions of an uncataloged data set

In this example, you are issuing the HBDELETE command to delete only backup versions 2, 3, and 10 of the uncataloged data set *userid*.MATRIX.TEXT. DFSMShsm had backed up this data set from volume VOL001.

```
HBDELETE MATRIX.TEXT FROMVOLUME(VOL001) VERSIONS(2,3,10)
```

Using the UNIX shell (hbdelete)

DFSMShsm provides a command, **hbdelete**, to allow UNIX shell users a way to delete backups of their own UNIX files.

Description

The **hbdelete** command sends a request to DFSMShsm to delete some or all backups of a UNIX file.

Note: To delete a backup of a UNIX file, you must have write permission to the UNIX file at the time of backup, or be the owner in order to delete a backup of the file.

Format

hbdelete [-ahv] [-d *date*] [-t *time*] [-V *bversion1*,*bversion2*,*bversion3 file file*

You can specify a relative path, or an absolute path for the file name. You can also specify multiple file names to the command. Each name is processed in sequence. If the UNIX file name has a single quotation mark character as part of the file name, specify two single quotation mark characters in the path name instead of one, and enclose the file name in double quotation marks.

Additionally, the backslash character can be used for each character that might have special meaning to the UNIX shell. If you want double quotation marks, the file name can be specified with backslash characters so that the UNIX shell passes the characters as-is. For example, the file name *$ab'?g.txt* could be specified as *\$ab''\?g.txt* (or *\$\|a\|b\|'\|'?\|g\|.\|t\|x\|t)*. Note the two single quotation mark characters indicate a single quotation mark in the file name.

Options

-a
Requests that all backup versions of the file be removed.

-h
Specifies that the list of acceptable options is written to stdout. No further processing is performed.

-v
Requests verbose output as processing is performed.

-d *date*
Specifies to delete the most recent backup of the file on or before the specified date. The date must be specified in yyyy/mm/dd format.

-t*time*
Specifies the exact time in hours, minutes, and seconds (hhmmss) when the backup version was created. The valid range for hours is 00–23, and for minutes and seconds is 00–59. If you specify `-t`, you must also specify `-d`, or the **hbdelete** command fails.

-V *vernum*
Specifies that you want to delete a particular backup version of a UNIX file. For *vernum*, substitute a decimal number from 1 to 999 for the version you want to recover. If DFSMShsm is unable to find the specified backup version, the recover fails and message ARC0182I is issued.

Chapter 17. HBDELETU: Deleting backup versions

The HBDELETU command is an alias to HBDELETE. All parameters that are valid for the HBDELETE command are valid for the HBDELETU command

The minimum abbreviation for the HBDELETU command is HBDELU.

Chapter 18. HCANCEL: Canceling a queued request

To cancel a queued request, use the HCANCEL command in TSO. The following discussion applies to both SMS-managed data sets and non-SMS-managed data sets.

Cancel queued requests

Task: Cancel existing queued DFSMShsm requests.

The HCANCEL command is designed for the TSO user who wants to cancel a data movement request. The command cannot be used on a request that is already being processed.

To use the HCANCEL command, your user ID must be DFSMShsm-authorized or be the same as that of the command to be canceled. Identification of the command to cancel can be specified by the DFSMShsm request number, user ID, or data set name. A request number implies that only one request be found, but a user ID or data set name causes all existing nonprocessing requests that have the same user ID or data set name to be canceled.

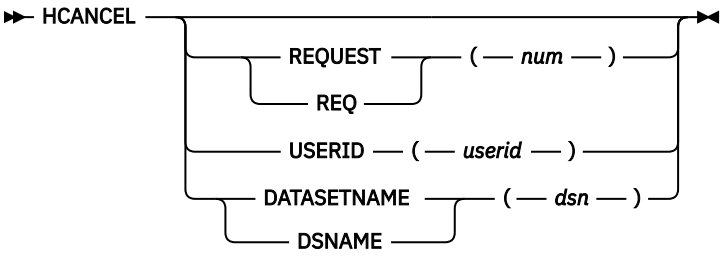
You can determine the request numbers that you have active by using the HQUERY command with the REQUEST parameter. Two commands cannot be canceled: HCANCEL and HQUERY.

If no parameters are included in this command, no function results.

Abbreviation: The minimum abbreviation for the HCANCEL command is HCAN.

Syntax

The following diagram presents the syntax of the HCANCEL command for **both** SMS-managed and non-SMS-managed data sets:



Required parameters

None.

Optional parameters

REQUEST: Specifying the DFSMShsm request number to be canceled

Explanation

REQUEST(*num*) is a optional parameter you use to specify a single request by a DFSMShsm request number. For *num*, substitute the number (issued by DFSMShsm) of the request to be canceled. You can enter a HQUERY REQUEST command to determine current requests.

Abbreviations

The TSO abbreviation convention applies for REQUEST. In addition, you can use the abbreviation REQ.

Defaults

None.

Restrictions

Only one parameter can be specified at a time. REQUEST and USERID or REQUEST and DATASETNAME cannot be specified together.

USERID: Specifying that all requests submitted by a particular user be canceled

Explanation

USERID(*userid*) is an optional parameter you use to specify that all requests submitted by a particular user be canceled. For *userid*, substitute the users identification to be canceled.

Abbreviations

The TSO abbreviation convention applies for USERID.

Defaults

None.

Restrictions

Only one parameter can be specified at a time. USERID and REQUEST or USERID and DATASETNAME cannot be specified together.

An unauthorized user cannot cancel the requests for another users ID.

DATASETNAME: Specifying that all requests submitted to process a particular data set be canceled

Explanation

DATASETNAME(*dsn*) is an optional parameter you use to specify that all requests submitted to process a particular data set be canceled. For *dsn*, substitute the name of the data set to be canceled.

Abbreviations

The TSO abbreviation convention applies for DATASETNAME. DSNAME can also be used.

Defaults

None.

Restrictions

Only one parameter can be specified at a time. DATASETNAME and REQUEST or DATASETNAME and USERID cannot be specified together.

You cannot use any wild card (%, *, or **) in a data set name.

Examples of different ways to code the HCANCEL command

The examples below present different ways to code the HCANCEL command. The values are examples only. Do not interpret them as values you should use for your system.

Canceling a request number

In this example, you are issuing the HCANCEL command to cancel a single request by its request number, 0068.

```
HCANCEL REQUEST(0068)
```

Canceling all requests submitted by a particular user

In this example, you are issuing the HCANCEL command to cancel all requests submitted by a particular user with a user ID of B123456.

```
HCANCEL USERID(B123456)
```

Canceling all requests submitted to process a particular data set

In this example, you are issuing the HCANCEL command to cancel all requests submitted to process a particular data set named USER.WXYZ2. The data set name must be fully qualified.

```
HCANCEL DSNAME('USER.WXYZ2')
```

Chapter 19. HCANCELU: Canceling a queued request on a Filemode DFSMShsm host

The HCANCELU command is an alias to the HCANCEL command. All parameters that are valid for the HCANCEL command are valid for the HCANCELU command. When the HCANCELU command is used, the cancel request is directed to the DFSMShsm Filemode host. If only a Full Support DFSMShsm host exists, the request is directed to the Full Support DFSMShsm host.

The minimum abbreviation for the HCANCELU command is HCANU.

Chapter 20. HDELETE: Deleting migrated data sets

This topic describes how to delete migrated data sets using ISMF or TSO. This command and its parameters apply to both SMS and non-SMS-managed data sets and is intended to supplement the automatic functions of DFSMShsm.

Using ISMF

The following steps present an example of how to use the HDELETE line operator to delete a migrated data set. In our example, we have used USER20.ISMF.JCL as a sample data set name.

1. Generate a list of data sets as described in Chapter 4, “Methods of performing tasks,” on page 13.
2. Enter the HDELETE line operator in the line operator column next to USER20.ISMF.JCL as described in Figure 20 on page 105.

```
  Panel  List  Dataset  Utilities  Scroll  Help
------------------------------------------------------------------------------
                               DATA SET LIST
                                                        Entries 1-1 of 1
Enter Line Operators below:                             Data Columns 3-6 of 39

     LINE                                    ALLOC    ALLOC   % NOT  COMPRESSED
     OPERATOR          DATA SET NAME         SPACE    USED    USED   FORMAT
    ---(1)----  ------------(2)------------ --(3)--  --(4)--  -(5)-  ---(6)----
                USER20.CLIST.CLIST              46       46      0  ???
                USER20.DFP220.DGTTLIB           46       46      0  ???
                USER20.ISMF.DGTLLIB             46       46      0  ???
                USER20.ISMF.DGTPLIB             46       46      0  ???
                USER20.ISMF.DUMP              4684     4356      7  ???
    HDELETE     USER20.ISMF.JCL                468       46     90  ???
                USER20.ISPFILE                  46       46      0  ???
                USER20.ISPPROF                  93       93      0  ???
                USER20.SPFLOG1.LIST           2623     1311     50  ???
                USER20.TEMP.DATASET           4684       93     98  ???
    ----------  ------  -----------  BOTTOM OF  DATA  -----------  ------  ----

Command ===>                                                 Scroll ===> HALF
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

Figure 20. Data Set List Panel with HDELETE Selected

The HDELETE Entry panel appears.

3. Complete the HDELETE Entry panel as described in Figure 21 on page 106. (Specify Y in the *wait for completion* field if you want to wait for HDELETE to complete before returning to ISMF.)

```
  Panel  Utilities  Help
------------------------------------------------------------------------------
                            HDELETE ENTRY PANEL

Optionally Specify One or More for
 Data Set: USER20.ISMF.JCL

  Delete DFSMShsm Backup Versions  Y         (Y or N)

  Wait for Completion  . . . . . . N         (Y or N)

  Purge Unexpired Data Set . . . . N         (Y or N)

  Data Set Password  . . . . . . .           (if password protected)




Command ===>
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

Figure 21. HDELETE Entry Panel

The Data Set List panel appears as shown in Figure 22 on page 106. The asterisk next to the HDELETE in the line operator column indicates that the deletion was successful if you specified *wait for completion=Y*, or that the deletion task was successfully issued to DFSMShsm if you specified *wait for completion=N*.

```
  Panel  List  Dataset  Utilities  Scroll  Help
------------------------------------------------------------------------------
                               DATA SET LIST
                                                    Entries 1-1 of 1
Enter Line Operators below:                         Data Columns 3-6 of 39

     LINE                                 ALLOC    ALLOC   % NOT  COMPRESSED
     OPERATOR          DATA SET NAME      SPACE    USED    USED   FORMAT
    ---(1)----  ------------(2)------------ --(3)--  --(4)--  -(5)-  ---(6)----
                USER20.CLIST.CLIST             46       46      0  ???
                USER20.DFP220.DGTTLIB          46       46      0  ???
                USER20.ISMF.DGTLLIB            46       46      0  ???
                USER20.ISMF.DGTPLIB            46       46      0  ???
                USER20.ISMF.DUMP             4684     4356      7  ???
    *HDELETE    USER20.ISMF.JCL               468       46     90  ???
                USER20.ISPFILE                 46       46      0  ???
                USER20.ISPPROF                 93       93      0  ???
                USER20.SPFLOG1.LIST          2623     1311     50  ???
                USER20.TEMP.DATASET          4684       93     98  ???
    ----------  ------  -----------  BOTTOM OF  DATA  -----------  ------  ----

Command ===>                                              Scroll ===> HALF
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

Figure 22. Data Set List Panel after Function Completes

For more information on using DFSMShsm/ISMF line operators, see *z/OS DFSMS Using the Interactive Storage Management Facility* or use the online help provided with ISMF.

Using TSO

The following discussion applies to both SMS-managed and non-SMS-managed data sets.

Task: Delete one or more migrated data sets from migration volumes.

DFSMShsm deletes the data set without recalling it to a DFSMShsm-managed volume. When DFSMShsm deletes the data set, it maintains any backup versions of the data set and the information in the BCDS. You cannot delete data sets from DFSMShsm-managed volumes or backup volumes with this command.

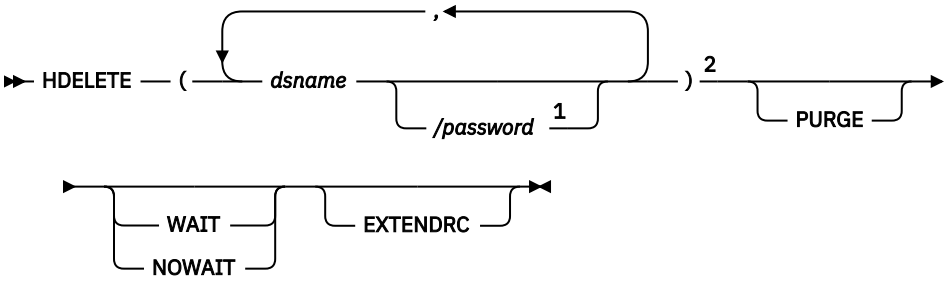
This command deletes both the migrated data set and the data set catalog entry.

RACF authority: To delete a RACF-protected data set, you must have RACF ALTER authority to the data set.

Abbreviation: The minimum abbreviation for the HDELETE command is HDEL.

Syntax

The following diagram presents the syntax of the HDELETE command for **both** SMS-managed and non-SMS-managed data sets:



Notes:

[1] Password does not apply to SMS-managed data sets.
[2] Parentheses are required only when multiple data set names are specified.

Required parameters

dsname: Specifying the data set to delete

Explanation

(*dsname*/*password* ...) is a required positional parameter that specifies the name of a migrated data set or list of names of migrated data sets that you want to delete. For *dsname*, substitute the name of the migrated data set you want to delete. You can use a data set filter for any dsname in a list. See "Specifying data set names" on page 36 for a discussion of how to specify data set names. For VSAM data sets, only the base cluster name can be specified. For non-VSAM data sets, only the true name can be specified. Other names, such as migration names, cannot be specified.

For *password*, substitute the correct password and include the preceding slash (/). TSO does not prompt you for the password. Password protection does not apply to SMS-managed data sets; if a password is specified, it is ignored.

- For a password-protected non-VSAM data set, you must supply the password that allows you to write to the data set.
- For a password-protected VSAM data set, you must supply the master password of the base cluster.

Abbreviations

None.

Defaults

None.

Restrictions

Because *dsname* is a required positional parameter, you must specify it immediately after HDELETE.

When you specify a password with a filter, all the password-protected data sets affected must have the same password. Otherwise, DFSMShsm rejects the HDELETE command for those password-protected data sets that are protected by some other password.

DFSMShsm does not process individual partitioned data set members. If you specify a partitioned data set name with a member name, DFSMShsm rejects the request.

Optional parameters

PURGE: Specifies deletion of migrated data sets within their retention periods

Explanation

PURGE is an optional parameter you use if you want to delete a migrated data set while it is within its retention period.

Abbreviations

The TSO abbreviation convention applies for PURGE. There are no additional abbreviations.

Defaults

None.

Restrictions

If the data set has a valid date that has not expired, the PURGE parameter is required.

WAIT and NOWAIT: Specifying whether to wait for the data set to be deleted

Explanation

`WAIT | NOWAIT` are mutually exclusive, optional parameters specifying whether you want to wait for the HDELETE command to complete.

WAIT specifies that you want to wait for the HDELETE command to complete. When DFSMShsm successfully completes the HDELETE process, an ARC1000I message is issued. If the HDELETE process does not complete successfully, an ARC1001I message is issued. If you press the TSO Attention key before DFSMShsm completes the command, DFSMShsm issues an ARC1800I message and does not issue an ARC1000I message.

NOWAIT specifies that you do not want to wait for the HDELETE command to complete. When DFSMShsm successfully receives the request, an ARC1007I message is issued. After DFSMShsm successfully completes the HDELETE command, an ARC1000I message is issued. If the HDELETE command does not complete successfully, an ARC1001I message is issued.

Abbreviations

The TSO abbreviation convention applies for WAIT and NOWAIT. There are no additional abbreviations.

Defaults

The default is NOWAIT.

Restrictions

You can specify WAIT or NOWAIT, but not both.

EXTENDRC: Requesting an extended set of return and reason codes

Explanation

EXTENDRC is an optional parameter specifying that DFSMShsm should return an extended set of return and reason codes while you are running DFSMShsm commands in a truly interactive mode (TSO or foreground). This option returns only the return and reason codes that are mapped into DFSMShsm messages that are issued to the users terminal. For detailed information on return codes that DFSMShsm returns for this command, see Appendix B, “Return codes from DFSMShsm commands,” on page 231.

Abbreviations

The TSO abbreviation convention applies for EXTENDRC.

Defaults

None.

Restrictions

The WAIT option must be specified with the EXTENDRC parameter when you are running DFSMShsm commands in a truly interactive mode (TSO or foreground).

Examples of different ways to code the HDELETE command

The examples below present different ways to code the HDELETE command. The values are examples only. Do not interpret them as values that you should use for your system.

Deleting a migrated data set that is still within its retention period

In this example, you are issuing the command to delete the migrated data set KTMM.TEXTVER1.TEXT. The PURGE parameter indicates that you want to delete the data set before the end of its retention period.

```
HDELETE 'KTMM.TEXTVER1.TEXT' PURGE
```

Deleting a migrated data set and waiting for completion

In this example, you are issuing the command to delete the migrated data set CLCE.TEXTVER1.TEXT. The WAIT parameter indicates that you want to wait for DFSMShsm to complete the deletion of the data set.

```
HDELETE 'CLCE.TEXTVER1.TEXT' WAIT
```

Deleting a group of migrated data sets and not waiting for completion

In this example, you are issuing the HDELETE command to delete all migrated data sets that have the user prefix and the descriptive qualifier of the specified data set name CCEL.*.LOADLIST. The NOWAIT parameter indicates that you do not want to wait for DFSMShsm to complete the deletion of the data sets.

```
HDELETE 'CCEL.*.LOADLIST' NOWAIT
```

Deleting a password-protected migrated data set and not waiting for completion

In this example, you are issuing the HDELETE command to delete the migrated data set ELCCA.BASICTST.VSBASIC with the password WRITE. You do not want to wait for DFSMShsm to complete the deletion of the data set.

```
HDELETE 'ELCCA.BASICTST.VSBASIC'/WRITE NOWAIT
```

Deleting two migrated data sets and not waiting for completion

In this example, you are issuing the HDELETE command to delete two migrated data sets, ELCCA.VER1TEXT.LIST and CLCE.BASICTST.VSBASIC. You do not want to wait for DFSMShsm to complete the deletion of the data sets.

```
HDELETE ('ELCCA.VER1TEXT.LIST','CLCE.BASICTST.VSBASIC') -
        NOWAIT
```

Deleting a data set and requesting to see the extended return and reason codes

In this example, you are issuing the HDELETE command from a TSO session to delete the migrated data set RPM2345.TEXTVER1.TEXT. You want to see the extended return and reason codes.

```
HDELETE 'RPM2345.TEXTVER1.TEXT' WAIT EXTENDRC
```

Chapter 21. HLIST: Listing information from the BCDS and MCDS

To list information from the backup control data set (BCDS) and migration control data set (MCDS), use TSO. This command can only be issued directly through TSO or UNIX shell.

An unauthorized user can use this command to get any of the information that is offered. The most useful information for unauthorized users is information about their own data sets and UNIX files.

DFSMShsm maintains information about the volumes and data sets and UNIX files that it manages and owns and its control data sets. DFSMShsm maintains three control data sets: backup, migration, and offline. The information for the user comes from only two: backup and migration.

The TSO HLIST command is a long-running command that can tie up your TSO terminal if its output is directed to TERM.

Listing information from the BCDS and MCDS in TSO

The following information applies to both SMS and non-SMS-managed data sets, and UNIX files.

Task: List selected information from the MCDS and BCDS.

You can issue the HLIST command without specifying any parameters to list all of your migrated data sets. Or, you can list information from the following categories, using the HLIST command:

- Backup volume information from the BCDS.
- Data set information from the MCDS or BCDS.
- UNIX file information from the BCDS.
- Migration and DFSMShsm-managed volume information from the MCDS.
- User authorization information.

The HLIST command can process only one of the four categories at a time. If you specify more than one category, the HLIST command processes the category of the highest order of preference. The following is the order of preference:

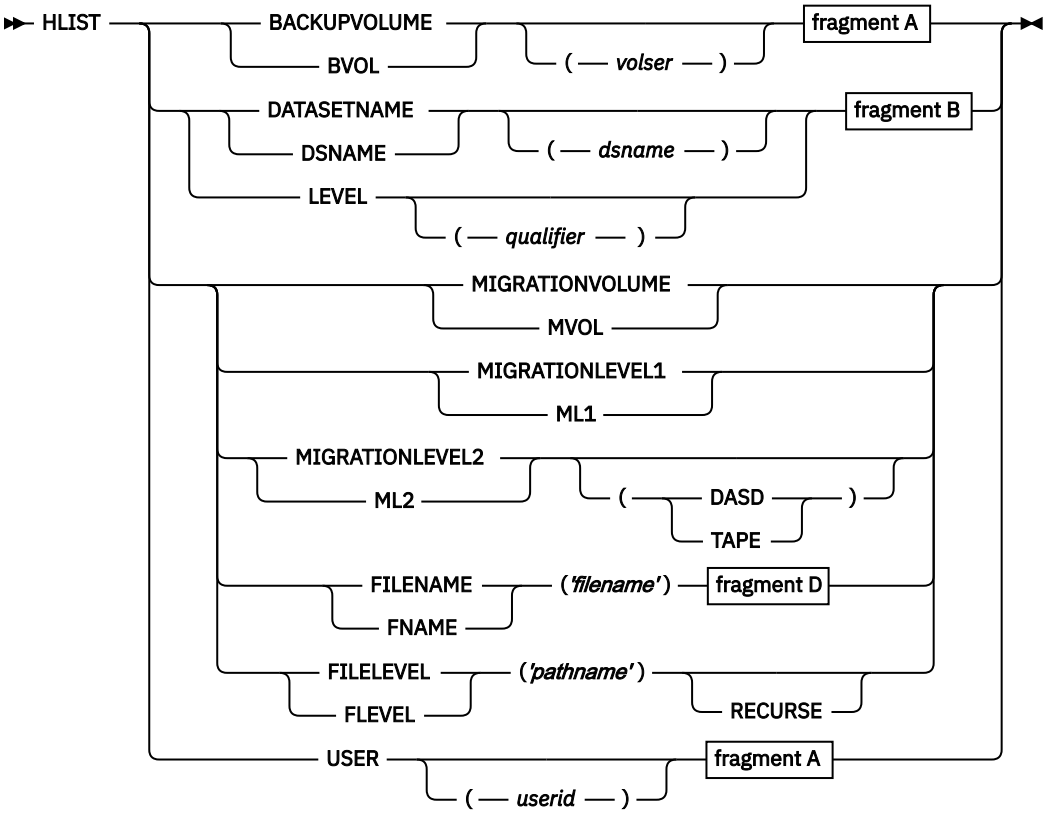
- PRIMARYVOLUME, MIGRATIONVOLUME, or VOLUME
- BACKUPVOLUME
- USER
- DATASETNAME or LEVEL
- FILENAME or FILELEVEL

Note: For examples of lists produced by using the HLIST command, see “Sample lists from the HLIST command” on page 124.

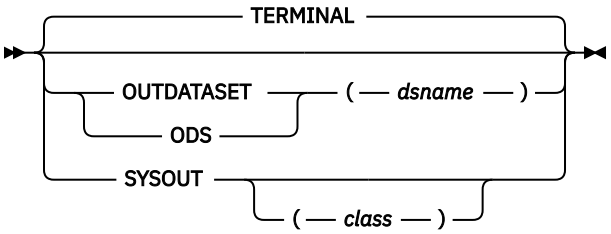
Abbreviation: The minimum abbreviation for the HLIST command is HL.

Syntax

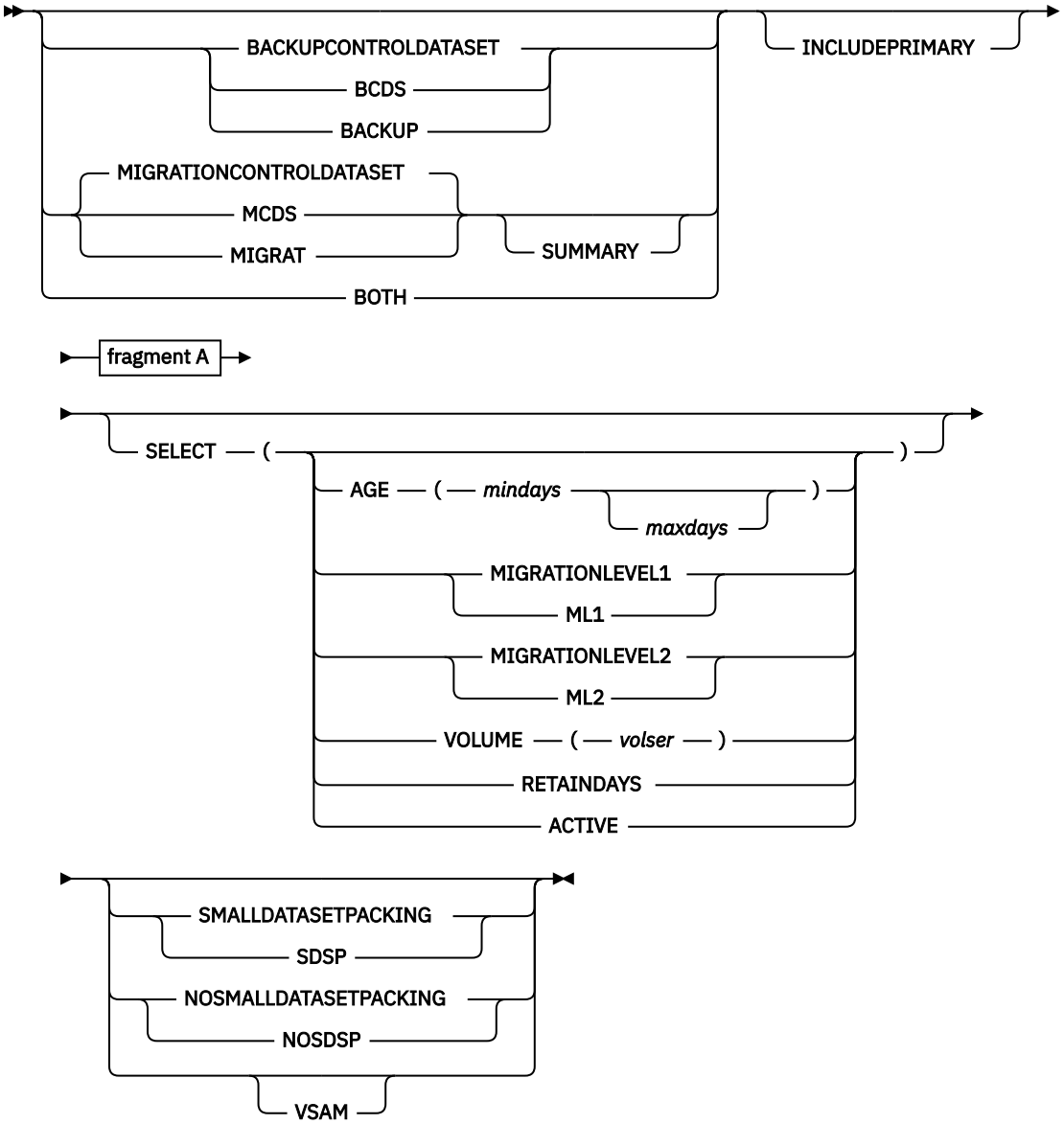
The following diagram presents the syntax of the HLIST command for SMS-managed and non-SMS-managed data sets or UNIX files.



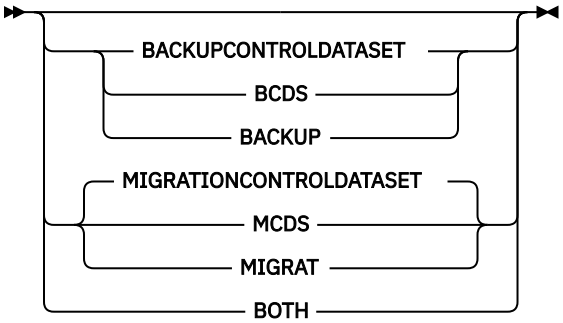
A: HLIST optional parameters



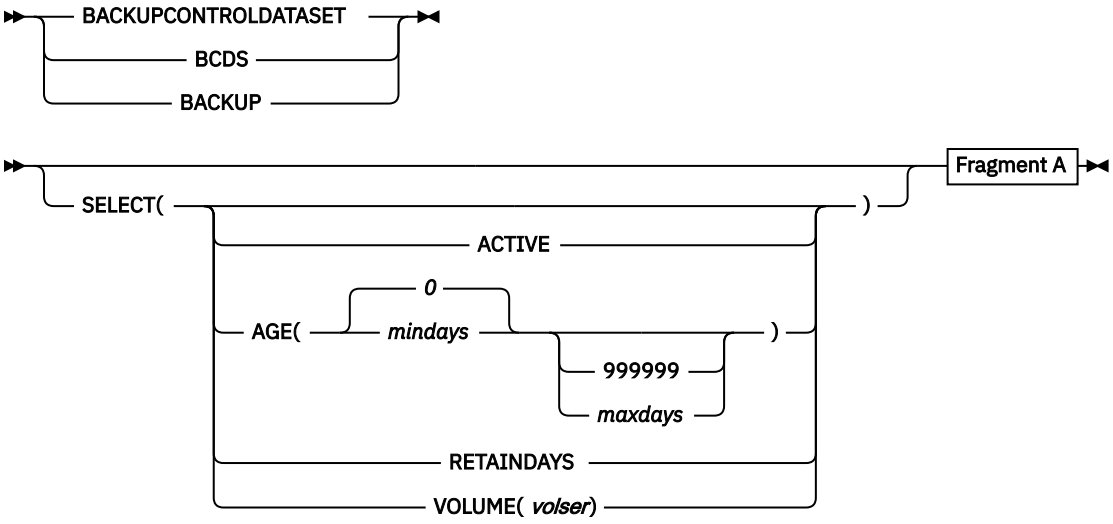
B: HLIST optional parameters



C: HLIST optional parameters



D: HLIST optional parameters



Required parameters

BACKUPVOLUME: Requesting a list of backup volume entries

Explanation

BACKUPVOLUME is the parameter you use to request a list of selected information from backup volume entries contained in the BCDS. For *volser*, substitute the serial number of the backup volume for which you want listed.

Abbreviations

The TSO abbreviation convention applies for BACKUPVOLUME. In addition, you can use the abbreviation BVOL for BACKUPVOLUME.

Defaults

If you specify BACKUPVOLUME without *volser*, DFSMShsm lists all the backup volume entries from the BCDS.

If you do not specify the parameters MIGRATIONVOLUME, PRIMARYVOLUME, VOLUME, BACKUPVOLUME, USER, DATASETNAME, or LEVEL, DFSMShsm lists all the data set entries that have your user identification as the set of initial characters of the data set name.

Restrictions

None.

DATASETNAME and LEVEL: Requesting a list of data set entries

Explanation

DATASETNAME | LEVEL(*qualifier*) are the parameters you use to request a list of data set entries.

DATASETNAME specifies a list of all of your data set entries. For *dsname*, substitute the name of the data set for which you want the list. You cannot use any wild cards (%, *, or **) in the data set name and you can specify a data set name of up to 44 characters.

LEVEL(*qualifier*) is specified to request a list of all data set entries that have the same set of initial characters of the data set name. For *qualifier*, substitute the set of initial characters of the data set name for the data sets you want listed. The set of initial characters can contain imbedded periods. The *qualifier* can end with a period if LEVEL is the first keyword on the command. You can specify a *qualifier* of up to 44 characters.

Abbreviations

The TSO abbreviation convention applies for DATASETNAME and LEVEL. In addition, you can use the abbreviation DSNAME for DATASETNAME.

Defaults

If you specify DATASETNAME without *dsname* or specify LEVEL without a qualifier, DFSMShsm lists all the data set entries that have your user identification as the set of initial characters of the data set name.

If you do not specify the parameters MIGRATIONVOLUME, PRIMARYVOLUME, VOLUME, USER, BACKUPVOLUME, DATASETNAME, or LEVEL, DFSMShsm lists all the data set entries that have your user identification as the set of initial characters of the data set name.

Restrictions

None.

FILENAME and FILELEVEL: Requesting a list of UNIX file entries

Explanation

'FILENAME*('filename')* | FILELEVEL*('pathname')* are the parameters that are used to request information of UNIX file entries.

FILENAME specifies a UNIX file entry. For *filename*, substitute the name of the UNIX file for which you want the information. The file name must be an absolute path that is enclosed in single quotation marks. If a UNIX directory is specified, 0 entries is returned. FILE is an acceptable abbreviation. You cannot use any wildcards (%, *, or **) in the UNIX file name and you can specify a name of up to 1000 characters.

With FILELEVEL(*pathname*), you can to list information about backups for all files under a specific UNIX directory. If the path is not for a directory, 0 entries are returned. The specified path name must be enclosed in single quotation marks and begin with a forward slash character.

MIGRATIONVOLUME, MIGRATIONLEVEL1, MIGRATIONLEVEL2, PRIMARYVOLUME, and VOLUME: Requesting a list of primary and migration volume entries

Explanation

`MIGRATIONVOLUME | MIGRATIONLEVEL1 | MIGRATIONLEVEL2 | PRIMARYVOLUME | VOLUME` are mutually exclusive, optional parameters you use to request a list of DFSMShsm-managed or migration volume entries. A list of volume entries does not include information about any individual data sets that reside on the volumes.

MIGRATIONVOLUME specifies that you want a list of the volume entries for all migration volumes.

MIGRATIONLEVEL1 specifies that you want a list of the volume entries for all migration level 1 volumes.

MIGRATIONLEVEL2 specifies that you want a list of the volume entries for all migration level 2 volumes.

DASD or TAPE are mutually exclusive, optional subparameters of the MIGRATIONLEVEL2 parameter that specifies whether to list DASD or tape migration level 2 volumes. DASD specifies that you want a list of the volume entries for all DASD migration level 2 volumes. TAPE specifies that you want a list of the volumes entries for all tape migration level 2 volumes.

PRIMARYVOLUME specifies that you want a list of the volume entries for all DFSMShsm-managed volumes.

VOLUME (*volser*) specifies a list of all DFSMShsm-managed and migration volumes. For *volser*, substitute the serial number of the volume for which you want the volume entry listed.

Abbreviations

The TSO abbreviation convention applies for PRIMARYVOLUME, MIGRATIONVOLUME, MIGRATIONLEVEL1, MIGRATIONLEVEL2 and VOLUME. In addition, you can use the abbreviation PVOL for PRIMARYVOLUME, the abbreviation MVOL for MIGRATIONVOLUME, the abbreviation ML1 for MIGRATIONLEVEL1, and the abbreviation ML2 for MIGRATIONLEVEL2.

Defaults

If you specify VOLUME without *volser*, DFSMShsm lists all volume entries for all the DFSMShsm-managed and migration volumes it owns or manages.

If you do not specify the parameters MIGRATIONVOLUME, PRIMARYVOLUME, VOLUME, BACKUPVOLUME, USER, DATASETNAME, or LEVEL, DFSMShsm lists all the data set entries that have your user identification as the set of initial characters of the data set name.

Restrictions

You can specify only one of PRIMARYVOLUME, MIGRATIONVOLUME, MIGRATIONLEVEL1, MIGRATIONLEVEL2, or VOLUME with each HLIST command.

USER: Requesting a list of user entries

Explanation

USER is the parameter you use to request a list of the authorization status of users. A list of user entries does not include any information about the data sets associated with a specified user.

Abbreviations

The TSO abbreviation convention applies for USER. There are no additional abbreviations.

Defaults

If you specify USER without *userid*, DFSMShsm lists all DFSMShsm-authorized users.

If you do not specify the parameters MIGRATIONVOLUME, PRIMARYVOLUME, VOLUME, BACKUPVOLUME, USER, DATASETNAME, or LEVEL, DFSMShsm lists all the data set entries that have your user identification as the set of initial characters of the data set name.

Optional parameters

BACKUPCONTROLDATASET, MIGRATIONCONTROLDATASET, and BOTH: Controlling the source of information listed

Explanation

BACKUPCONTROLDATASET | MIGRATIONCONTROLDATASET | BOTH are mutually exclusive, optional parameters that specify where DFSMShsm should obtain the information for the list. Specify one or the other when data set or volume information can exist in both the MCDS and BCDS.

BACKUPCONTROLDATASET specifies a list of selected information from only the BCDS entries for a specific data set, UNIX file, level, or volume, or for DFSMShsm-managed volumes. BACKUP is allowed as an alias for BACKUPCONTROLDATASET.

MIGRATIONCONTROLDATASET specifies a list of selected information from the MCDS entries for a specific data set, level, or volume, or for DFSMShsm-managed volumes or migration volumes. MIGRAT is allowed as an alias for MIGRATIONCONTROLDATASET.

BOTH specifies a list of selected information from the MCDS and BCDS entries for the specified data sets, DFSMShsm-managed volumes, or migration volumes.

Note: Records of the DFSMShsm-managed volumes exist in both the MCDS and BCDS. Records of the migration volumes exist only in the MCDS. Records of the backup volumes exist only in the BCDS.

Abbreviations

The TSO abbreviation convention applies for BOTH, MIGRATIONCONTROLDATASET, and BACKUPCONTROLDATASET. In addition, you can use the abbreviation MCDS for MIGRATIONCONTROLDATASET and the abbreviation BCDS for BACKUPCONTROLDATASET.

Defaults

The default is MIGRATIONCONTROLDATASET.

Restrictions

You can specify only one of BOTH, MIGRATIONCONTROLDATASET, or BACKUPCONTROLDATASET when you specify DATASETNAME, LEVEL, PRIMARYVOLUME, MIGRATIONVOLUME, or VOLUME. If you do not specify any of these parameters, DFSMShsm ignores the BOTH, MIGRATIONCONTROLDATASET, and BACKUPCONTROLDATASET parameters.

INCLUDEPRIMARY: Requesting a list of entries for a data set that has migrated even though the data set might have been recalled

Explanation

INCLUDEPRIMARY is an optional parameter you use to request a list of all data set entries including entries of recalled data sets. DFSMShsm retains data set entries in the MCDS for a limited amount of time even after it recalls the data set.

Abbreviations

The TSO abbreviation convention applies for INCLUDEPRIMARY. There are no additional abbreviations.

Defaults

If you do not specify INCLUDEPRIMARY, the list will not include data set entries for recalled data sets among the data set entries listed.

Restrictions

The INCLUDEPRIMARY parameter applies only to the DATASETNAME and LEVEL parameters and only when information from the MCDS is being listed. If you specify INCLUDEPRIMARY when it does not apply, DFSMShsm ignores it.

OUTDATASET, SYSOUT, and TERMINAL: Specifying the location of output for the list

Explanation

OUTDATASET(*dsname*) | SYSOUT | TERMINAL are mutually exclusive, optional parameters that specify the output location for the list.

OUTDATASET(*dsname*) specifies the name of the data set where DFSMShsm is to write the output data. For *dsname*, substitute the fully-qualified name of the data set to receive the HLIST command output.

If you specify a data set that does not exist, DFSMShsm dynamically allocates and catalogs an output data set with the following characteristics:

- Data set name specified (*dsname*)
- Record format of fixed-blocked with ANSI control characters (FBA)
- Logical record length of 121
- System-reblockable if DFSMShsm is running with DFP 3.1.0 or a subsequent release; otherwise, block size of 1210
- Primary allocation of 20 tracks
- Secondary allocation of 50 tracks
- Unit of SYSALLDA

If the data set already exists:

- The data set must be cataloged and on DASD.
- The data set record format must be FBA and the logical record length must be 121.
- The data set is system-reblockable if DFSMShsm is running with DFP 3.1.0 or a subsequent release and the block size must be 0; otherwise, the block size must be a multiple of 121 up to a limit of 32K.
- The user can choose the primary space allocation.
- If DFSMShsm needs additional extents after the primary space allocation, DFSMShsm uses a secondary space allocation of 50 tracks.
- If the data set does not contain data, DFSMShsm starts writing output data at the beginning of the data set.
- If the data set contains data, DFSMShsm writes the output data after the existing data.

SYSOUT specifies that the list is to be printed to the specified system output class. For *class*, substitute the alphanumeric character for the system output class you want.

TERMINAL specifies that the list is to be printed at your terminal.

Abbreviations

The TSO abbreviation convention applies for TERMINAL, SYSOUT, and OUTDATASET. In addition, you can use the abbreviation ODS for OUTDATASET.

Defaults

The default is TERMINAL. If you specify SYSOUT without *class*, *class* defaults to the type of class specified by the system programmer. If the system programmer did not specify a type of class, the default is class A.

Restrictions

You can specify only one of TERMINAL, SYSOUT, or OUTDATASET with each HLIST command.

DFSMShsm does not process partitioned data set members individually. If you specify a partitioned data set with a member name as the output data set, DFSMShsm could write the list over existing data.

RECURSE: Examine subdirectories of the specified UNIX file path

Explanation

`RECURSE(CROSSMOUNTS|CMT|NOCROSSMOUNTS|NCM)` Examines subdirectories of the specified path while looking for files that match pattern to recover from the DFSMShsm backup inventory.

- `NOCROSSMOUNTS` specifies not to recover files that came from a different file system than the initial specified path. It is the default.

- CROSSMOUNTS examines directories that are in a different file system from the file system that contains the starting location when choosing files to recover. The default is not to examine subdirectories for files to recover.

Default

Subdirectories are not examined for files to recover.

SELECT: Requesting a list of only those data set or UNIX file entries that meet selection criteria

Explanation

SELECT is an optional parameter set that you use to request a list containing only selected data or UNIX file set entries. When the DATASETNAME or LEVEL parameter identifies multiple data sets, use the SELECT parameter to select a subset of data set or UNIX file entries for the list.

Note: Because of the number of subparameters of SELECT, this publication lists and describes each subparameter separately.

Abbreviations

The TSO abbreviation convention applies for SELECT. There are no additional abbreviations.

Defaults

None.

Restrictions

The SELECT parameter applies only to the DATASETNAME and LEVEL, FILENAME and FILELEVEL parameters. If you do not specify either parameter, DFSMShsm ignores the SELECT parameter.

The AGE subparameter is the only subparameter that applies to information from both the MCDS and BCDS. The other subparameters apply only to the MCDS.

SELECT(ACTIVE | RETAINDAYS): Selecting entries based on specification of the RETAINDAYS keyword

ACTIVE specifies that DFSMShsm is to display the information about the active backup versions only. The information about the retained backup copies is not included in the output.

RETAINDAYS specifies that DFSMShsm is to display the backup information about the active and retained backup copies that have RETAINDAYS specified at the time of backup. Retained backup copies do not have version and generation numbers, therefore this information is not available in the HLIST command output.

Note: If you specify SELECT without specifying either RETAINDAYS or ACTIVE, DFSMShsm displays information about both active and retained backup copies. The output contains "***" for generation and version numbers for retained copies, and "*****" in the field of the RETAINDAYS value for copies that do not have RETAINDAYS specified during backup.

SELECT(AGE): Selecting entries based on data set or UNIX file use

Explanation

AGE(*mindays maxdays*) is an optional subparameter of SELECT that specifies a list of those entries in the MCDS for only the data sets whose most recent reference is within the specified range of days, or a list of those entries in the BCDS for the data sets or UNIX files that were backed up within the specified range of days.

For *mindays*, substitute a decimal number from 0 to 999999 for the minimum number of days since you referred to the data sets or UNIX files or since DFSMShsm backed them up.

For *maxdays*, substitute a decimal number from 0 to 999999 for the maximum number of days since you referred to the data sets or UNIX files or since DFSMShsm backed them up. The *maxdays* value should be greater than or equal to the *mindays* value. If the *maxdays* value is not greater than the *mindays* value, DFSMShsm lists only the data sets whose most recent reference or backup was exactly *mindays* days ago.

Abbreviations

The TSO abbreviation convention applies for AGE. There are no additional abbreviations.

Defaults

The default for *mindays* is 0, and the default for *maxdays* is 999999. The default range of days causes entries to be listed for all of the data sets, or UNIX files that meet the data set or volume specification. If *maxdays* is less than *mindays*, *maxdays* defaults to the same value as *mindays*.

Restrictions

None.

SELECT(MIGRATIONLEVEL1 | MIGRATIONLEVEL2 | VOLUME(volser)): Selecting entries based on the volume where the data set resides

Explanation

`MIGRATIONLEVEL1` | `MIGRATIONLEVEL2` | `VOLUME`(*volser*) | are mutually exclusive, optional subparameters of SELECT that specify the volume or migration volumes where the data sets must reside for the data set entries to be included in the list.

MIGRATIONLEVEL1 specifies a list of the entries for data sets that reside on level 1 migration volumes only.

MIGRATIONLEVEL2 specifies a list of the entries for data sets that reside on level 2 migration volumes only.

VOLUME (*volser*) specifies a list of one of the following:

- The entries for data sets that reside on the specified migration volume
- The entries for data sets that reside on the specified level 0 volume
- The entries for only those data sets whose most recent backup version resides on the specified backup volume
- The entries for only those UNIX files whose most recent backup version resides on the specified backup volume .

For *volser*, substitute the serial number of the volume that contains the data sets for which you want entries listed.

Note: To list data set entries on a specific level 0 volume, you must also specify INCLUDEPRIMARY.

Abbreviations

The TSO abbreviation convention applies for VOLUME, MIGRATIONLEVEL1, and MIGRATIONLEVEL2. In addition, you can use the abbreviation ML1 for MIGRATIONLEVEL1 and the abbreviation ML2 for MIGRATIONLEVEL2.

Defaults

None.

Restrictions

You can specify only one of VOLUME, MIGRATIONLEVEL1, or MIGRATIONLEVEL2 with the SELECT parameter for each HLIST command.

SELECT(SMALLDATASETPACKING | NOSMALLDATASETPACKING): Selecting entries based on whether the data sets migrated to an SDSP data set

Explanation

SMALLDATASETPACKING | NOSMALLDATASETPACKING are mutually exclusive, optional subparameters of the SELECT parameter that you use to request a list of those entries for the data sets that DFSMShsm has migrated to small-data-set-packing data sets or entries for only the data sets that DFSMShsm has not migrated to a small-data-set-packing data set. If you do not specify either subparameter, the list contains entries for data sets that DFSMShsm migrated regardless of where it migrated them to.

SMALLDATASETPACKING specifies a list of entries for only those data sets that DFSMShsm has migrated to small-data-set-packing data sets.

NOSMALLDATASETPACKING specifies a list of entries for only those data sets that DFSMShsm has not migrated to small-data-set-packing data sets.

Small-data-set-packing data sets can exist only on migration level 1 volumes. You can specify the ML1 subparameter and the SDSP or NOSDSP subparameters of the SELECT parameter in the same HLIST command.

Abbreviations

The TSO abbreviation convention applies for SMALLDATASETPACKING and NOSMALLDATASETPACKING. In addition, you can use the abbreviation SDSP for SMALLDATASETPACKING and the abbreviation NOSDSP for NOSMALLDATASETPACKING.

Defaults

None.

Restrictions

You can specify either SMALLDATASETPACKING or NOSMALLDATASETPACKING, but not both. Do not specify ML2 and SDSP in the same HLIST command. In addition, do not specify a particular volume and SDSP in the same HLIST command if the volume is not a migration level 1 volume.

SELECT(VSAM): Specifying the data set organization

Explanation

VSAM is an optional subparameter of the SELECT parameter that specifies a list of only migrated VSAM data sets. The list contains standard data set information for the MCDS data set records and any VSAM object names that you can use to automatically recall the data set.

The VSAM subparameter applies only to data set information from the MCDS.

Abbreviations

The TSO abbreviation convention applies for VSAM. There are no additional abbreviations.

Defaults

None.

Restrictions

None.

SUMMARY: Requesting a summary only

Explanation

SUMMARY is an optional parameter that specifies only a count of data sets, tracks, and bytes of the selected data sets. The SUMMARY parameter suppresses information about individual data sets. Also, this parameter applies only to information from the MCDS.

Abbreviations

The TSO abbreviation convention applies for SUMMARY. There are no additional abbreviations.

Defaults

None.

Restrictions

- When you specify this parameter, DFSMShsm does not list information about each data set. Also, this parameter applies only to information from the MCDS.
- The SUMMARY information is issued when you specify the LEVEL parameter or the DATASETNAME parameter (with no data set name specified) and the MCDS information is requested and available. The SUMMARY parameter applies only to the DATASETNAME parameter (with no data set name specified) and the LEVEL parameter.

Examples of different ways to code the HLIST command

The examples below present different ways to code the HLIST command. The values are examples only. Do not interpret them as values that you should use for your system.

Listing the data set entries from the MCDS and printing them at the terminal

In this example, you are issuing the HLIST command to list all migrated data set entries in the MCDS with MST7707 as the specified set of initial characters of the data set name. The list is printed at the terminal from which you issued the command.

```
HLIST LEVEL(MST7707) MIGRATIONCONTROLDATASET TERMINAL
```

Listing the data set entries for data sets from the BCDS

In this example, you are issuing the HLIST command to list the BCDS entries for all data sets that have MST7707.A as the set of initial characters of the data set name. The list is printed at SYSOUT class A.

```
HLIST LEVEL(MST7707.A) BACKUPCONTROLDATASET SYSOUT(A)
```

Listing the entry for a backup volume

In this example, you are issuing the HLIST command to list the BCDS volume entry for backup volume BVL005. The list is printed at the terminal from which you issued the command.

```
HLIST BACKUPVOLUME(BVL005)
```

Listing the entries for data sets of selected age and sending the output to an output data set

In this example, you are issuing the HLIST command to list all the data sets from both the MCDS and BCDS whose set of initial characters is the same as your user identification. The data sets listed from the MCDS will be those that are migrated and that you have referred to in the last 60 days. The data sets listed from the BCDS will be those that DFSMShsm last backed up in the last 60 days. The list is to go to the output data set CECL.OUTTESTS.TESTLIST.

```
HLIST DATASETNAME BOTH SELECT(AGE(0 60)) -
      OUTDATASET('CECL.OUTTESTS.TESTLIST')
```

Listing all migration volume entries from the MCDS

In this example, you are issuing the HLIST command to list all the migration volume entries from the MCDS. The list is to go to the output data set GRPA.COMMTEST.LIST.

```
HLIST MIGRATIONVOLUME OUTDATASET('GRPA.COMMTEST.LIST')
```

Listing the data set entries for data sets residing in a small-data-set-packing data set of a specific volume

In this example, you are issuing the HLIST command to list the entries from the MCDS for all migrated data sets with MST7707 as the specific set of initial characters of the data set name that are in the small-data-set-packing data set on migration level 1 volume MVL003. The list is to go to SYSOUT class A.

```
HLIST LEVEL(MST7707) SELECT(VOLUME(MVL003) -
      SMALLDATASETPACKING) SYSOUT(A)
```

Listing the data set entries for all level 1 volumes and sending the output to a terminal

In this example, you are issuing the HLIST command to list the entries for migrated data sets that have MST7707 as the set of initial characters of the data set name, are on migration level 1 volumes, but are not in small-data-set-packing data sets. The list is to be printed at the terminal from which you issued the command.

```
HLIST LEVEL(MST7707) SELECT(MIGRATIONLEVEL1 -
      NOSMALLDATASETPACKING)
```

Listing information from the BCDS in the UNIX shell

DFSMShsm provides a command, **hlist**, to allow UNIX shell users a way to list the backup versions of their own UNIX files.

Description

The **hlist** command communicates with DFSMShsm to list information about backups of UNIX files. The information is written to stdout.

Format

hlist [-AhXRdtv] [-amindays,maxdays] [-V *volser*] *path*

path can be any of the following:

- The full path to a specific file: `/u/username/dir1/file1.txt`
- A single file name: `file1.txt` – DFSMShsm will use the current working directory as a basis to look for backups.
- A partial path: `/u/username/dir1/`
- A single directory name: `dir1/` - DFSMShsm will list all backups in that directory.

You may specify multiple file or directory names to the **hlist** command. Each name will be processed in sequence.

Options

-a *mindays,maxdays*
Requests that DFSMShsm list those entries in the BCDS for the data sets that were backed up within the specified range of days.

For *mindays*, substitute a decimal number from 0 to 999999 for the minimum number of days since you referred to the files or since DFSMShsm backed them up.

For *maxdays*, substitute a decimal number from 0 to 999999 for the maximum number of days since you referred to the files or since DFSMShsm backed them up. The *maxdays* value should be greater than or equal to the *mindays* value. If the *maxdays* value is not greater than the *mindays* value, DFSMShsm lists only the files whose most recent reference or backup was exactly *mindays* days ago.

-A
Requests that DFSMShsm is to display the information about the active backup versions only. The information about the retained backup copies is not included in the output.

-b
Displays backups for the specified file. This option is the default.

-d
Requests detailed information be printed about each backup. This option is the default.

-h
Specifies that the list of acceptable options is printed to stdout. No further processing is performed.

-R
Requests that DFSMShsm is to display the backup information about the retained backup copies that DFSMShsm is to display the backup information about the active and retained backup copies that have RETAINDAYS specified at the time of backup. Retained backup copies do not have version and generation numbers, therefore this information is not available in the **hlist** command output.

-t
Requests that information be printed in table form.

-v
Requests verbose output as processing is performed.

-V *volser*
Requests that DFSMShsm is to display the matching files that have their latest backup version on the specified volser.

-X
When a directory is specified for path then any directories contained in that directory will also be processed.

Sample lists from the HLIST command

This section contains examples of printer and terminal lists generated by the HLIST command.

Listing volume entries

Table 3 on page 125 presents the headings that appear in a list printed at the printer or terminal when you request information for DFSMShsm-managed or migration volumes and a description of the information that appears with those headings.

Table 3. Headings of output when you request information from the migration control data set (MCDS) for DFSMShsm-managed or DASD migration volume

Printer Output Heading	Terminal Label	Description
VOLSER	VOL	The number under this heading is the volume serial number of the DFSMShsm-managed or migration volume.
DEVICE TYPE	DEVTYP	The name under this heading is the name of the type of unit on which this volume can reside.
VOL TYPE	VOLTYPE	The DFSMShsm category assigned to this volume is PRIM, P SMS, LEV 1, L1-OV, or LEV 2. UN indicates that a DASD migration level 2 volume has not been assigned to a key range and that a tape level 2 migration volume has not been selected for migration by any processing unit.
THRESHOLD HI---LO	HI-THRESH LO-THRESH	This field contains the high and low threshold of occupancy defined for this volume. The low threshold of occupancy applies only to DFSMShsm-managed volumes. The values listed for SMS-managed volumes are those that DFSMShsm last retrieved from SMS and may not be the most current values. The most current values for SMS-managed volumes are reflected in the volume's associated storage group.
FRAG INDEX	FRAG	The number under this heading is a qualitative measure of the scattered free space on the volume. The values of the index can range from 0 to 1. The higher the value, the more fragmented the free space on the volume.
HOSTID	AUTO-MIG	The character listed is the processor ID of a processor by which this volume was assigned the automatic space management attribute. A NO indicates that the volume has not been assigned the automatic space management attribute by any processor. This field applies to DFSMShsm-managed volumes only.
HOSTID	BACK	The character listed is the processor ID of a processor by which this volume was assigned the automatic backup attribute. A NO indicates that the volume was not assigned the automatic backup attribute by any processor. This field applies to DFSMShsm-managed volumes only.
	DUMP	The character listed is the processor ID of a processor by which this volume was assigned the automatic dump attribute. A NO indicates that the volume was not assigned the automatic dump attribute by any processor. This field applies to DFSMShsm-managed volumes only.
AUTO RECALL	AUTO-RECALL	YES or Y indicates that the volume with the automatic recall attribute is eligible to receive recalled data sets. This field applies to DFSMShsm-managed volumes only.

Table 3. Headings of output when you request information from the migration control data set (MCDS) for DFSMShsm-managed or DASD migration volume (continued)

Printer Output Heading	Terminal Label	Description
SDSP AVAIL	SDSP	YES or Y indicates that a small-data-set-packing data set was created on this volume. This field applies to migration level 1 volumes only.
MIN AGE	MIN-AGE	This is the inactive age of the most recently migrated data set from the volume that was processed the last time volume space management ran.
MIGRATED DS--TRKS	MIG DS	This is the number of data sets that were migrated or deleted from the volume during the last volume space management.
	MIG TRKS	This is the number of tracks of data that were migrated or deleted from the volume during the last volume space management.
DATE--TIME LAST MIGRATED	MIGDATE-TIME	This is the date of the last volume space management of this volume.
SPACE-MGMT TYPE/AGE	SPACE-MGMT	This is the type of space management assigned to this volume. MIG indicates migration, DBA indicates delete-by-age, and DBU indicates delete-if-backed-up.
	AGE	This is the number of days a data set on this volume must be inactive before it is eligible for space management. DEFAULT indicates that the age criteria for the volume or all DFSMShsm-managed volumes is not specified in the SETSYS command and DFSMShsm determines the age based on whether DFSMShsm is running in a single processor environment or multiple processor environment. This field applies only to DFSMShsm-managed volumes.
BACKDEV CATEGORY	BACKUP-DEVICE CATEGORY	This field contains the backup device category assigned to this volume. If no category was assigned, the field contains ANY. This field applies only to DFSMShsm-managed volumes.
DUMP CLASS	DUMPCLASS	This field contains the dump class of the DFSMShsm-managed or migration volume. The values listed for SMS-managed volumes are those that DFSMShsm last retrieved from SMS and may not be the most current values. The most current values for SMS-managed volumes are reflected in the volume's associated storage group.

Note: A field containing only *** is not applicable to this volume (see individual field descriptions in the sample lists).

Figure 23 on page 127 is a sample printer list of a specific migration volume when you specify the MIGRATIONVOLUME parameter. The printer list format for a specific migration volume, for all the DFSMShsm-managed and migration volumes, or for all the DFSMShsm-managed volumes or migration volumes has the same format as described in Figure 23 on page 127. If you request information for more than one volume, the list has multiple entries.

```
1- DFSMSHSM CONTROL DATASET - MIGRATE VOLUME-MCDS--- LISTING ----- AT 14:09:45 ON 08/12/02 FOR SYSTEM=PCC

 VOLSER  DEVICE  VOLUME  THRESH  FRAG HOSTID AUTO-   AUTO SDSP MIN MIGRATED       DATE---TIME   SPACE-MGMT BUDEV DUMP
          TYPE    TYPE  HI--LOW  INDX MIG--BACK-DUMP RECL ELIG AGE DS-----TRKS    LAST MIGRATED  TYPE/AGE  CATGY CLASS

 MIG101   3390   LEV 1   075 *** .018 **** **** 8     ***  YES *** 00115  009636  00/00/00 00:00  *** ***  ****  DUMPCLB
 MIG102   3390   LEV 1   075 *** .012 **** **** 8     ***  NO  *** 00010  000125  00/00/00 00:00  *** ***  ****  DUMPCLC
 MIG103   3390   LEV 1   075 *** .079 **** **** 8     ***  NO  *** 00005  000070  00/00/00 00:00  *** ***  ****  DUMPCLC
 OVFML1   3390   L1-OV   080 *** .000 **** **** C     ***  NO  *** 00012  745930  00/00/00 00:00  *** ***  ****  DUMPCLB

 ----- END OF - MIGRATE VOLUME - LISTING -----

1- DFSMSHSM CONTROL DATASET - MIGRATE VOLUME-MCDS--- LISTING ----- AT 14:09:54 ON 08/12/02 FOR SYSTEM=PCC
```

Figure 23. Sample printer list of migration volumes from the migration control data set (MCDS) when you specify MIGRATIONVOLUME and MIGRATIONCONTROLDATASET

Figure 24 on page 127 is a sample terminal list for all the DFSMShsm-managed and migration volumes when you have specified the VOLUME and TERMINAL parameters. The terminal list format for a specific DFSMShsm-managed volume or migration volume, or for all the DFSMShsm-managed volumes or migration volumes, has the same format as described in Figure 24 on page 127. If you request information for only one volume, the list has one entry.

```
VOL=SMS001  DEVTYP=3380     VOLTYPE=P SMS    MIGDS=0001  MIGTRKS=****
   MIGDATE-TIME=89/01/28 12:01  FRAG=.069  HI-THRESH=020  LO-THRESH=010
   MIN-AGE=***  BACKUP-DEVICE-CATEGORY=****   AUTO-RECALL=*
   SDSP=***  SPACE-MGMT=MIG  AGE=***  AUTO-HOST MIG=**  BACK=**  DUMP=**
   DUMPCLASS = ********

VOL=M2TP02  DEVTYP=3480     MIGTYP=L2-TP   VOL FULL=Y  VOL EMPTY=N  DELDS=0000
   SP-MGT-DATE=88/01/10  PSWD=Y  EXP=N  RACF=N  AVAIL=Y  IN USE=-NO-  SELD=N
```

Figure 24. Sample Terminal list of all volumes from the migration control data set when you specify VOLUME and TERMINAL

Table 4 on page 127 presents the headings of the output when DFSMShsm lists information from the MCDS for tape migration level 2 volumes.

Table 4. Headings of output when you request information from the migration control data set (MCDS) for Tape Migration Level 2 volumes

Printer Output Heading	Terminal Label	Description
VOLSER	VOL	This field contains the volume serial number of the tape migration level 2 volume.
DEVICE TYPE	DEVTYP	This field contains the name of the unit where this volume can be allocated.
MIGRATE TYPE	MIGTYP	L2-TP: The tape volume was added as a tape migration level 2 volume.
VOL FULL	VOL FULL	A YES or Y indicates that an end-of-tape marker was reached or a data movement error occurred while DFSMShsm was writing on the tape volume.
DATE LAST VOL SP MANAGEMENT	SP-MGT-DATE	This is the date of the last volume space management of this volume.
VOL EMPTY	VOL EMPTY	A YES or Y indicates that the volume is empty.

Table 4. Headings of output when you request information from the migration control data set (MCDS) for Tape Migration Level 2 volumes (continued)

Printer Output Heading	Terminal Label	Description
DELETED DS	DELDS	This is the number of data sets deleted from the volume during the last volume space management.
PSWD	PSWD	A YES or Y indicates that the tape volume is password-protected.
EXP	EXP	A YES or Y indicates that this tape volume is protected by an expiration date.
RACF	RACF	A YES or Y indicates that the tape volume is RACF-protected.
AVAILABLE	AVAIL	A YES or Y indicates that the tape volume is available.
IN USE	IN USE	NO: The tape volume is not being used. MIGD: Data set migration is using the tape volume. MIGV: Volume migration is using the tape volume. RECL: Recall is using the tape volume. RCYS: The tape volume is a recycle source volume. RCYT: The tape volume is a recycle target volume. DBAU: Data set deletion or data set retirement is using the tape volume.
SELECTED	SELD	A YES or Y indicates that the volume is selected.
IDRC	IDRC	Y = Volume contains data in the Improved Data Recording Capability format. N = Volume does not contain data in the Improved Data Recording Capability format. ** = Volume is empty—not assigned the Improved Data Recording Capability format.
DUPLEX ALT	DUPLEX ALT	*volser* indicated the volume serial number of the duplexed alternate. *PEND* indicates an exception condition and an internal TAPECOPY is pending. *NONE* indicates volume not created in a duplexing environment.

Figure 25 on page 129 is a sample of the printer list of tape migration level 2 volumes when you specify the MIGRATIONLEVEL2(TAPE) parameter and MIGRATIONCONTROLDATASET parameter.

```
1- DFSMSHSM CONTROL DATASET - MIGRATE VOLUME-MCDS--- LISTING ----- AT 14:09:45 ON 08/12/02 FOR SYSTEM=PCC

 VOLSER  DEVICE  VOLUME  THRESH  FRAG HOSTID AUTO-   AUTO SDSP MIN MIGRATED       DATE---TIME   SPACE-MGMT BUDEV DUMP
          TYPE    TYPE  HI--LOW  INDX MIG--BACK-DUMP RECL ELIG AGE DS-----TRKS    LAST MIGRATED  TYPE/AGE  CATGY CLASS

MIG101   3390   LEV 1   075 *** .018 **** **** 8     ***  YES *** 00115  009636  00/00/00 00:00  *** ***  ****  DUMPCLB
MIG102   3390   LEV 1   075 *** .012 **** **** 8     ***  NO  *** 00010  000125  00/00/00 00:00  *** ***  ****  DUMPCLC
MIG103   3390   LEV 1   075 *** .079 **** **** 8     ***  NO  *** 00005  000070  00/00/00 00:00  *** ***  ****  DUMPCLC
OVFML1   3390   L1-OV   080 *** .000 **** **** C     ***  NO  *** 00012  745930  00/00/00 00:00  *** ***  ****  DUMPCLB

 ----- END OF - MIGRATE VOLUME - LISTING -----

1- DFSMSHSM CONTROL DATASET - MIGRATE VOLUME-MCDS--- LISTING ----- AT 14:09:54 ON 08/12/02 FOR
SYSTEM=PCC

1- DFSMSHSM CONTROL DATASET - MIGRATE VOLUME-MCDS--- LISTING ----- AT 10:44:26 ON 96/11/12 FOR SYSTEM=3090

 VOLSER  DEVICE  MIGRATE  VOL   DATE VOL LAST VOL   DELETED  PSWD  EX  RACF AVAILABLE IN USE SELECTED IDRC DUPLEX
          TYPE    TYPE    FULL  SP MANAGED    EMPTY    DS                                                  ALT

 A16010   3480    L2-TP    NO     00/00/00     NO     0000   YES   NO   NO     YES     -NO-     NO     N   A16011
 A16012   3480    L2-TP    NO     00/00/00     NO     0000   YES   NO   NO     YES     -NO-     NO     N   *NONE*
 A16014   3480    L2-TP    NO     00/00/00     NO     0000   YES   NO   NO     YES     -NO-     NO     N   *PEND*
 ----- END OF - MIGRATE VOLUME - LISTING -----
```

Figure 25. Sample printer list of Tape Migration Level 2 volumes when you specify MIGRATIONLEVEL2(TAPE) and MIGRATIONCONTROLDATASET parameter.

Table 5 on page 129 presents the headings that appear when you request a list of DFSMShsm-managed volume information from the backup control data set.

Table 5. Headings of output when you request information for DFSMShsm-managed volumes from the backup control data set (BCDS)

Printer Output Heading	Terminal Label	Description
VOLSER	VOL	The number under this heading is the volume serial number of the volume.
ICF catalog	VSAM CTLG	ICF catalogs are no longer supported.
CATALOG ON VOLSER	CTLG VOL	This field contains the volume serial number of the volume on which the catalog resides, SYSRES, or blanks.
LAST BACKED UP DATE TIME	LAST BACKED UP ON	This field contains the date and time of the last volume backup of this volume.
DUMP CLASS	DUMPCLASS	This field contains the dump class of the DFSMShsm-managed or migration volume.

Figure 26 on page 129 is a sample of a printer list of information about DFSMShsm-managed volumes from the BCDS.

```
 ---- DFSMShsm CONTROL DATASET -PRIMARY VOLUME-BCDS--- LISTING -----
AT 13:31:36 ON 89/12/31 FOR SYSTEM=SYSA
                                                CATALOG     LAST BACKED UP
VOLSER  SMS  OWNED BY ICF CATALOG              ON VOLSER     DATE     TIME  DUMPCLASS  DUMPED
TIME   EXP DATE
PRIM01  NO   NOT OWNED BY A ICF CATALOG          PRIM01    88/01/15   00:59 DCLASS01  88/01/31
01:59  *NOLIMIT
                                                                             DCLASS02  88/01/31
01:59  88/12/31
                                                                             DCLASS03  88/01/31
01:59  88/12/31
                                                                             DCLASS04  88/01/31
01:59  88/12/31
                                                                             DCLASS05  88/01/31
01:59  88/12/31
```

Figure 26. Sample printer list from the backup control data set (BCDS) when you specify VOLUME, PRIMARYVOLUME(volser) and BACKUPCONTROLDATASET

Listing backup volume entries

You specify the HLIST command with the BACKUPVOLUME parameter to get a list of the information for all the backup volumes managed by DFSMShsm. The command lists the volumes in alphanumeric sequence by volume serial number. You specify HLIST BACKUPVOLUME(volser) to get a list of the information for a specific backup volume managed by DFSMShsm.

Table 6 on page 130 presents the information included in the list of all backup volumes or of a specific backup volume.

Table 6. Headings of Output When You Request Information for Backup Volumes

Printer Output Heading	Terminal Label	Description
VOLSER	VOL	This field contains the volume serial number of the backup volume.
DEVICE TYPE	DEVTYP	This field contains the type of unit on which this volume can be allocated.
BACKUP TYPE	BACKTYP	DAILY or SPILL indicates the DFSMShsm volume category of the backup volume. AVAIL specifies that the backup category was not assigned and the volume is available to be used as a daily or spill backup volume when the volume is used for the first time.
VOL FULL	FULL	For a DASD backup volume, YES indicates that an attempt to back up a data set to this volume failed because of insufficient space. For a tape backup volume, YES indicates that in writing to the tape, an end-of-tape marker was reached or a data movement error occurred and the volume was marked full to prevent further use.
TOTAL TRACKS	TOTAL TRKS	This field contains the total track capacity of the DASD volume. If this field indicates zero tracks, the backup volume has never been used. This field does not apply to tape.
FREE TRACKS	FREE TRKS	This field contains the number of tracks on the DASD volume available for data sets. This field does not apply to tape.
THRESH	THRESH	This field contains the threshold of occupancy for the DASD backup volume. This field does not apply to tape.
LAST BACKUP DATE	LAST BACKUP DATE	This field contains the date that the volume was most recently used as a target volume for backup, spill, or recycle processing.
PSWD	PSWD	A YES or Y indicates that the tape volume is password-protected. This field does not apply to DASD.
EXP	EXP	A YES or Y indicates that the tape volume is protected by an expiration date. This field does not apply to DASD.
RACF	RACF	A YES or Y indicates that the tape volume is RACF-protected. This field does not apply to DASD.
EMPTY	EMPTY	A Y indicates that the tape volume is empty. This field does not apply to DASD.

Table 6. Headings of Output When You Request Information for Backup Volumes (continued)		
Printer Output Heading	**Terminal Label**	**Description**
IDRC	IDRC	Y = Volume contains data in the Improved Data Recording Capability format. N = Volume does not contain data in the Improved Data Recording Capability format. ** = Volume is empty—not assigned the Improved Data Recording Capability format.
DUPLEX ALT	DUPLEX ALT	*volser* indicated the volume serial number of the duplexed alternate *PEND* indicates an exception condition and an internal TAPECOPY is pending *NONE* indicates volume not created in a duplexing environment
Note: A field containing only *** is not applicable (see individual field descriptions in the sample lists).		

Figure 27 on page 131 is a sample printer list of all the backup volumes when you specify the BACKUPVOLUME parameter. The printer list format for a specific volume has the same format as that described in Figure 27 on page 131. If you request information for only one volume, the list has one entry.

```
 1- DFSMSHSM CONTROL DATASET - BACKUP VOLUME-- LISTING ----- AT 10:55:46 ON 01/04/03 FOR
SYSTEM=3090

VOLSER   DEVICE  BACKUP   VOL  TOTAL     FREE   THRESH  LAST BACKUP  PSWD  EXP  RACF  EMPTY
IDRC  DUPLEX  PCT
         TYPE    TYPE    FULL TRACKS    TRACKS
DATE                                    ALT     FULL
A00002    3480   DAILY    NO  ******** ********  ***    00/09/05     YES   NO   NO    NO     N
*NONE*   ****
A00017    3480   DAILY    YES ******** ********  ***    00/08/25     YES   NO   NO    NO     N
*NONE*   ****
A00018    3480   DAILY    NO  ******** ********  ***    00/10/31     YES   NO   NO    NO     N
*NONE*   ****
BACK01    3390   DAILY    NO  00000150 00000021  090    01/04/02     ***   ***  ***   ***    NA
NA       NA
BACK02    3390   DAILY    NO  00000150 00000023  090    01/04/03     ***   ***  ***   ***    NA
NA       NA
BACK03    3390   SPILL    NO  00000150 ********  090    00/00/00     ***   ***  ***   ***    NA
NA       NA
----- END OF - BACKUP VOLUME - LISTING -----
```

Figure 27. Sample Printer List of All the Backup Volumes When You Specify BACKUPVOLUME

Listing data set entries from the migration control data set

Table 7 on page 131 presents the information you receive when you request information from the MCDS for data sets.

Table 7. Headings of Output When You Request MCDS Information for Data Sets		
Printer Output Heading	**Terminal Label**	**Description**
DATASET NAME	DSN	This field contains the name of the user data set.

Table 7. Headings of Output When You Request MCDS Information for Data Sets (continued)		
Printer Output Heading	**Terminal Label**	**Description**
MIGRATED ON VOLUME	MIGVOL	This field contains the volume serial number of the migration volume the data set is on if the data set is currently migrated. If the data set is on more than one tape migration level 2 volume, this field contains the volume serial number of the first volume the data set is on. The field contains ONLINE if the data set was recalled.
LAST REF DATE	LAST REF	This field contains the date of the most recent reference of the data set.
MIGRATED DATE	MIG	This field contains the date that the data set was last migrated.
TRKS ALLOC	TRKS	If the data set is currently migrated, this field contains the number of tracks allocated for the data set on the DFSMShsm-managed volume from which the data set migrated. If the data set is recalled, this field is the number of tracks allocated for the recalled data set.
QTY 2K BLKS	2K BLKS	This field contains the size, in 2K blocks, of the data set on the migration volume. This field does not apply to tape.
TIMES MIG	TIMES MIG	This field contains the number of times DFSMShsm migrated the data set. If migration cleanup has deleted the data set record, this is the number of times DFSMShsm migrated the data set since the record was deleted.
DS ORG	DSO	This field contains the type of data set organization: • PE (partitioned data set extended) • PS (physical sequential) • PO (partitioned) • DA (BDAM) • VS (VSAM) • *** if the data set organization is unknown.
SDSP DS	SDSP	A YES under this heading indicates that the data set resides in a small-data-set-packing data set.
QTY 16K BLOCKS	16K BLOCKS	This field contains the size, in 16K blocks, of the data set on the tape migration level 2 volume. This field does not apply to DASD migration volumes.
LAST MIG VOLUME	LAST MIGVOL	This field contains the volume serial number of the last tape migration level 2 volume if the data set spans more than one tape volume. *NONE* indicates that the data set does not span more than one tape volume. This field does not apply to DASD.

Figure 28 on page 133 is a sample printer list from the migration control data set for all the data sets that contain the user's identification as the specific set of initial characters of the data set name. If you request information for a specific data set, the list contains the entry for only that data set.

```
----DFSMShsm CONTROL DATASET - MIGRATED DATASET--LISTING ----- AT 13:07:20 ON 89/03/23 FOR
SYSTEM=381A

DATASET NAME                          MIGRATED   LAST REF MIGRATED  TRKS   QTY   TIMES  DS SDSP
QTY    LAST MIG
                                      ON VOLUME    DATE     DATE   ALLOC 2K BLKS  MIG  ORG  DS
16K BLKS  VOLUME

S469193.DAV.N.F40RC034.DSET01           M2TP10   89/03/23 89/03/01  0589  ****    01   DA   NO
0118    M2TP01
S469193.DAVS.N.F40RC034.DSET01          M2TP10   89/03/23 89/03/01  0001  ****    01   DA   NO
0001    *NONE*
```

Figure 28. Sample Printer List When You Specify DATASETNAME and MIGRATIONCONTROLDATASET

Figure 29 on page 133 is a sample printer list of data set entries when you specify the LEVEL parameter.

```
----DFSMShsm CONTROL DATASET - MIGRATED DATASET--LISTING ----- AT 13:07:20 ON 89/03/23 FOR
SYSTEM=381A

DATASET NAME                          MIGRATED   LAST REF MIGRATED  TRKS   QTY   TIMES  DS SDSP
QTY    LAST MIG
                                      ON VOLUME    DATE     DATE   ALLOC 2K BLKS  MIG  ORG  DS
16K BLKS  VOLUME

H952762.PSFB.F40LI404.DSET01            M2TP01   89/03/23 89/03/23  0006  ****    01   PS   NO
0004    *NONE*
H952762.PSFB.F40LI404.DSET02            M2TP01   89/03/23 89/03/23  0006  ****    01   PS   NO
0004    *NONE*
```

Figure 29. Sample Printer List of a Group of Data Sets When You Specify LEVEL

Figure 30 on page 133 is a sample terminal list of data set entries when you specify the LEVEL and TERMINAL parameters.

```
DSN=H952762.PSFB.F40LI404.DSET01                  MIGVOL=M2TP01 DSO=PS  SDSP=NO
  LAST REF=89/03/23 MIG=89/03/23 TRKS=0006 2K BLKS=**** TIMES MIG=01
  16K BLKS=0004  LAST MIGVOL=*NONE*



DSN=H952762.PSFB.F40LI404.DSET02                  MIGVOL=M2TP01 DSO=PS  SDSP=NO
  LAST REF=89/03/23 MIG=89/03/23 TRKS=0006 2K BLKS=**** TIMES MIG=01
  16K BLKS=0004  LAST MIGVOL=*NONE*

MIGRATED DATA SETS = 00002  TRACKS = 000012  K-BYTES = 00000104
```

Figure 30. Sample Terminal List of a Group of Data Sets When You Specify LEVEL and TERMINAL

Listing data set entries from the backup control data set

Table 8 on page 133 presents the following information from the BCDS for all data sets:

Table 8. Headings of Output for All Data Sets When You Request Information from the Backup Control Data Set

Printer Output Heading	Terminal Label	Description
DSNAME	DSN	This field contains the data set name of the data set that was backed up.

Table 8. Headings of Output for All Data Sets When You Request Information from the Backup Control Data Set (continued)

Printer Output Heading	Terminal Label	Description
BACKUP FREQ	BACK FREQ	This field contains the minimum number of days that must elapse after a backup of the data set before another backup can be done during incremental backup processing.
MAX BACKUP VERSIONS	MAX VERS	This field contains the maximum number of versions of the data set to be kept. More than this number of backup versions may be listed if backup versions exist of uncataloged data sets with the same names as cataloged data sets or if you reduced the limit and no new backup versions were created.
BACKUP VERSION DATA SET NAME	BDSN	This field contains the data set name of the backup version.
BACKUP VOLUME	BACKVOL	This field contains the volume serial number of the volume on which the backup version resides. The volume can be a backup volume or a migration level 1 volume.
FROM VOLUME	FRVOL	This field contains the volume serial number of the user volume on which the data set resided when the backup version was made. If the data set was migrated at the time of the backup, this field contains the volume serial number of the user volume from which the data set migrated.
BACKUP DATE	BACKDATE	This field contains the date the backup version was created.
BACKUP TIME	BACKTIME	This field contains the time the backup version was created.
SYS CAT	CAT	YES indicates that the backup version was made from the cataloged data set.
GEN NMBR	GEN	This field contains the relative generation number of the backup version. The most recent backup version is number 0, the next most recent backup version is number 1, and so forth.
VER NMBR	VER	This field contains the version number of the backup version. This number is unique to the backup version during its entire life span. The numbering begins at 1 for the first backup version of a data set.
UNS/ RET	UNS/RET	This field indicates special conditions or exceptions. UNS indicates that the data set was unserialized when backed up. RET indicates that the version listed is a retired version. U/R indicates an unserialized, retired version. NO indicates a version that is neither unserialized nor retired.
RET DAYS	RETDAYS	This field contains the RETAINDAYS parameter specified at the time of backup. The value represents the minimum number of days that DFSMShsm maintains the backup copy. ***** indicates that RETAINDAYS is not specified.

Table 8. Headings of Output for All Data Sets When You Request Information from the Backup Control Data Set (continued)

Printer Output Heading	Terminal Label	Description
RACF IND	RACF IND	YES indicates that the RACF indicator was on at the time of backup. NO indicates that the RACF indicator was not on at the time of backup.
BACKUP PROF	BACK PROF	YES indicates that the RACF discrete backup profile exists. NO indicates that a RACF discrete backup profile does not exist.
NEWNAME	NEWNM	Y as the first character indicates that NEWNAME was specified at the time of backup. N as the first character indicates that NEWNAME was not specified at the time of backup. Y as the second character indicates that the data set was VSAM with associated AIX/PATH, and SPHERE(NO) was specified. N as the second character indicates the data set was VSAM with associated AIX/PATH and SPHERE(NO) was not specified. Y as the third character indicates the data set was VSAM and was uncataloged or migrated and the backup was processed with the GVCN(YES) option. * as the second character indicates the data set was non-VSAM or VSAM and no AIX/PATH existed. * as the third character indicates the data set was non-VSAM or was VSAM and cataloged and not migrated.
SPHERE(NO)	NOSPH	YES indicates the data set was VSAM with associated AIX/PATH and SPHERE(NO) was specified. NO indicates the data set was VSAM with associated AIX/PATH and SPHERE(NO) was not specified.
GENVSAMCOMPNAMES	GVCN	YES indicates the data set was VSAM and was uncataloged or migrated and the backup was processed with the GVCN(YES) option.

Figure 31 on page 136 is a sample printer list of all data sets that contain the user's identification as the specific set of initial characters of the data set name when you have specified the DATASETNAME and BACKUPCONTROLDATASET parameters. If you request information for a specific data set, the list contains the entries for only that data set.

```
1- DFSMSHSM CONTROL DATASET - BACKUP DATASET-- LISTING ----- AT 08:55:18 ON 09/03/06 FOR
SYSTEM=3090


DSNAME = HSMATH0.SMSDS4.N01.KSDS             BACKUP FREQ = ***, MAX ACTIVE BACKUP VERSIONS = ***

BACKUP VERSION DATA SET NAME                 BACKUP FROM   BACKUP   BACKUP   SYS GEN  VER  UNS/
RET  BACKUP NEW
                                             VOLUME VOLUME DATE     TIME     CAT NMBR NMBR RET
DAYS PROF   NAME

DFHSM.BACK.T165308.HSMATH0.SMSDS4.J9065      A00138 SRC001 09/03/06 08:53:16 YES 000  002   NO
00300 NO     N**
DFHSM.BACK.T445208.HSMATH0.SMSDS4.J9065      A00136 SRC001 09/03/06 08:52:44 YES 001  001   NO
***** NO     N**

TOTAL BACKUP VERSIONS = 0000000002


----- END OF - BACKUP DATASET - LISTING -----
```

Figure 31. Sample Printer List of All Data Sets When You Specify DATASETNAME and BACKUPCONTROLDATASET

Figure 32 on page 136 is a sample terminal list for all the data sets that contain the user's identification as the specific set of initial characters of the data set name when you have specified the DATASETNAME, BACKUPCONTROLDATASET, and TERMINAL parameters. If you request information for a specific data set, the list only contains entries for that data set.

```
DSN=HSMATH0.SMSDS4.N01.KSDS                      BACK FREQ = ***  MAX ACTIVE BACKUP VERSIONS =
***

BDSN=DFHSM.BACK.T371814.HSMATH0.SMSDS4.J9064     BACKVOL=MIG102
FRVOL=SMS001, BACKDATE=09/03/05  BACKTIME=14:18:37  CAT=YES  GEN=000  VER=001
UNS/RET= NO RACF IND=NO  BACK PROF=NO  NEWNM=NO  NOSPH=*** GVCN=*** RETDAYS=00002

TOTAL BACKUP VERSIONS = 0000000001
```

Figure 32. Sample Terminal List of All Data Sets When You Specify DATASETNAME, BACKUPCONTROLDATASET, and TERMINAL

Listing UNIX file entries from the backup control data set

Table 9 on page 136 presents the information from the BCDS for all UNIX files.

Table 9. Headings of output for all UNIX files when you request information from the backup control data set

Printer Output Heading	Terminal Label	Description
FILE	FILE	This field contains the UNIX file name of the file that was backed up.
BACKUP FREQ	BACKUP FREQ	This field contains asterisks as it does not apply to UNIX files.
MAX ACTIVE BACKUP VERSIONS	MAX ACTIVE BACKUP VERSIONS	This field contains the maximum number of versions of the UNIX file to be kept. More than this number of backup versions may be listed if you reduced the limit and no new backup versions were created. *** is listed for files in an SMS-managed zFS because the value comes from the current management class definition.
	FROMFS	This field contains the most recent zFS data set name containing the file system that the UNIX file was backed up from.
BACKUP VERSION DATA SET NAME	BDSN	This field contains the data set name of the backup version.

Table 9. Headings of output for all UNIX files when you request information from the backup control data set (continued)

Printer Output Heading	Terminal Label	Description
BACKUP VOLUME	BACKVOL	This field contains the volume serial number of the volume on which the backup version resides. The volume can be a backup volume or a migration level 1 volume.
BACKUP DATE	BACKDATE	This field contains the date that the backup version was created.
BACKUP TIME	BACKTIME	This field contains the time that the backup version was created.
GEN NMBR	GEN	This field contains the relative generation number of the backup version. The most recent backup version is number 0, the next most recent backup version is number 1, and so forth.
VER NMBR	VER	This field contains the version number of the backup version. This number is unique to the backup version during its entire life span. The numbering begins at 1 for the first backup version of a UNIX file.
UNS/ RET	UNS/RET	This field indicates special conditions or exceptions. UNS indicates that the UNIX file was unserialized when backed up. RET indicates that the version listed is a retired version. U/R indicates an unserialized, retired version. NO indicates a version that is neither unserialized nor retired.
RET DAYS	RETDAYS	This field contains the RETAINDAYS parameter that is specified at the time of backup. The value represents the minimum number of days that DFSMShsm maintains the backup copy. ***** indicates that RETAINDAYS is not specified.
	EXTENDED ACL	This field contains YES or NO, depending if an extended file access control list existed for the UNIX file.
TYPE	TYPE	This field contains FILE or DIR to indicate that a particular backup is for a UNIX file, or an empty UNIX directory.
	INUSE	This field contains YES or NO, depending on whether the UNIX file was backed up while in use. YES indicates the UNIX file was backed up while in use. NO indicates the UNIX file was backed up with exclusive serialization (a normal backup was created).

Figure 33 on page 138 is a sample printer list for the file, /test/prod/passenger-manifests/12-31- 2018/AA6185/business-class/12ab84nt95axa/VIP-list.csv. The command to request this output:

```
HLIST FILENAME('/test/prod/passenger-manifests/12-31-2018/AA6185/business-class/12ab84nt95axa/
VIP-list.csv') BCDSODS(LIST.OUTPUT)
```

.

```
- DFSMSHSM CONTROL DATASET - BACKUP FILE-- LISTING ----- AT 04:15:06 ON 19/01/11 FOR SYSTEM=3090


FILE=/test/prod/passenger-manifests/12-31-2018/AA6185/business-class/12ab84nt95axa/VIP-list.csv

BACKUP FREQ =*** , MAX ACTIVE BACKUP VERSIONS =***
FROMFS=zFS.UDIR

BACKUP VERSION DATA SET NAME               BACKUP BACKUP     BACKUP GEN VER UNS/ RET      TYPE
                                           VOLUME DATE       TIME      NMBR NMBR RET DAYS
DFHSM.BACK.TDXYV04.$NT95AXA.VIP-LIST.A9011 MIG102 2019/01/11 04:10:18 000 003 NO *****    FILE
DFHSM.BACK.TAWIV04.$NT95AXA.VIP-LIST.A9011 MIG102 2019/01/11 04:02:19 001 002 NO *****    FILE
DFHSM.BACK.TWODT03.$NT95AXA.VIP-LIST.A9011 MIG102 2019/01/11 03:58:46 002 001 NO *****    FILE

TOTAL BACKUP VERSIONS = 0000000003
----- END OF - BACKUP FILE - LISTING -----
```

Figure 33. Sample printer list for the file

Figure 34 on page 138 is a sample terminal list for the file, `/test/prod/passenger-manifests/12-31- 2018/AA6185/business-class/12ab84nt95axa/VIP-list.csv`. The command to request this output:

```
HLIST FILENAME('/test/prod/passenger-manifests/12-31- 2018/AA6185/business-class/12ab84nt95axa/
VIP-list.csv') BCDS TERM
```

```
 FILE=/test/prod/passenger-manifests/12-31-2018/AA6185/business-class/12ab84nt95a
xa/VIP-list.csv
BACKUP FREQ =*** , MAX ACTIVE BACKUP VERSIONS =***
FROMFS=zFS.UDIR

BDSN=DFHSM.BACK.TDXYV04.$NT95AXA.VIP-LIST.A9011 BACKVOL=MIG102
BACKDATE=2019/01/11 BACKTIME=04:10:18 GEN=000 VER=003 UNS/RET= NO
EXTENDED ACL= NO RETDAYS=***** TYPE=FILE INUSE=NO

BDSN=DFHSM.BACK.TAWIV04.$NT95AXA.VIP-LIST.A9011 BACKVOL=MIG102
BACKDATE=2019/01/11 BACKTIME=04:02:19 GEN=001 VER=002 UNS/RET= NO
EXTENDED ACL= NO RETDAYS=***** TYPE=FILE INUSE=YES

BDSN=DFHSM.BACK.TWODT03.$NT95AXA.VIP-LIST.A9011 BACKVOL=MIG102
BACKDATE=2019/01/11 BACKTIME=03:58:46 GEN=002 VER=001 UNS/RET= NO
EXTENDED ACL= NO RETDAYS=***** TYPE=FILE INUSE=NO

TOTAL BACKUP VERSIONS = 0000000003

ARC0140I LIST COMPLETED, 13 LINE(S) OF DATA OUTPUT
```

Figure 34. Sample terminal list for the file

Figure 35 on page 139 is a sample printer list for the directory, `/test/prod/passenger-manifests/12- 31-2018/AA6185/business-class/12ab84nt95axa/`. The command to request this output:

```
HLIST FILELEVEL('/test/prod/passenger-manifests/12-31- 2018/AA6185/business-class/
12ab84nt95axa/') BCDS ODS(LIST.OUTPUT)
```

```
 - DFSMSHSM CONTROL DATASET - BACKUP FILE-- LISTING ----- AT 04:28:29 ON 19/01/11 FOR SYSTEM=3090


FILE=/test/prod/passenger-manifests/12-31-2018/AA6185/business-class/12ab84nt95axa/VIP-list.csv

BACKUP FREQ =*** , MAX ACTIVE BACKUP VERSIONS =***
FROMFS=zFS.UDIR

BACKUP VERSION DATA SET NAME               BACKUP BACKUP     BACKUP GEN VER UNS/ RET      TYPE
                                           VOLUME DATE       TIME      NMBR NMBR RET DAYS
DFHSM.BACK.TDXYV04.$NT95AXA.VIP-LIST.A9011 MIG102 2019/01/11 04:10:18 000 003 NO *****    FILE
DFHSM.BACK.TAWIV04.$NT95AXA.VIP-LIST.A9011 MIG102 2019/01/11 04:02:19 001 002 NO *****    FILE
DFHSM.BACK.TWODT03.$NT95AXA.VIP-LIST.A9011 MIG102 2019/01/11 03:58:46 002 001 NO *****    FILE

TOTAL BACKUP VERSIONS = 0000000003


FILE=/test/prod/passenger-manifests/12-31-2018/AA6185/business-class/12ab84nt95axa/movies-
list.json

BACKUP FREQ =*** , MAX ACTIVE BACKUP VERSIONS =***
FROMFS=zFS.UDIR

BACKUP VERSION DATA SET NAME               BACKUP BACKUP     BACKUP GEN VER UNS/ RET      TYPE
                                           VOLUME DATE       TIME      NMBR NMBR RET DAYS
DFHSM.BACK.TDYJK04.$NT95AXA.MOVIES-L.A9011 MIG102 2019/01/11 04:10:21 000 003 NO *****    FILE
DFHSM.BACK.TAWJM04.$NT95AXA.MOVIES-L.A9011 MIG102 2019/01/11 04:02:20 001 002 NO *****    FILE
DFHSM.BACK.TWOET03.$NT95AXA.MOVIES-L.A9011 MIG102 2019/01/11 03:59:14 002 001 NO *****    FILE

TOTAL BACKUP VERSIONS = 0000000003


FILE=/test/prod/passenger-manifests/12-31-2018/AA6185/business-class/12ab84nt95axa/fr?¬34.png

BACKUP FREQ =*** , MAX ACTIVE BACKUP VERSIONS =***
FROMFS=zFS.UDIR

BACKUP VERSION DATA SET NAME               BACKUP BACKUP     BACKUP GEN VER UNS/ RET      TYPE
                                           VOLUME DATE       TIME      NMBR NMBR RET DAYS
DFHSM.BACK.TDYIT04.$NT95AXA.FR$$34$P.A9011 MIG102 2019/01/11 04:10:21 000 002 NO *****    FILE
DFHSM.BACK.TDNTR04.$NT95AXA.FR$$34$P.A9011 MIG102 2019/01/11 04:09:15 001 001 NO *****    FILE

TOTAL BACKUP VERSIONS = 0000000002
----- END OF - BACKUP FILE - LISTING -----
```

Figure 35. Sample printer list for the directory

Listing entries of the latest backup version on backup volumes

Table 10 on page 139 presents the following information for data sets whose latest backup version is contained on the specified backup volume:

Table 10. HLIST--Listing Information from the BCDS and MCDS

Printer Output Heading	Terminal Label	Description
DATA SET NAME	DSN	This field contains the original data set name of the data set that was backed up.
FROM VOLUME	FRVOL	This field contains the volume serial number of the user volume on which the data set resided when the backup version was made. If the data set was migrated at the time of the backup, this field contains the volume serial number of the user volume from which the data set migrated.
BACKUP DATE	BACKDATE	This field contains the date the backup version was created.

Table 10. HLIST--Listing Information from the BCDS and MCDS (continued)		
Printer Output Heading	**Terminal Label**	**Description**
BACKUP TIME	BACKTIME	This field contains the time the backup version was created.
UNS/ RET	UNS/RET	This field indicates special conditions or exceptions. UNS indicates that the data set was unserialized when backed up. RET indicates that the version listed is a retired version. U/R indicates an unserialized, retired version. NO indicates a version that is neither unserialized nor retired.
RET DAYS	RETDAYS	This field contains the RETAINDAYS parameter specified at the time of backup. The value represents the minimum number of days that DFSMShsm maintains the backup copy. ***** indicates that RETAINDAYS is not specified.

Figure 36 on page 140 is a sample printer list that you would get if you specified the DATASETNAME and SELECT(VOLUME(*volser*)) parameters and the volume specified was a backup volume.

```
- DFSMSHSM CONTROL DATASET - LATEST VERSION BACK01-- LISTING ----- AT 12:51:21 ON 09/01/22 FOR
SYSTEM=3090


     DATA SET NAME                                      FROM      BACKUP      BACKUP    UNS/
RET
                                                       VOLUME      DATE        TIME     RET
DAYS


     HSMATH0.SMSDS4.N01.KSDS                           SMS001    09/01/22    12:49:32     NO
00999
     HSMATH0.SMSDS4.N04.PSFB                           SMS001    09/01/22    12:49:58     NO
00034



 ----- END OF - LATEST VERSION BACK01 - LISTING -----
```

Figure 36. Sample Printer List When You Specify DATASETNAME and SELECT(VOLUME(volser))

Figure 37 on page 140 is a sample terminal list that you would get if you specified the DATASETNAME, SELECT(VOLUME(*volser*)), and TERMINAL parameters and the volume specified was a backup volume.

```
DSN= HSMATH0.SMSDS4.N04.PSFB                                  BACKVOL=BACK01
FRVOL=SMS001 BACKDATE=09/01/22 BACKTIME=12:49:58 UNS/RET= NO
RETDAYS=00034

ARC0140I LIST COMPLETED,4 LINE(S) OF DATA
ARC0140I (CONT.) OUTPUT
```

Figure 37. Sample Terminal List When You Specify DATASETNAME, SELECT(VOLUME(volser)), and TERMINAL

Listing data set entries from both control data sets

You specify HLIST DATASETNAME BOTH to get a list of both the migration and backup control data set information for all the data sets that contain the user's identification as the specific set of initial characters of the data set name. You specify HLIST DATASETNAME(*dsname*) BOTH to get a list of both the migration and backup control data set information for a specific data set.

The information is provided in separate lists, and the command lists the data sets in each list in alphanumeric sequence by data set name. If you request information for a specific data set, the list contains entries only for that data set.

If you specify SYSOUT or OUTDATASET, the lists are in the same format as that described in Figure 28 on page 133 and Figure 31 on page 136. If you specify TERMINAL, the lists are in the same format as that described in Figure 32 on page 136.

Listing user authorization status entries

Figure 38 on page 141 is a sample printer list of user entries when you specify the USER (*userid*) parameter.

```
--- DFSMShsm CONTROL DATASET - USER-- LISTING --- AT 15:24:51 ON 89/01/24 FOR SYSTEM=381A

 USERID     AUTH

D324711      USER
G834921      USER
H952762      CNTL
M059259      USER
M100222      CNTL
S369193      CNTL
S469193      CNTL
TMPUSRI      USER

-----END OF - USER - LISTING -----
```

Figure 38. Sample Printer List of User Entries When You Specify USER

Listing a summary of data set entries

Table 11 on page 141 presents the following information from the MCDS for the specified data sets:

Table 11. Headings of Output When You Request Summary Information from the MCDS

Printer Output Heading	Terminal Label	Description
MIGRATED DATA SETS	MIGRATED DATA SETS	This field contains the number of data sets listed.
TRACKS MIGRATED	TRACKS	This field contains the sum of the tracks allocated for all the data sets listed.
K-BYTES MIGRATED	K-BYTES	This field contains the sum of the lengths of the data sets listed in units of 1024 bytes.

Figure 39 on page 142 is a sample printer list of data sets when you specify DATASETNAME and SUMMARY.

```
---- DFSMShsm CONTROL DATASET - SUMMARY-- LISTING ----- AT 13:07:32 ON 89/03/23 FOR
SYSTEM=381A



                                     MIGRATED       TRACKS      K-BYTES
                                     DATA SETS     MIGRATED     MIGRATED

                                       00002        000012      00000104

---- END OF - MIGRATED DATASET - LISTING ----
```

Figure 39. Sample Printer List When You Specify DATASETNAME and SUMMARY

Chapter 22. HLISTU: Listing information from the BCDS and MCDS

The HLISTU command is an alias to HLIST. All parameters that are valid for the HLIST command are valid for the HLISTU command. When this command is specified, the request is directed to the Filemode DFSMShsm host. If only a Full Support DFSMShsm host exists, the request is directed to the Full Support DFSMShsm host.

The abbreviation for HLISTU is HLU.

Chapter 23. HMIGRATE: Migrating data sets

This topic describes how to migrate data sets using ISMF or TSO. This command applies to both SMS-managed and non-SMS-managed data sets and is intended to supplement the automatic functions of DFSMShsm.

Using ISMF

The following steps present an example of how to use the HMIGRATE line operator to migrate a data set. In this example, USER20.ISMF.JCL is used as a sample data set name.

1. Generate a list of data sets as described in Chapter 4, “Methods of performing tasks,” on page 13.
2. Enter the HMIGRATE line operator in the line operator column next to USER20.ISMF.JCL as described in Figure 40 on page 145.

```
  Panel  List  Dataset  Utilities  Scroll  Help
------------------------------------------------------------------------------
                               DATA SET LIST
                                                      Entries 1-1 of 1
Enter Line Operators below:                           Data Columns 3-6 of 39

     LINE                                    ALLOC    ALLOC   % NOT  COMPRESSED
     OPERATOR          DATA SET NAME         SPACE    USED    USED   FORMAT
    ---(1)----  ------------(2)------------ --(3)--  --(4)--  -(5)-  ---(6)---
                USER20.CLIST.CLIST              46       46      0  ???
                USER20.DFP220.DGTTLIB           46       46      0  ???
                USER20.ISMF.DGTLLIB             46       46      0  ???
                USER20.ISMF.DGTPLIB             46       46      0  ???
                USER20.ISMF.DUMP              4684     4356      7  ???
    HMIGRATE    USER20.ISMF.JCL                468       46     90  ???
                USER20.ISPFILE                  46       46      0  ???
                USER20.ISPPROF                  93       93      0  ???
                USER20.SPFLOG1.LIST           2623     1311     50  ???
                USER20.TEMP.DATASET           4684       93     98  ???
    ----------  ------  -----------  BOTTOM OF  DATA  -----------  ------  ---

Command ===>                                                  Scroll ===> HALF
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

Figure 40. Data Set List Panel with HMIGRATE Selected

The **HMIGRATE Entry** panel appears.

3. Complete the **HMIGRATE Entry** panel as described in Figure 41 on page 146. (Specify Y in the *Wait for Completion* field if you want to wait for HMIGRATE to complete before returning to ISMF.)

```
  Panel  Utilities  Help
------------------------------------------------------------------------------
                            HMIGRATE ENTRY PANEL

Optionally Specify One or More for
 Data Set: USER20.ISMF.JCL

 Current Migration Level : NOT MIGRATED

  Desired Migration Level/Transition/Move . . 1       (1, 2, T, M or blank)

  Wait for Completion . . . . . . . . . . . . N       (Y or N)

  Data Set Password . . . . . . . . . . . . .         (if password protected)

  Note: Dataset Password ignored when in ADMIN mode.


Use ENTER to Perform Hmigrate;
Use HELP Command for Help; Use END Command to Exit.

 Command ===>
  F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
 F10=Left   F11=Right  F12=Cursor
```

Figure 41. HMIGRATE Entry Panel

4. Press ENTER to perform the migration and redisplay the list (see Figure 42 on page 146).

The asterisk next to the HMIGRATE in the line operator column indicates that the migration was successful if you specified *Wait for Completion=Y*, or that the migration task was successfully issued to DFSMShsm if you specified *Wait for Completion=N*.

```
  Panel  List  Dataset  Utilities  Scroll  Help
------------------------------------------------------------------------------
                               DATA SET LIST
                                                    Entries 1-1 of 1
Enter Line Operators below:                         Data Columns 3-6 of 39

     LINE                                  ALLOC    ALLOC   % NOT  COMPRESSED
     OPERATOR          DATA SET NAME       SPACE    USED    USED   FORMAT
    ---(1)----  ------------(2)------------ --(3)--  --(4)--  -(5)-  ---(6)----
                USER20.CLIST.CLIST             46       46      0  ???
                USER20.DFP220.DGTTLIB          46       46      0  ???
                USER20.ISMF.DGTLLIB            46       46      0  ???
                USER20.ISMF.DGTPLIB            46       46      0  ???
                USER20.ISMF.DUMP             4684     4356      7  ???
    *HMIGRATE   USER20.ISMF.JCL               468       46     90  ???
                USER20.ISPFILE                 46       46      0  ???
                USER20.ISPPROF                 93       93      0  ???
                USER20.SPFLOG1.LIST          2623     1311     50  ???
                USER20.TEMP.DATASET          4684       93     98  ???
    ----------  ------  -----------  BOTTOM OF  DATA  -----------  ------  ----

Command ===>                                              Scroll ===> HALF
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

Figure 42. Data Set List Panel After Function Completes

For more information on using DFSMShsm/ISMF line operators, see *z/OS DFSMS Using the Interactive Storage Management Facility* or use the online help that is provided with ISMF.

Using TSO commands

The following information applies to both SMS-managed and non-SMS-managed data sets.

Task: Migrate one or more data sets to migration volumes. For SMS-managed data sets only, you can also perform class transition.

The data set migrates to a level 1 migration volume unless you specify the MIGRATIONLEVEL2 parameter in the command or you are in an environment that migrates directly to migration level 2 volumes. An

SMS-managed data set, for example, can migrate directly to a level 2 volume if defined to do so by a management class parameter. You can cause a data set on a level 1 migration volume to migrate to a level 2 migration volume if you specify a data set that is already on a level 1 migration volume and you specify the MIGRATIONLEVEL2 parameter.

Command migration or class transition processing of SMS-managed data sets is available only for eligible data sets. Data set eligibility is determined by an SMS management class attribute. If you issue HMIGRATE for a data set that is not eligible for migration, the HMIGRATE operation ends and DFSMShsm issues message ARC1245I.

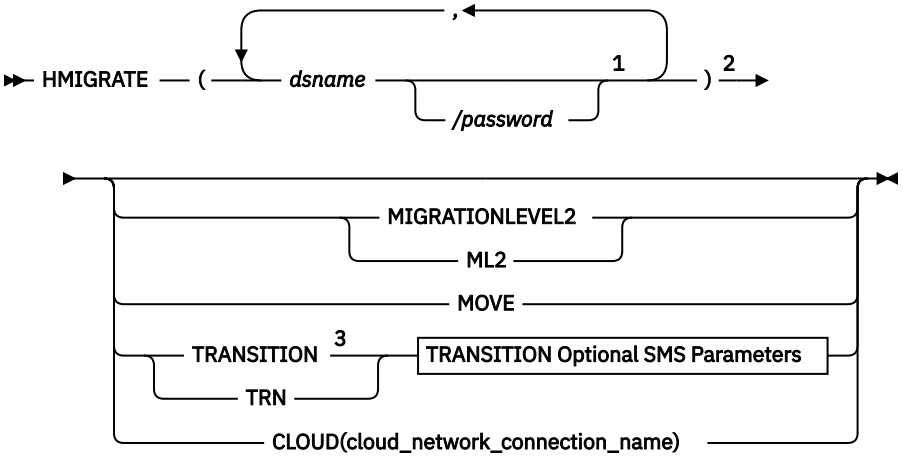
If choosing class transition for a data set (SMS-managed only), note that class transition processing is mutually exclusive with any of the migration-related options.

RACF Authority: To migrate a RACF-protected data set, you must have RACF UPDATE authority to the data set.

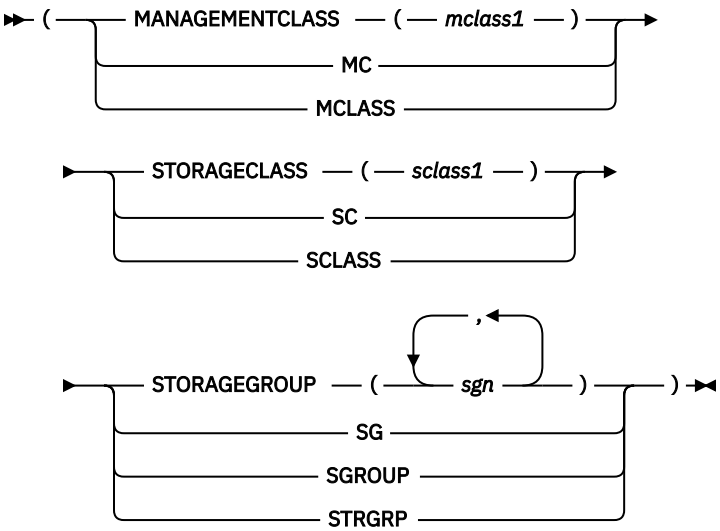
Abbreviation: The minimum abbreviation for the HMIGRATE command is HMIG.

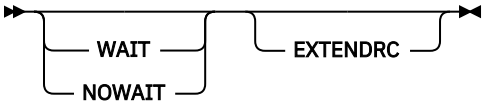
Syntax

The following diagram presents the syntax of the HMIGRATE command for both SMS-managed and non-SMS-managed data sets:



TRANSITION Optional SMS Parameters





Notes:

[1] Password does not apply to SMS-managed data sets.
[2] Parentheses around data set names are required only when multiple data set names are specified.
[3] TRANSITION applies to SMS-managed data sets only.

Required parameters

dsname: Specifying the name of the data set that is to migrate

Explanation

(*dsname*/*password* ...) is a required positional parameter specifying the name of the cataloged data set or list of names of cataloged data sets that are to migrate. For *dsname*, substitute the name or list of names of the data sets (in parentheses) that are to migrate. You can use a data set filter for any dsname in a list. See "Specifying data set names" on page 36 for a discussion of how to specify data set names.

For *password*, substitute the correct password and include the preceding slash (/). TSO does not prompt you for the password. Password protection does not apply to SMS-managed data sets; if a password is specified, it is ignored.

- For password-protected non-VSAM data sets, you must supply the password that allows you to write to the data set.
- For password-protected VSAM data sets, you must supply the master password of the base cluster.

Abbreviations

None.

Defaults

None.

Restrictions

- Because *dsname* is a required positional parameter, you must specify it immediately after HMIGRATE.
- The volume on which the data set resides must be mounted before you issue the command.
- When you specify a password with a filter, all the data sets protected by a password must have the same password. Otherwise, DFSMShsm authorization checking fails the migration of those data sets that are protected by a different password.
- DFSMShsm does not process individual partitioned data set members. If you specify a partitioned data set name with a member name, DFSMShsm fails the HMIGRATE command.
- If *dsname* is fully qualified and refers to a VSAM data set, specify the base cluster name, or any component name, or any path name. The entire VSAM sphere will be migrated. If the sphere has more than one alternate index (AIX), more than one path, or more than one path on the AIX, the data set can be recalled by the base cluster name only.
- If you migrate a VSAM data set with more than one path per alternate index, only the last path listed in the catalog is preserved. After the migration, you must redefine any other paths that are needed.

Optional parameters

MIGRATIONLEVEL2: Specifying migration of a data set directly to a level 2 volume

Explanation

MIGRATIONLEVEL2 is an optional parameter you use to migrate a data set from a level 0 volume or a migration level 1 volume to a migration level 2 volume. The MIGRATIONLEVEL2 parameter must be specified if you are migrating an already migrated data set.

Abbreviations

The TSO abbreviation convention applies for MIGRATIONLEVEL2. In addition, you can use the abbreviation ML2.

Defaults

None.

Restrictions

You can specify either MIGRATIONLEVEL2/ML2 or TRANSITION, but not both.

TRANSITION: Specifying whether the data set should go through transition processing

Explanation

TRANSITION is an optional parameter that you use to specify whether the data set is to go through transition processing. It is valid only for SMS-managed data sets.

The optional subparameters of the TRANSITION parameter are:

MANAGEMENTCLASS
Specifies the target management class used for class transition. Aliases: MC, MCLASS

STORAGECLASS
Specifies the target storage class used for class transition processing. Aliases: SC, SCLASS

STORAGEGROUP
Specifies the target storage group list used for class transition processing. Up to 15 storage groups can be specified by this parameter. If STORAGEGROUP is specified with more than 15 storage groups, only the first 15 are processed. Aliases: SG, SGROUP, STRGRP

Note: If at least one SMS parameter is specified, then the specified value or values are used and the ACS routine is not called during class transition processing. The omitted values of management class, storage class, or storage group are taken from the data set's SMS construct.

Abbreviations

The TSO abbreviation convention applies for TRANSITION. There are no additional abbreviations.

Defaults

None.

Restrictions

You can specify either MIGRATIONLEVEL2/ML2 or TRANSITION, but not both.

CLOUD: Specifying migration of a data set directly to Cloud storage

Explanation

CLOUD is an optional parameter specifying that a data set migrates from an SMS managed volume to the requested Cloud storage. The cloud_network_connection_name is defined in the network connection construct. When the cloud name is specified, the data set is migrated to the requested Cloud storage, regardless of the data set management class attributes (with the exception of migration, which is not allowed). It is valid only for SMS-managed data sets.

The CLOUD parameter cannot be specified with the following parameters:

MIGRATIONLEVEL1, MIGRATIONLEVEL2, and CONVERT.

Note: When you perform a Migrate to Cloud storage, the following DFSMShsm SETSYS settings do not apply:

COMPACT, COMPACTPERCENT, COMPACT(ALL)
Migrating a data set to cloud storage ignores any current COMPACT setting. If the data set is being migrated to a cloud object storage that supports transparent cloud tiering compression, the data set can be compressed by TCT compression if it is not already compressed, encrypted, or compressed and encrypted.

CONVERSION(REBLOCKTOANY)
Because data movement is not performed by the host, there is no opportunity to perform re-blocking of a data set.

CONCURRENT
Migrating a data set to Cloud storage ignores any current setting that relates to concurrent.

WAIT and NOWAIT: Specifying whether to wait for data set migration

Explanation

WAIT | NOWAIT are mutually exclusive, optional parameters that specify whether you want to wait for the HMIGRATE command to complete.

WAIT specifies that you want to wait for the HMIGRATE command to complete. When DFSMShsm successfully completes the HMIGRATE process, an ARC1000I message is issued. If the HMIGRATE process does not complete successfully, an ARC1001I message is issued. If you press the TSO Attention key before DFSMShsm completes the command, DFSMShsm issues an ARC1800I message and does not issue an ARC1000I message.

NOWAIT specifies that you do not want to wait for the HMIGRATE command to complete. When DFSMShsm successfully receives the request, an ARC1007I message is issued. After DFSMShsm successfully completes the HMIGRATE command, an ARC1000I message is issued. If the HMIGRATE command does not complete successfully, an ARC1001I message is issued.

Abbreviations

The TSO abbreviation convention applies for WAIT and NOWAIT. There are no additional abbreviations.

Defaults

The default is NOWAIT.

Restrictions

You can specify either WAIT or NOWAIT, but not both.

MOVE: Specifying that the data set should go through data set moving processing

Explanation

MOVE is an optional parameter that specifies that the data set should go through the data set moving processing. MOVE is mutually exclusive with the migration related parameters.

Abbreviations

The TSO abbreviation convention applies for MOVE.

Defaults

None.

Restrictions

MOVE is mutually exclusive with the migration-related parameters.

EXTENDRC: Requesting an extended set of return and reason codes

Explanation

MOVE is an optional parameter that specifies that the data set should go through the data set moving processing. MOVE is mutually exclusive with the migration related parameters.

Abbreviations

The TSO abbreviation convention applies for EXTENDRC.

Defaults

None.

Restrictions

The WAIT option must be specified with the EXTENDRC parameter when you are running DFSMShsm commands in a truly interactive mode (TSO or foreground).

Examples of different ways to code the HMIGRATE command

The examples below present different ways to code the HMIGRATE command. The values are examples only. Do not interpret them as values that you should use for your system.

Causing multiple data sets to migrate and not waiting for completion

In this example, you are issuing the HMIGRATE command to migrate all data sets that have the same user prefix and descriptive qualifier, GRPA.*.OUTLIST, from level 0 volumes. The NOWAIT parameter indicates that you do not want to wait for DFSMShsm to complete the migration of the data sets.

```
HMIGRATE 'GRPA.*.OUTLIST' NOWAIT
```

If your *datasetname* filter specification includes already-migrated data sets, DFSMShsm does not attempt to migrate these data sets.

Causing a password-protected data set to migrate

In this example, you are issuing the HMIGRATE command to migrate the data set CLARK.TEXTVER3.TEXT protected by the password WRITE from a level 0 volume. The WAIT parameter indicates that you want to wait for DFSMShsm to complete the migration of the data set.

```
HMIGRATE 'CLARK.TEXTVER3.TEXT'/WRITE WAIT
```

Causing a password-protected data set to go through transition processing

In this example, you are issuing the HMIGRATE command to cause the data set CLARK.TEXTVER3.TEXT, protected by the password WRITE, to go through transition processing. The WAIT parameter indicates that you want to wait for the transition processing to complete.

```
HMIGRATE 'CLARK.TEXTVER3.TEXT'/WRITE WAIT TRANSITION
```

Causing data sets to migrate to level 2 volumes and not waiting for completion

In this example, you are issuing the HMIGRATE command to migrate all data sets that have the same user prefix and descriptive qualifier, GRPA.*.OUTLIST, from level 0 volumes or migration level 1 volumes (ML1) to migration level 2 volumes (ML2). The NOWAIT parameter indicates that you do not want to wait for DFSMShsm to complete the migration of the data sets.

```
HMIGRATE 'GRPA.*.OUTLIST' MIGRATIONLEVEL2 NOWAIT
```

Causing multiple data sets to migrate to level 2 volumes and not waiting for completion

In this example you are issuing the HMIGRATE command to migrate two data sets, USER01.TEXTVER3.TEXT and USER01.APGOUT.LOADLIST, which are both protected by the password WRITE from level 0 volumes directly to migration level 2 volumes. Your user ID prefix is USER01. The NOWAIT parameter indicates that you do not want to wait for DFSMShsm to complete the migration of the data sets.

```
HMIGRATE (TEXTVER3.TEXT/WRITE APGOUT.LOADLIST/WRITE) -
         MIGRATIONLEVEL2 NOWAIT
```

Migrating a data set and requesting to see the return codes and reason codes

In this example, you are issuing the HMIGRATE command from a TSO session to migrate the data set VOLUN.TEXTVER2.TEXT from a level 0 volume to a migration volume. The WAIT EXTENDRC parameter indicates that you want to see the extended return and reason codes.

```
HMIGRATE 'VOLUN.TEXTVER2.TEXT' WAIT EXTENDRC
```

Chapter 24. HQUERY: Listing pending requests

To list pending requests, use the HQUERY command in TSO. The following discussion applies to SMS-managed data sets, non-SMS-managed data sets, and UNIX files.

Using TSO commands

Task: Display pending DFSMShsm requests associated with your user identification.

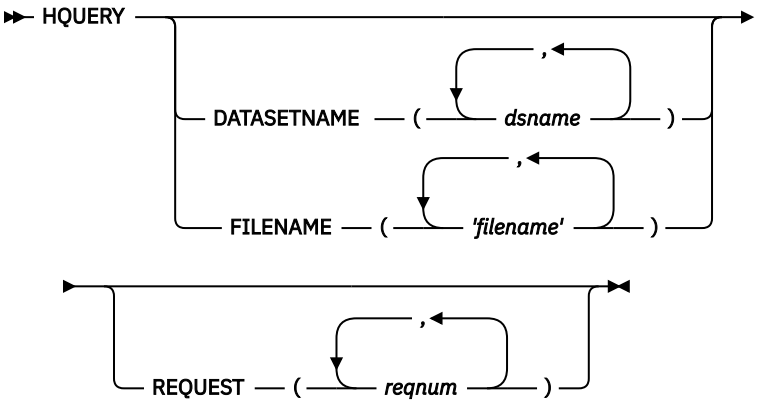
You can display specific requests by request number or you can display all of the requests for a specific data set or UNIX file name. To display all pending requests associated with your user identification, issue the HQUERY command without parameters.

For an example of the messages displayed in response to an HQUERY command, see "Messages from the HQUERY command" on page 155.

Abbreviation: The minimum abbreviation for the HQUERY command is HQ.

Syntax

The following diagram presents the syntax of the HQUERY command for SMS-managed data sets, non-SMS-managed data sets, and UNIX files.



Required parameters

None.

Optional parameters

DATASETNAME: Specifying a list of requests by data set name

Explanation

DATASETNAME(*dsname ...*) is an optional parameter you use to display pending requests associated with one or more specified data set names.

For *dsname*, substitute the name or names of the data sets for which you want the list of requests. You cannot use any wild cards (%, *, or **) in a data set name.

Abbreviations

The TSO abbreviation convention applies for DATASETNAME. There are no additional abbreviations.

Defaults

If you do not specify HQUERY with either DATASETNAME(*dsname*) or REQUEST(*reqnum*), the list contains all pending requests associated with your user identification.

Restrictions

DFSMShsm does not process individual partitioned data set members. If you specify a partitioned data set name with a member name, DFSMShsm ignores the member name and lists the requests for the entire partitioned data set.

FILENAME: Specifying a list of requests by UNIX file name

Explanation

FILENAME('*filename*') is an optional parameter that you use to display pending requests associated with the specified UNIX file name. For *filename*, substitute the absolute path and UNIX file name, which is enclosed in single quotation marks for the file for which you want the list of requests.

Abbreviations

The TSO abbreviation convention applies for FILENAME. There are no additional abbreviations.

Defaults

If you do not specify HQUERY with either DATASETNAME(*dsname*), FILENAME(*pathname*) or REQUEST(*reqnum*), the list contains all pending requests associated with your user identification.

Restrictions

DATASETNAME may not be specified with FILENAME.

REQUEST: Specifying a list of requests by request number

Explanation

REQUEST(*reqnum ...*) is an optional parameter you can use to display specific pending requests for your user identification. For *reqnum*, substitute the DFSMShsm request number. A request number is given when a DFSMShsm command is accepted and you specify that you do not want to wait for completion of the command.

To display all of the pending requests associated with your user identification, issue the HQUERY command by itself.

Abbreviations

The TSO abbreviation convention applies for REQUEST. There are no additional abbreviations.

Defaults

If you do not specify HQUERY with either DATASETNAME(*dsname*) or REQUEST(*reqnum*), the list contains all pending requests associated with your user identification.

Restrictions

None.

Examples of different ways to code the HQUERY command

The examples below present different ways to code the HQUERY command. The values are examples only. Do not interpret them as values that you should use for your system.

Listing pending requests for a data set

In this example, you are issuing the HQUERY command to list the pending DFSMShsm requests for the data set ELPA.OUTTESTS.TESTLIST and request number 104.

```
HQUERY DATASETNAME('ELPA.OUTTESTS.TESTLIST') -
       REQUEST(104)
```

Listing all pending requests for your user identification

In this example, you are issuing the HQUERY command to list all pending DFSMShsm requests that are associated with your user identification.

```
HQUERY
```

Listing pending requests by request number

In this example, you are issuing the HQUERY command to list three pending DFSMShsm requests, 25, 27, and 28.

```
HQUERY REQUEST(25,27,28)
```

Messages from the HQUERY command

When you issue the HQUERY command, the information appears as a message at your terminal as well as on the DFSMShsm log. Table 12 on page 156 presents the messages associated with the HQUERY command.

Table 12. Messages Associated with the QUERY Command by Parameter Name	
Parameter name	**Message**
DATASETNAME (*dsname*)	ARC0101I QUERY {ACTIVE | ABARS | ARPOOL | AUTOPROGRESS | BACKUP | CDSVERSIONBACKUP | CONTROLDATASETS | CSALIMITS | DATASETNAME | MIGRATIONLEVEL2 | POOL/VOLUMEPOOL | REQUEST | RETAIN | SETSYS | SPACE | STARTUP | STATISTICS | TRAPS | USER | WAITING} COMMAND {STARTING | COMPLETED | IGNORED} ON HOST=*x*
	ARC0161I {MIGRATING | MIGRATION PREPROCESSING | FREEVOL PROCESSING | DBA/DBU PROCESSING | BACKING UP | RECOVERING | RECYCLING | AUDITING | {DUMPING | FRBACKUP DUMP OF | FRBACKUP DUMPONLY OF} | MOUNTING INITIAL TAPE FOR DS BACKUP,| RESTORING} VOLUME {*volser* | *volser*, SGROUP=*sg* | *volser*, COPY POOL = *cpname*} FOR USER {*userid* | **AUTO** | *} REQUEST {*request-number* | NONE | *} [, TCB=X'*tcbaddress*'| TCB2=X'*tcbaddress*' | TCB=X'****?***']
	ARC0162I {MIGRATING | BACKING UP | RECALLING | RECOVERING | DELETING | RESTORING | FRRECOV OF} DATA SET *dsname* FOR USER *userid*, REQUEST *request* ON HOST *hostid* [,TCB=X'*tcbaddress*']
	ARC0165I USER NOT AUTHORIZED TO QUERY REQUESTS FOR OTHER USERIDS OR REQNUM MISSING
	ARC0166I NO DFSMSHSM REQUEST FOUND FOR QUERY
	ARC0167I *type* MWE FOR {VOLUME | DATA SET | COMMAND | AGGREGATE GROUP | CONTROL FILE DATA SET | COPY POOL} {*name* |*name*, SGROUP = *sg* | *name*, COPY POOL = *cpname*} FOR USER *userid*, REQUEST *request*, WAITING TO BE PROCESSED, *nmwe* MWE(S) AHEAD OF THIS ONE
	ARC1543I *type* MWE FOR DATA SET *name*, FOR USER *userid*, REQUEST *request_number*, WAITING TO BE PROCESSED ON A COMMON QUEUE, *nmwe* MWES AHEAD OF THIS ONE{, REQUEST ORIGINATED ON HOST *hostid*}

Table 12. Messages Associated with the QUERY Command by Parameter Name (continued)

Parameter name	Message
REQUEST	ARC0101I QUERY {ACTIVE | ABARS | ARPOOL | AUTOPROGRESS | BACKUP | CDSVERSIONBACKUP | CONTROLDATASETS | CSALIMITS | DATASETNAME | MIGRATIONLEVEL2 | POOL/VOLUMEPOOL | REQUEST | RETAIN | SETSYS | SPACE | STARTUP | STATISTICS | TRAPS | USER | WAITING} COMMAND {STARTING | COMPLETED | IGNORED} ON HOST=*x*
	ARC0161I {MIGRATING | MIGRATION PREPROCESSING | FREEVOL PROCESSING | DBA/DBU PROCESSING | BACKING UP | RECOVERING | RECYCLING | AUDITING | {DUMPING | FRBACKUP DUMP OF | FRBACKUP DUMPONLY OF} | MOUNTING INITIAL TAPE FOR DS BACKUP,| RESTORING} VOLUME {*volser* | *volser*, SGROUP=*sg* | *volser*, COPY POOL = *cpname*} FOR USER {*userid* | **AUTO** | *} REQUEST {*request-number* | NONE | *} [, TCB=X'*tcbaddress*'| TCB2=X'*tcbaddress*' | TCB=X'****?***']
	ARC0162I {MIGRATING | BACKING UP | RECALLING | RECOVERING | DELETING | RESTORING | FRRECOV OF} DATA SET *dsname* FOR USER *userid*, REQUEST *request* ON HOST *hostid* [,TCB=X'*tcbaddress*']
	ARC0165I USER NOT AUTHORIZED TO QUERY REQUESTS FOR OTHER USERIDS OR REQNUM MISSING
	ARC0166I NO DFSMSHSM REQUEST FOUND FOR QUERY
	ARC0167I *type* MWE FOR {VOLUME | DATA SET | COMMAND | AGGREGATE GROUP | CONTROL FILE DATA SET | COPY POOL} {*name* |*name*, SGROUP = *sg* | *name*, COPY POOL = *cpname*} FOR USER *userid*, REQUEST *request*, WAITING TO BE PROCESSED, *nmwe* MWE(S) AHEAD OF THIS ONE
	ARC1543I *type* MWE FOR DATA SET *name*, FOR USER *userid*, REQUEST *request_number*, WAITING TO BE PROCESSED ON A COMMON QUEUE, *nmwe* MWES AHEAD OF THIS ONE{, REQUEST ORIGINATED ON HOST *hostid*}
	ARC1822I {FRBACKUP | FRRECOV | FRBACKUP DUMP OR DUMPONLY | FRRECOV FROMDUMP} OF COPY POOL *cpname* FOR USER *userid*, REQUEST *request-number* ON HOST *host_id* IS IN PROGRESS: NOT PROCESSED = *xx*, TOTAL = *yy*

Chapter 25. HQUERYU: Listing pending requests on a Filemode DFSMShsm host

The HQUERYU command is an alias to the HQUERY command. All parameters that are valid for the HQUERY command are valid for the HQUERYU command. When the HQUERYU command is used, the request is directed to the Filemode DFSMShsm host. If only a Full Support DFSMShsm host exists, the request is directed to the Full Support DFSMShsm host.

The abbreviation for HQUERYU is HQU.

Chapter 26. HRECALL: Recalling data sets

This topic describes how to recall one or more data sets using ISMF or TSO. This command applies to both SMS-managed and non-SMS-managed data sets and is intended to supplement the automatic functions of DFSMShsm.

Using ISMF

The following steps present an example of how to use the HRECALL line operator to recall one or more data sets. In our example, we have used USER20.ISMF.JCL as a sample data set name.

1. Generate a list of data sets as described in Chapter 4, “Methods of performing tasks,” on page 13.
2. Enter the HRECALL line operator in the line operator column next to USER20.ISMF.JCL as described in Figure 43 on page 161.

```
  Panel  List  Dataset  Utilities  Scroll  Help
------------------------------------------------------------------------------
                               DATA SET LIST
                                                      Entries 1-1 of 1
Enter Line Operators below:                           Data Columns 3-6 of 39

     LINE                                  ALLOC    ALLOC   % NOT  COMPRESSED
     OPERATOR          DATA SET NAME       SPACE    USED    USED   FORMAT
    ---(1)----  ------------(2)------------ --(3)--  --(4)--  -(5)-  ---(6)----
                USER20.CLIST.CLIST              46       46      0  ???
                USER20.DFP220.DGTTLIB           46       46      0  ???
                USER20.ISMF.DGTLLIB             46       46      0  ???
                USER20.ISMF.DGTPLIB             46       46      0  ???
                USER20.ISMF.DUMP              4684     4356      7  ???
    HRECALL     USER20.ISMF.JCL                468       46     90  ???
                USER20.ISPFILE                  46       46      0  ???
                USER20.ISPPROF                  93       93      0  ???
                USER20.SPFLOG1.LIST           2623     1311     50  ???
                USER20.TEMP.DATASET           4684       93     98  ???
    ----------  ------  -----------  BOTTOM OF  DATA  -----------  ------  ----

Command ===>                                                  Scroll ===> HALF
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

Figure 43. Data Set List Panel with HRECALL Selected

The HRECALL Entry panel appears.

3. Complete the HRECALL Entry panel as described in Figure 44 on page 162. (Specify Y in the *wait for completion* field if you want to wait for HRECALL to complete before returning to ISMF. Specify N in the *wait for completion* field if you do not want to wait for HRECALL to complete before returning to ISMF.)

```
  Panel  Utilities  Help
------------------------------------------------------------------------------
                            HRECALL ENTRY PANEL

Optionally Specify One or More for
 Data Set: USER20.ISMF.JCL

  To Recall to a Specific Volume, Specify:
    Volume Serial Number  . .           (target volume)
    Device Type . . . . . . .           (target device type)

  DA Access Option  . . . . .           (SAMETRK, RELTRK OR RELBLK)

  Wait for Completion . . . . N         (Y or N)

  Data Set Password . . . . .           (if password protected)




Command ===>
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

Figure 44. HRECALL Entry Panel

4. Press ENTER to perform the recall and redisplay the list (see Figure 45 on page 162).

The asterisk next to HRECALL in the line operator column indicates that the recall was successful if you specified *wait for completion=Y*, or that the HRECALL task was successfully issued to DFSMShsm if you specified *wait for completion=N*.

```
  Panel  List  Dataset  Utilities  Scroll  Help
------------------------------------------------------------------------------
                                DATA SET LIST
                                                      Entries 1-1 of 1
Enter Line Operators below:                           Data Columns 3-6 of 39

     LINE                                  ALLOC    ALLOC   % NOT  COMPRESSED
     OPERATOR          DATA SET NAME       SPACE    USED    USED   FORMAT
    ---(1)----  ------------(2)------------ --(3)--  --(4)--  -(5)-  ---(6)----
              USER20.CLIST.CLIST              46       46      0  ???
              USER20.DFP220.DGTTLIB           46       46      0  ???
              USER20.ISMF.DGTLLIB             46       46      0  ???
              USER20.ISMF.DGTPLIB             46       46      0  ???
              USER20.ISMF.DUMP              4684     4356      7  ???
    *HRECALL  USER20.ISMF.JCL                468       46     90  ???
              USER20.ISPFILE                  46       46      0  ???
              USER20.ISPPROF                  93       93      0  ???
              USER20.SPFLOG1.LIST           2623     1311     50  ???
              USER20.TEMP.DATASET           4684       93     98  ???
    ----------  ------  -----------  BOTTOM OF  DATA  -----------  ------  ----

Command ===>                                                 Scroll ===> HALF
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

Figure 45. Data Set List Panel After Function Completes

For more information on using DFSMShsm/ISMF line operators, see *z/OS DFSMS Using the Interactive Storage Management Facility* or use the online help provided with ISMF.

Using TSO commands

The commands for recalling SMS-managed and non-SMS-managed data sets are different.

When you are recalling SMS-managed data sets, the SMS allocation services used in your computing center directs the return of your data set. When you are recalling non-SMS-managed data sets or uncataloged data sets, you can direct the return of your data set to a specific volume.

Recalling one or more data sets with TSO

Task: Recall one or more migrated data sets.

When you are recalling an SMS-managed data set, the automatic class selection (ACS) routines determine whether a data set should be SMS-managed or not. If a data set is going to be SMS-managed, the ACS routines select a target storage group and from the volumes that belong to that storage group, a target volume is chosen on which to place the data set.

When you are recalling non-SMS-managed data sets, you can specify to which volume you want DFSMShsm to recall the data sets. If you do not specify the volume, DFSMShsm selects the volume.

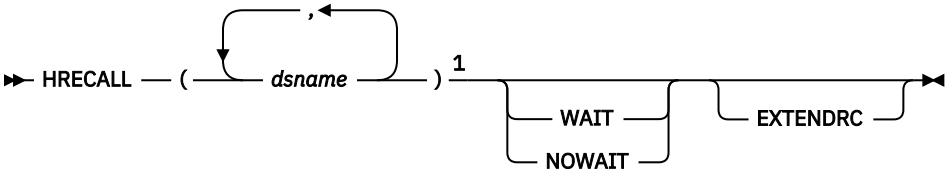
It is not considered an error when you are recalling a data set that is not cataloged to the volume MIGRAT. If this occurs, the informational message ARC1102I will be issued and a zero will be returned in register 15.

RACF authority: To recall a RACF-protected data set, you must have RACF EXECUTE authority to the data set.

Abbreviation: The minimum abbreviation for the HRECALL command is HRECA.

Syntax

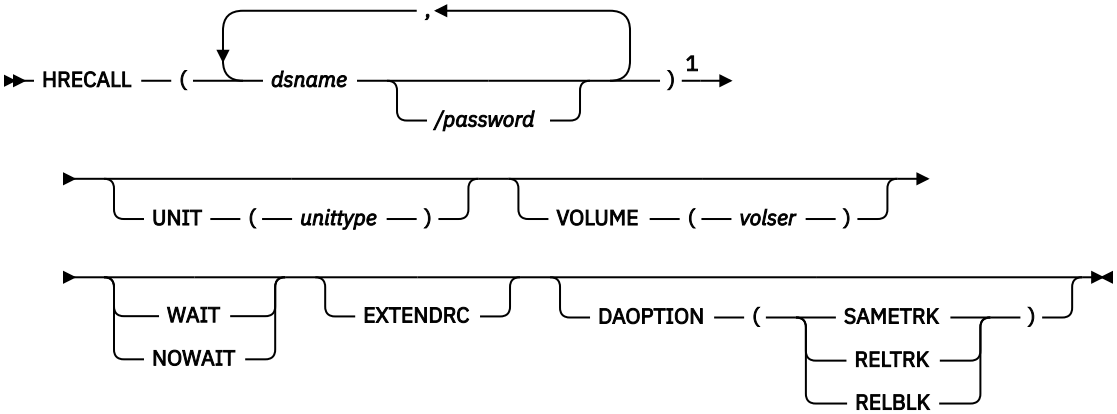
The following diagram presents the syntax of the HRECALL command for **SMS-managed** data sets:



Notes:

[1] Parentheses around data set names are required only when multiple data set names are specified.

The following diagram presents the syntax of the HRECALL command for **non-SMS-managed** data sets:



Notes:

[1] Parentheses around data set names are required only when multiple data set names are specified.

Required parameters

dsname: Specifying the name of the data set to be recalled

This parameter applies to both SMS-managed and non-SMS-managed data sets.

Explanation

(*dsname*...) or (*dsname*/*password* ...) is a required positional parameter you use to specify the name of the data set or list of data set names that you want to recall. For *dsname*, substitute the name of the data set or list of data set names that you want to recall. You can use a data set filter for any data set name in a list. See "Specifying data set names" on page 36 for a discussion of how to specify data set names.

For *password*, substitute the correct password and include the preceding slash (/). TSO does not prompt you for the password.

- For a password-protected non-VSAM data set, you must supply the password that allows you to read the data set.
- For a password-protected VSAM data set, you must supply the master password of the base cluster.

Abbreviations

None.

Defaults

None.

Restrictions

- Because *dsname* is a required positional parameter, you must specify it immediately after HRECALL.
- DFSMShsm does not process individual members of partitioned data sets. If you specify a partitioned data set name with a member name, message ARC1065I is issued and nothing is recalled.
- If *dsname* is fully qualified and refers to a VSAM data set, specify the base cluster name, or any component name, or any path name.
- If you recall a VSAM data set with more than one path per alternate index, only the last path listed in the catalog is preserved. After the migration, you must redefine any other paths that are needed.
- When you specify a password with a filter, all the affected data sets protected by a password must have the same password. Otherwise, DFSMShsm authorization checking fails the recall of those password-protected data sets that are protected by some other password.

Optional parameters

DAOPTION: Selecting target volume track length

This parameter applies only to data that will be returned to a non-SMS-managed DASD volume.

Explanation

`DAOPTION(SAMETRK | RELTRK | RELBLK)` are mutually exclusive, optional parameters specifying the type of data set accessing required (relative track or relative block) upon recall of a direct access data set. This, in turn, will imply the allowable target volume device types.

SAMETRK specifies that if DFSMShsm is not directed to a volume by the VOLUME parameter, it will select a target volume with the same track length as the last L0 volume from which the data set was migrated. If DFSMShsm is directed to a specific volume by the VOLUME parameter, this volume must have the same track length as the last L0 volume from which the data set was migrated.

Data will be moved as a track-to-track image, accessible for both relative track and relative block processing.

RELTRK specifies that if DFSMShsm is not directed to a volume by the VOLUME parameter, it will attempt to select a target volume with the same track length as the last L0 volume from which the data set was migrated. If no volume with equal track length is available, then the target volume selected may have a larger track length than the last L0 volume. If DFSMShsm is directed to a specific volume by the VOLUME

parameter, this volume must have the same or greater track length than the last L0 volume from which the data set was migrated.

Data will be moved as a track-to-track image, accessible by relative track addressing.

RELBLK specifies that if DFSMShsm is not directed to a volume by the VOLUME parameter, it will attempt to select a target volume with the same track length as the last L0 volume from which the data set was migrated. If no volume with equal track length is available, then the target volume selected may have a larger or smaller track length than the last L0 volume. If DFSMShsm is directed to a specific volume by the VOLUME parameter, this volume can have any track length.

Data will be moved to fill out the track, accessible by relative block addressing.

Abbreviations

TSO abbreviation convention applies for this parameter. There are no additional abbreviations.

Defaults

If DAOPTION is not specified, the target volume selection is unchanged and data is moved as a track image, allowing for relative track accessing.

Note: Only direct access (BDAM) data sets are supported by this option. Using DAOPTION to recall a data set as SMS-managed is not supported. If a data set would be SMS-managed after the recall, the FORCENONSMS parameter of the RECALL command must be used to force it to be non-SMS-managed.

EXTENDRC: Requesting an extended set of return and reason codes

This parameter applies to both SMS-managed and non-SMS-managed data sets.

Explanation

EXTENDRC is an optional parameter you use to specify that DFSMShsm should return an extended set of return and reason codes while you are running DFSMShsm commands in a truly interactive mode (TSO or foreground). This option returns only the return and reason codes that are mapped into DFSMShsm messages that are issued to the user's terminal. For detailed information on return codes that DFSMShsm returns for this command, see Appendix B, "Return codes from DFSMShsm commands," on page 231.

Abbreviations

The TSO abbreviation convention applies for EXTENDRC.

Defaults

None.

Restrictions

The WAIT option must be specified with the EXTENDRC parameter when you run DFSMShsm commands in a truly interactive mode (TSO or foreground).

UNIT: Specifying the type of unit for the receiving volume

This parameter applies only to data that will be returned to a non-SMS-managed DASD volume.

Explanation

UNIT(*unittype*) is an optional parameter you use to specify the type of unit where the receiving volume can be allocated. For *unittype*, substitute the type of unit where the volume that is to receive the recalled data set can be allocated. The valid types of units are 3380, 3390, and 9345.

Abbreviations

The TSO abbreviation convention applies for UNIT. There are no additional abbreviations.

Defaults

None.

Restrictions

- If you specify UNIT, you must also specify VOLUME.
- If the block size of the data set is greater than the track capacity of the target volume, track overflow must be supported in both the software and the hardware. This applies to devices whose track size is less than 32K.

VOLUME: Specifying the volume to receive the recalled data set

This parameter applies only to data that will be returned to a non-SMS-managed DASD volume.

Explanation

VOLUME(*volser*) is an optional parameter you use to specify the volume that is to receive the recalled data set. The volume does not have to be managed by DFSMShsm. For *volser*, substitute the serial number of the volume that is to receive the recalled data set.

The volume specified with the HRECALL command can be a DFSMShsm-managed volume or a volume not managed by DFSMShsm. If you do not specify the VOLUME parameter on the HRECALL command, DFSMShsm uses its defaults for volume selection.

Abbreviations

The TSO abbreviation convention applies for VOLUME. There are no additional abbreviations.

Defaults

If you do not specify VOLUME, DFSMShsm recalls the data set to the DFSMShsm-managed storage volume that has the most space available, unless the data set is associated with a recall pool.

Restrictions

- If you specify VOLUME, you must also specify UNIT and *unittype*. The volume cannot be SMS-managed.
- If you specify the VOLUME parameter on the HRECALL command, enough available space must exist on the specified volume for the data set recall. Otherwise, the recall fails.

WAIT and NOWAIT: Specifying whether to wait for the data set to be recalled

This parameter applies to both SMS-managed and non-SMS-managed data sets.

Explanation

WAIT | NOWAIT are mutually exclusive, optional parameters you use to specify whether to wait for the HRECALL command to complete.

WAIT specifies that you want to wait for the HRECALL command to complete. If you are recalling data sets from tape, we recommend that you specify the NOWAIT parameter because the operator must mount the tape before the recall can complete.

When DFSMShsm successfully completes the HRECALL process, an ARC1000I message is issued. If the HRECALL process does not complete successfully, an ARC1001I message is issued. If you press the TSO Attention key before DFSMShsm completes the command, DFSMShsm issues an ARC1800I message and does not issue an ARC1000I message.

NOWAIT specifies that you do not want to wait for the HRECALL command to complete. When DFSMShsm successfully receives the request, an ARC1007I message is issued. If you are recalling data sets from tape, a volume mount request message (ARC0612I) is issued. After DFSMShsm successfully completes

the HRECALL command, an ARC1000I message is issued. If the HRECALL command does not complete successfully, an ARC1001I message is issued.

Abbreviations

The TSO abbreviation convention applies for WAIT and NOWAIT. There are no additional abbreviations.

Defaults

The default is NOWAIT.

Restrictions

You can specify either WAIT or NOWAIT, but not both.

Examples of different ways to code the HRECALL command

The examples below present different ways to code the HRECALL command. The values are examples only. Do not interpret them as values that you should use for your system.

Recalling two SMS-managed data sets and not waiting for completion

In this example, you are issuing the HRECALL command to recall two SMS-managed data sets, ELMST.TEXTVER3.TEXT and ELMST.VER1TEXT.LIST. Because the data are SMS-managed, SMS directs the return of the data sets. The NOWAIT parameter indicates that you do not want to wait for DFSMShsm to complete the recall of the data sets.

```
HRECALL ('ELMST.TEXTVER3.TEXT','ELMST.VER1TEXT.LIST') NOWAIT
```

Recalling a group of data sets and not waiting for completion

In this example, you are issuing the HRECALL command to recall all data sets that have ELMST.*.TEXT as the user prefix and descriptive qualifier. The NOWAIT parameter indicates that you do not want to wait for DFSMShsm to complete the recall of the data sets.

```
HRECALL 'ELMST.*.TEXT' NOWAIT
```

Recalling a data set and requesting to see the return code and reason code

In this example, you are issuing the HRECALL command from a TSO session to recall the data set BROWN.TEXTVER6.TEXT to a DFSMShsm-managed volume. The WAIT EXTENDRC parameter indicates that you want to see the extended return and reason codes.

```
HRECALL 'BROWN.TEXTVER6.TEXT' WAIT EXTENDRC
```

Recalling a password-protected data set to a specific volume and waiting for completion

In this example, you are issuing the HRECALL command to recall the data set CRPA.COMMTEST.CLIST protected with password LOCK1 to volume VOL005. A 3380 is the type of unit where volume VOL005 can be allocated. The WAIT parameter indicates that you want to wait for DFSMShsm to complete the recall of the data set.

```
HRECALL 'CRPA.COMMTEST.CLIST'/LOCK1 VOLUME(VOL005) -
        UNIT(3390) WAIT
```

Recalling two non-SMS-managed data sets to a DFSMShsm-managed volume and not waiting for completion

In this example, you are issuing the HRECALL command to recall two non-SMS-managed data sets, ELMST.TEXTVER3.TEXT and ELMST.VER1TEXT.LIST, to a DFSMShsm-managed volume. Because you did not specify a specific volume, DFSMShsm directs the return of the data set. The NOWAIT parameter indicates that you do not want to wait for DFSMShsm to complete the recall of the data sets.

```
HRECALL ('ELMST.TEXTVER3.TEXT','ELMST.VER1TEXT.LIST') NOWAIT
```

Recalling a non-SMS-managed DA (BDAM) data set to a volume with a different track length than that of the last level 0 volume

In this example, a non-SMS-managed direct access (DA) data set is recalled to a target volume that, if no volume with equal track length is available, will have a track length either larger or smaller than the last L0 volume from which the data set was migrated. The data will be moved to fill out the track, allowing for relative block accessing.

```
HRECALL TKS1975.SERVICE.DATA DAOPTION(RELBLK)
```

Chapter 27. HRECOVER: Recovering data sets or UNIX files

You can recover a backup version or a dump copy of a data set or UNIX file by using ISMF or TSO or the UNIX shell. This command applies to SMS-managed data sets, non-SMS-managed data sets, and UNIX files.

Using ISMF

The following steps present an example of how to use the HRECOVER line operator to recover a cataloged data set. In our ISMF panel example, we have used USER20.SAMPLE.DATASET as a sample data set name.

1. Generate a list of data sets as described in Chapter 4, “Methods of performing tasks,” on page 13.
2. Enter the HRECOVER line operator in the line operator column next to USER20.SAMPLE.DATASET as described in Figure 46 on page 169.

```
  Panel  List  Dataset  Utilities  Scroll  Help
------------------------------------------------------------------------------
                               DATA SET LIST
                                                      Entries 1-1 of 1
Enter Line Operators below:                           Data Columns 3-6 of 39

     LINE                                    ALLOC    ALLOC   % NOT  COMPRESSED
     OPERATOR          DATA SET NAME         SPACE    USED    USED   FORMAT
    ---(1)----  ------------(2)------------ --(3)--  --(4)--  -(5)-  ---(6)----
                USER20.CLIST.CLIST              46       46      0  ???
                USER20.DFP220.DGTTLIB           46       46      0  ???
                USER20.ISMF.DGTLLIB             46       46      0  ???
                USER20.ISMF.DGTPLIB             46       46      0  ???
                USER20.ISMF.DUMP              4684     4356      7  ???
                USER20.ISPFILE                  46       46      0  ???
                USER20.ISPPROF                  93       93      0  ???
    HRECOVER    USER20.SAMPLE.DATASET          468       46     90  ???
                USER20.SPFLOG1.LIST           2623     1311     50  ???
                USER20.TEMP.DATASET           4684       93     98  ???
    ----------  ------  -----------  BOTTOM OF  DATA  -----------  ------  ----

Command ===>                                                Scroll ===> HALF
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

Figure 46. Data Set List Panel with HRECOVER Selected

The HRECOVER entry panel appears.

3. Complete the HRECOVER entry panel as described in Figure 47 on page 170 through Figure 52 on page 172. Up to six panels can be displayed. In each panel, the backup version, date and time of the backup are displayed as two lists with headers.

   Note: Retained backup versions are not displayed on these panels. Use the DFSMShsm HLIST DSNAME (dsname) BCDS command to obtain a complete list of the active and retained backup copies of this data set. To recover a retained backup copy, specify the creation date and time of the copy to recover on page 6 of the ISMF HRECOVER panel, or issue the HRECOVER command with the DATE and TIME keywords.

```
   Panel  Utilities  Scroll  Help
------------------------------------------------------------------------------
                           HRECOVER ENTRY PANEL                 Page 1 of 6
Command ===>

Specify Y to recover a Backup Version for
 Data Set:
                              Recover                                    Recover
Version  Date    TIME   Gen#   (Y/N)  |  Version  Date    TIME   Gen#   (Y/N)
-------------------------------------|-------------------------------------
100     2008100  162511  00      N    |  099     2008099  163501  01      N
098     2008098  162926  02      N    |  097     2008097  162551  03      N
096     2008096  162704  04      N    |  095     2008095  162905  05      N
094     2008094  162851  06      N    |  093     2008093  163301  07      N
092     2008092  162956  08      N    |  091     2008091  162918  09      N
090     2008090  162604  10      N    |  089     2008089  162945  11      N
088     2008088  162936  12      N    |  087     2008087  162651  13      N
086     2008086  162724  14      N    |  085     2008085  162705  15      N
084     2008084  162801  16      N    |  083     2008083  163103  17      N
082     2008082  162916  18      N    |  081     2008081  162938  19      N


Use ENTER to Continue; Use DOWN to select other versions;
Use HELP Command for Help; Use END Command to Cancel the HRecover.
```

Figure 47. HRECOVER Entry Panel (Part 1 of 6)

```
   Panel  Utilities  Scroll  Help
 ------------------------------------------------------------------------------
   Panel  Utilities  Scroll  Help
------------------------------------------------------------------------------
                           HRECOVER ENTRY PANEL                 Page 2 of 6
Command ===>

Specify Y to recover a Backup Version for
 Data Set:
                              Recover                                    Recover
Version  Date    TIME   Gen#   (Y/N)  |  Version  Date    TIME   Gen#   (Y/N)
-------------------------------------|-------------------------------------
080     2008080  162634  20      N    |  079     2008079  162935  21      N
078     2008078  162936  22      N    |  077     2008077  162531  23      N
076     2008076  162744  24      N    |  075     2008075  162805  25      N
074     2008074  162951  26      N    |  073     2008073  163101  27      N
072     2008072  162556  28      N    |  071     2008071  162718  29      N
070     2008070  162624  30      N    |  069     2008069  162925  31      N
068     2008068  162836  32      N    |  067     2008067  162611  33      N
066     2008066  162734  34      N    |  065     2008065  162805  35      N
064     2008064  162841  36      N    |  063     2008063  163133  37      N
062     2008062  162916  38      N    |  061     2008061  162918  39      N


Use ENTER to Continue; Use UP/DOWN to select other versions;
Use HELP Command for Help; Use END Command to Cancel the HRecover.
```

Figure 48. HRECOVER Entry Panel (Part 2 of 6)

```
   Panel  Utilities  Scroll  Help
------------------------------------------------------------------------------
                           HRECOVER ENTRY PANEL                 Page 3 of 6
Command ===>

Specify Y to recover a Backup Version for
 Data Set:
                              Recover                                    Recover
Version  Date    TIME   Gen#   (Y/N)  |  Version  Date    TIME   Gen#   (Y/N)
-------------------------------------|-------------------------------------
060     2008060  162534  40      N    |  059     2008059  163421  41      N
058     2008058  162936  42      N    |  057     2008057  162631  43      N
056     2008056  162738  44      N    |  055     2008055  162815  45      N
054     2008054  162827  46      N    |  053     2008053  163331  47      N
052     2008052  162929  48      N    |  051     2008051  162948  49      N
050     2008050  162631  50      N    |  049     2008049  162825  51      N
048     2008048  162736  52      N    |  047     2008047  162751  53      N
046     2008046  162924  54      N    |  045     2008045  162545  55      N
044     2008044  163001  56      N    |  043     2008043  163213  57      N
042     2008042  162956  58      N    |  041     2008041  162848  59      N


Use ENTER to Continue; Use UP/DOWN to select other versions;
Use HELP Command for Help; Use END Command to Cancel the HRecover.
```

Figure 49. HRECOVER Entry Panel (Part 3 of 6)

```
Panel  Utilities  Scroll  Help
------------------------------------------------------------------------------
                           HRECOVER ENTRY PANEL                 Page 4 of 6
Command ===>

Specify Y to recover a Backup Version for
 Data Set:
                              Recover                                    Recover
Version  Date    TIME   Gen#   (Y/N)  |  Version  Date    TIME   Gen#   (Y/N)
-------------------------------------|-------------------------------------
040     2008040  162924  60      N    |  039     2008039  162835  61      N
038     2008038  162636  62      N    |  037     2008037  162921  63      N
036     2008036  162724  64      N    |  035     2008035  162635  65      N
034     2008034  162911  66      N    |  033     2008033  163201  67      N
032     2008032  162756  68      N    |  031     2008031  162748  69      N
030     2008030  162724  70      N    |  029     2008029  162825  71      N
028     2008028  162936  72      N    |  027     2008027  162711  73      N
026     2008026  162734  74      N    |  025     2008025  162705  75      N
024     2008024  162821  76      N    |  023     2008023  163233  77      N
022     2008022  162936  78      N    |  021     2008021  162958  79      N


Use ENTER to Continue; Use UP/DOWN to select other versions;
Use HELP Command for Help; Use END Command to Cancel the HRecover.
```

Figure 50. HRECOVER Entry Panel (Part 4 of 6)

```
  Panel  Utilities  Scroll  Help
------------------------------------------------------------------------------
                            HRECOVER ENTRY PANEL                 Page 5 of 6
Command ===>

Specify Y to recover a Backup Version for
 Data Set:
                              Recover                                   Recover
Version  Date    TIME   Gen#   (Y/N)  |  Version  Date    TIME   Gen#   (Y/N)
-------------------------------------|-------------------------------------
020     2008020  162544  80      N    |  019     2008019  163411  81      N
018     2008018  162726  82      N    |  017     2008017  162831  83      N
016     2008016  162908  84      N    |  015     2008015  162515  85      N
014     2008014  162623  86      N    |  013     2008013  163131  87      N
012     2008012  162826  88      N    |  011     2008011  162908  89      N
010     2008010  163039  90      N    |  009     2008009  162625  91      N
008     2008008  162706  92      N    |  007     2008007  162721  93      N
006     2008006  162524  94      N    |  005     2008005  162845  95      N
004     2008004  163201  96      N    |  003     2008003  163113  97      N
002     2008002  162856  98      N    |  001     2008001  162808  99      N


Use ENTER to Continue; Use UP to select other versions;
Use HELP Command for Help; Use END Command to Cancel the HRecover.
```

Figure 51. HRECOVER Entry Panel (Part 5 of 6)

```
   Panel  Utilities  Help
------------------------------------------------------------------------------
                            HRECOVER ENTRY PANEL                 Page 6 of 6
Command ===>

Optionally specify one or more for
 Data Set:
 For the Backup Data Set, Specify:
   Backup Generation Number   . __          (0 to 99)
   Backup Date  . . . . . . . . __________  (yyyy/mm/dd)
   Backup Time  . . . . . . . . ______      (hhmmss)
   Data Set Password  . . . . .             (if password protected)
   Note: Dataset Password ignored when in ADMIN mode.
 To Recover to a specific volume, Specify:
   Volume Serial Number . . . . ______      (target volume)
   Device Type  . . . . . . . . ______      (target device type)
 To rename recovered Data Set, Specify:
   New Data Set Name  . . . . . ____________________________________________
   Password of New Data Set . .             (if password protected)
 Replace existing Data Set  . . _           (Y or N)
 DA Access Option . . . . . . . _           (1-SAMETRK, 2-RELTRK or 3-RELBLK)
 Wait for completion  . . . . . N           (Y or N)
Use ENTER to perform HRecover;
Use HELP Command for Help; Use END Command to Exit.
```

Figure 52. HRECOVER Entry Panel (Part 6 of 6)

4. Press ENTER to perform the recover and redisplay the list (see Figure 53 on page 173).

The asterisk next to the HRECOVER in the line operator column indicates that the recovery was successful.

```
  Panel  List  Dataset  Utilities  Scroll  Help
------------------------------------------------------------------------------
                              DATA SET LIST
                                                        Entries 1-1 of 1
Enter Line Operators below:                             Data Columns 3-6 of 39

     LINE                                     ALLOC    ALLOC   % NOT  COMPRESSED
     OPERATOR          DATA SET NAME          SPACE    USED    USED   FORMAT
    ---(1)----  ------------(2)------------ --(3)--  --(4)--  -(5)-  ---(6)---
               USER20.CLIST.CLIST               46       46      0  ???
               USER20.DFP220.DGTTLIB            46       46      0  ???
               USER20.ISMF.DGTLLIB              46       46      0  ???
               USER20.ISMF.DGTPLIB              46       46      0  ???
               USER20.ISMF.DUMP               4684     4356      7  ???
               USER20.ISPFILE                   46       46      0  ???
               USER20.ISPPROF                   93       93      0  ???
    *HRECOVER  USER20.SAMPLE.DATASET           468       46     90  ???
               USER20.SPFLOG1.LIST            2623     1311     50  ???
               USER20.TEMP.DATASET            4684       93     98  ???
    ----------  ------  -----------  BOTTOM OF  DATA  -----------  ------  ---

Command ===>                                                 Scroll ===> HALF
 F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

Figure 53. Data Set List Panel After Function Completes

For more information on using DFSMShsm/ISMF line operators, see *z/OS DFSMS Using the Interactive Storage Management Facility* or use the online help provided with ISMF.

Using TSO

The commands for recovering SMS-managed data sets, non-SMS-managed dataset, or UNIX files are different.

- If you are recovering SMS-managed data sets, the SMS allocation services used in your computing center directs the return of your data set.
- If you are recovering non-SMS data sets or uncataloged data sets, you can direct the return of your data sets to a specific volume.
- If you are recovering UNIX files, each file is placed back in its original path.

Recovering a backup version or a dump copy of a data set

Task: Recover a backup version or a dump copy of one or more data sets.

When recovering SMS-managed or non-SMS-managed data sets, you can do any of the following tasks:

- Replace an existing version or damaged data set with the recovered version of the data set.
- Recover the backup version of a cataloged non-VSAM data set that is currently migrated, as specified in the computing system catalog or the MCDS, if the HRECOVER command is issued with NEWNAME specified, and the NEWNAME data set is not a migrated data set.
- Rename the recovered version of the data set and have two versions of the same data set on DFSMShsm-managed volumes.

You cannot recover the backup version of a cataloged VSAM data set that is currently migrated, as specified in the computing system catalog or the MCDS, until DFSMShsm recalls or deletes the migrated VSAM data set.

The copy of a data set to be recovered can be either a backup version or a dump copy created by DFSMSdss. If your installation uses both incremental backup and the DFSMSdss dump function, an HRECOVER command may result in DFSMShsm invoking DFSMSdss to do a restore of the data set. You can read about the decisions that DFSMShsm makes to select the DFSMSdss copy in *z/OS DFSMShsm Storage Administration*. In most cases, it will be transparent to you whether the HRECOVER command results in using a backup version or a dump copy. Usually, the most recent copy of your data set will be

made available based on the DFSMShsm options set by your installation's system programmer and on the optional parameters that you specify on the HRECOVER command.

RACF authority: To recover a RACF-protected data set and you issue the HRECOVER command:

- Without the NEWNAME parameter, you must have RACF ALTER authority to the data set.
- With the NEWNAME parameter:
  - You must have RACF READ authority to the data set being recovered.
  - In addition, if the newname data set exists and is RACF-protected and you specify REPLACE, you must have RACF ALTER authority to the newname data set.

RACF profile requirements: The following are RACF profile requirements when you issue the HRECOVER command with the NEWNAME parameter:

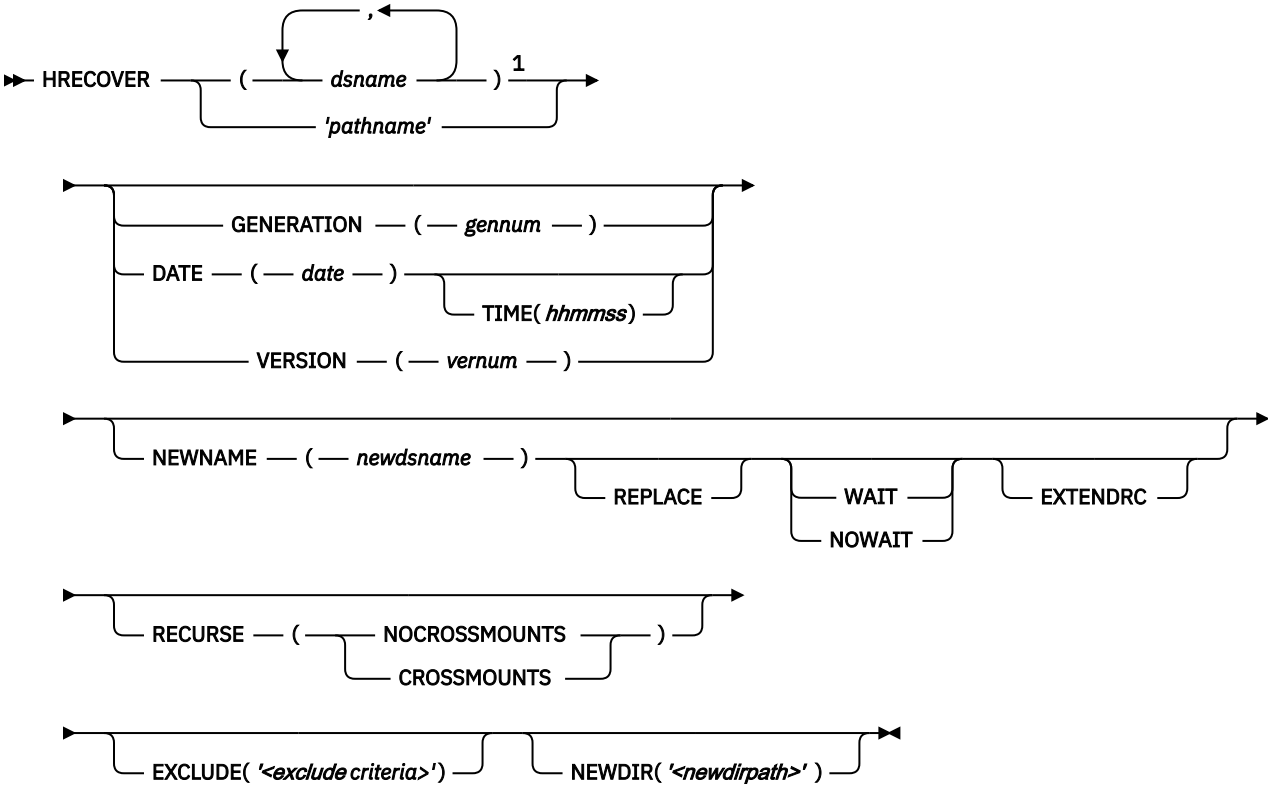
- A RACF profile must exist for the original data set if the original data set was RACF-indicated at the time of backup or recovery.
- A RACF profile must exist for the newname data set if the newname data set exists and is RACF indicated.

Note: In either case, it does not matter if the original data set exists as long as the profile exists.

Abbreviation: The minimum abbreviation for the HRECOVER command is HRECOV.

Syntax

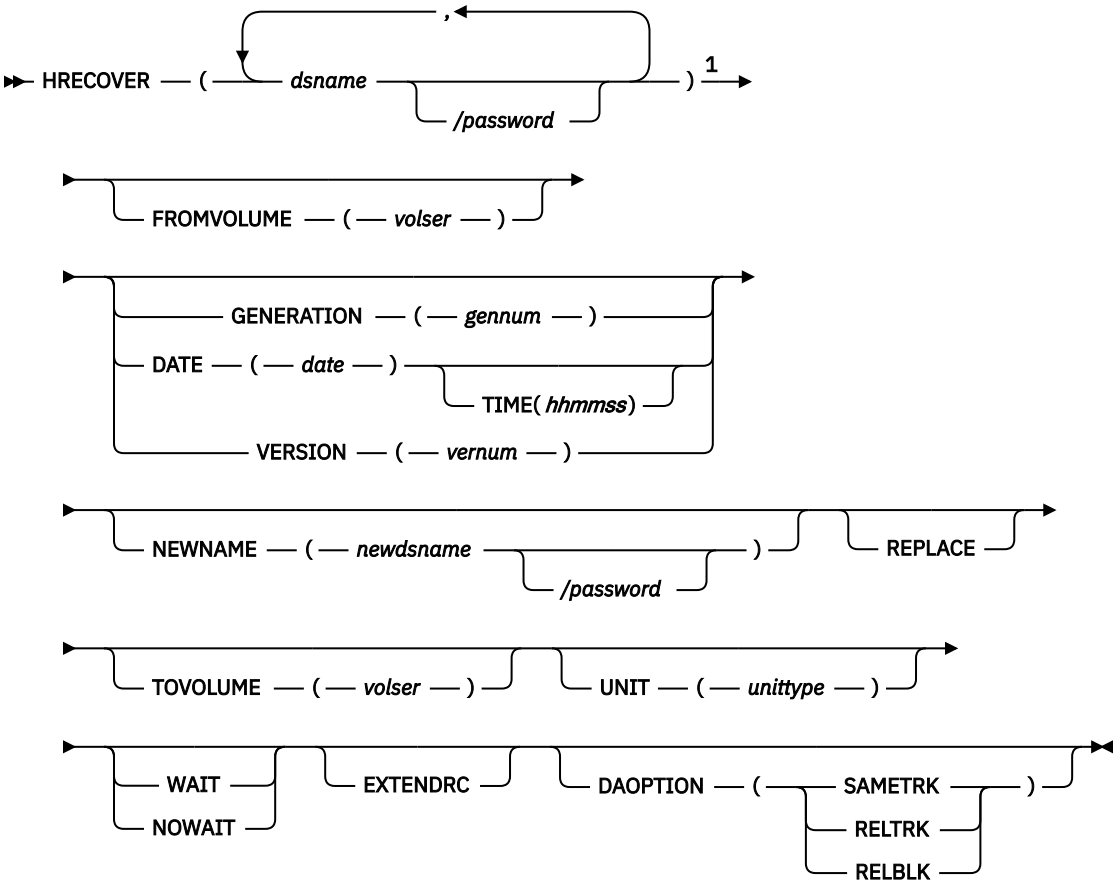
The following diagram presents the syntax of the HRECOVER syntax for **SMS-managed** data sets and **UNIX** files.



Notes:

[1] Parentheses around data set names are required only when multiple data set are specified.

The following diagram presents the syntax of the HRECOVER command for **non-SMS-managed** data sets:



Notes:

[1] Parentheses around data set names are required only when multiple data set are specified.

Required parameters

dsname: Specifying the name of the data set to be recovered

This parameter applies to both SMS-managed and non-SMS-managed data sets.

Explanation

(*dsname*...) or (*dsname*/*password* ...) is a required positional parameter used to specify the name of the data set or list of data set names to be recovered. For *dsname*, substitute the name of the data set or list of data set names that you want to recover. You can use a data set filter for any dsname in a list. If you specify a list of data sets or one or more filters, each data set is associated with the other parameters specified with the command. Thus a filter and the NEWNAME parameter are not compatible since a filter implies more than one data set to recover.

If you want to recover an uncataloged data set, you must specify its data set name explicitly. For a discussion of how to specify data set names, see "Specifying data set names" on page 36.

For *password*, substitute the correct password and include the preceding slash (/). TSO does not prompt you for the password.

- For a password-protected non-VSAM data set, supply the password that allows you to write to the data set.
- For a password-protected VSAM data set:
  - If the data set exists, you must supply the current master password of the base cluster.

– If the data set does not exist, you must supply the master password of the base cluster that existed when DFSMShsm backed up the data set.

Abbreviations

None.

Defaults

None.

Restrictions

- Because *dsname* is a required positional parameter, you must specify it immediately after HRECOVER.
- Individual partitioned data set members are not processed by DFSMShsm. If you specify a partitioned data set with a member name, message ARC1065I is issued and nothing is recovered.
- If *dsname* is fully qualified and refers to a VSAM data set, specify the base cluster name. The entire VSAM data set will be recovered.
- When you specify a password with a filter, all the affected data sets protected by a password must have the same password. Otherwise, DFSMShsm authorization checking fails the recovery of those password-protected data sets that are protected by a different password.
- If an alias is substituted for the data set name of an ICF catalog, the command fails, even if the user is DFSMShsm-authorized.

pathname: Specifying the name of the UNIX file to be recovered

This parameter applies to UNIX files in both SMS-managed and non-SMS-managed zFS data sets.

Explanation

('*pathname*') is a required positional parameter that specifies the absolute *pathname* of the UNIX file or list of absolute path UNIX file names whose backup versions you want to recover. UNIX path names must be enclosed in single quotation marks that start with the forward slash character. If the UNIX file name has a single quotation mark as part of the file name, specify two single quotation marks in the *pathname* instead of one.

Optional parameters

DAOPTION: Selecting target volume track length

This parameter applies only to data that will be returned to a non-SMS-managed DASD volume.

Explanation

`DAOPTION(SAMETRK | RELTRK | RELBLK)` are mutually exclusive, optional parameters specifying the type of data set accessing required (relative track or relative block) upon recovery of a direct access data set. This, in turn, implies the allowable target volume device types.

SAMETRK specifies that data is to be moved as a track-to-track image and that the target volume track size must be the same as the L0 volume from which the data set was backed up. If DFSMShsm is directed to a specific volume by the TOVOLUME parameter, this volume must have the same track length as the L0 volume from which the data set was backed up.

Data can be accessed for both relative track and relative block processing.

RELTRK specifies that data is to be moved as a track-to-track image and that the target volume track size must be the same or greater than the L0 volume from which the data set was backed up. If DFSMShsm is directed to a specific volume by the TOVOLUME parameter, this volume must have the same or greater track length as the L0 volume from which the data set was backed up.

Data can be accessed for relative track processing.

RELBLK specifies that data is to be moved to fill out the track and that the target volume track size can be the same, greater, or smaller than the L0 volume from which the data set was backed up.

Data can be accessed for relative block processing.

Abbreviations

The TSO abbreviation convention applies to this parameter. There are no additional abbreviations.

Defaults

If you do not specify DAOPTION, the data is moved as a track image, allowing for relative track accessing.

Note: Only direct access (BDAM) data sets are supported by this option. Using DAOPTION to recover a data set as SMS-managed is not supported. If a data set would be SMS-managed after the recover, the FORCENONSMS parameter of RECOVER must be used to force it to be non-SMS-managed.

EXCLUDE and EXCLUDEF: Specifying files or directories to be excluded from processing

This parameter applies to both SMS-managed and non-SMS-managed data sets or UNIX files.

Explanation

EXCLUDE | EXCLUDEF are mutually exclusive, optional parameters that are used to specify files and directories that are to be excluded during Unix File recover processing.

EXCLUDE('<exclude_criteria>') - specifies a comma-separated list of exclude criteria directly on the command. This criteria is applied to the UNIX files examined during the UNIX File recover processing:

The exclude criteria list specified on the command with EXCLUDE keyword has the following restrictions and rules unique to the keyword:

- The <*exclude_criteria*> list must be specified in single quotes
- The <*exclude_criteria*> list cannot exceed 1023 characters

EXCLUDEF('<*filepath*>') - specifies the UNIX path to a file that contains the exclude criteria to be applied to the UNIX files examined during UNIX File recover processing. The file path must be specified in single-quotes and must be an absolute path. Any imbedded single quotes in the filename must be specified with a second single quote, e.g. the filename exclude'criteria.txt would be specified as: 'exclude''criteria.txt'. (optional).

The exclude criteria file specified using the EXCLUDEF keyword has the following restrictions and rules unique to the keyword:

- Line starting with a blank character is a comment.
- Each line can only contain one criterion.
- A single line cannot be longer than 1023 characters.
- Total length of all exclude criteria with added commas to separate them cannot exceed 32767 characters. For 'n' number of criteria, 'n-1' number of COMMA should also be accounted for to calculate the total size.

Exclude criteria, whether specified on the command in a comma separated list using the EXCLUDE keyword or specified within a file using the EXCLUDEF keyword, must conform to the following rules:

- Absolute directory path, beginning and ending with a forward-slash character.
- Partial directory path, ending with a forward-slash character. If the directory name begins with a forward slash character, then it is considered an absolute path. If the directory name does not begin with a forward slash character, it is considered a relative path that begins at the directory requested on

the command. A directory name that is a relative path is considered relative to the directory requested on the command only, even when the command requests recursion.

- Filename pattern (does not contain forward slashes). Can contain * or ? wildcards. An asterisk (*) can match with 0 or more characters in a filename. A question mark (?) can match with a single character. Wildcard characters may be escaped with the backslash character if desired.
- A filename pattern can begin with an absolute or relative path, however wildcard characters can only be used in the filename pattern. A directory path containing an asterisk (*) or question mark (?) is considered an invalid pattern.
- If a filename contains special characters that are not to be treated as wildcards or escape characters i.e. an asterisk (*), question mark (?), or backslash (\), these characters must be escaped using a backslash (\). If these characters are not escaped, they will be treated as wildcards or escape characters.
- A directory wildcard may be specified in the directory portion of a criterion by specifying /.../ (<forward slash><period><period><period><forward slash>). A directory wildcard can match with 0 or more directories.
- If a criterion begins with a directory wildcard (/.../) then it is treated as a relative path.
- A comma cannot be used within the exclude criterion.
- A single criterion cannot exceed 1023 characters.
- A single forward slash or a single asterisk are treated as invalid patterns.
- A directory path cannot contain consecutive forward slashes.

The example below shows sample criteria in a file specified by the EXCLUDEF keyword. The same criteria could be specified on the command using the EXCLUDE keyword where each criterion is separated by a comma.

```
Useful comment (maybe with commas) <= blank in 1st position - ignored
                                      <= empty line - ignored
/a/b/c/                               <= absolute directory
/a/b/c/x1.txt                         <= absolute directory with filename
/a/.../d/.../g/syslog1.txt            <= absolute directory with wildcards
/a/.../d/.../g/*log?.txt              <= absolute directory and filename with wildcards
e/f/g                                 <= relative directory
e/f/g/mvs.log                         <= relative directory with filename
d/e/f/g/*log?.txt                     <= relative directory with filename wildcard
d/.../g/sys*.*                        <= relative directory and filename with wildcards
/.../d/.../g/sys*.*                   <= relative directory and filename with wildcards
*.log                                 <= filename with wildcards
*.log2                                <= blank in 1st position makes a comment, ignored
\*abc                                 <= escaping wildcards - files with exact name *abc
\\abc                                 <= escaping wildcards - files with exact name \abc
```

Restrictions

This parameter only applies when a file path is specified on the request. A maximum of 1023 characters can be specified in the list. Do not use the comma (,) character in filename patterns or directory names.

Defaults

No files are excluded from processing

EXTENDRC: Requesting an extended set of return and reason codes

This parameter applies to both SMS-managed and non-SMS-managed data sets.

Explanation

EXTENDRC is an optional parameter that specifies that DFSMShsm return an extended set of return and reason codes while you are running DFSMShsm commands in a truly interactive mode (TSO or foreground). This option returns only the return and reason codes that are mapped into DFSMShsm messages that are issued to the user's terminal. For detailed information on return codes that DFSMShsm returns for this command, see Appendix B, "Return codes from DFSMShsm commands," on page 231.

Abbreviations

The TSO abbreviation convention applies for EXTENDRC.

Defaults

None.

Restrictions

The WAIT option must be specified with the EXTENDRC parameter when you are running DFSMShsm commands in a truly interactive mode (TSO or foreground).

FROMVOLUME: Specifying the volume from which the backup version or dump copy of a data set was created

This parameter applies only to non-SMS-managed data sets.

Explanation

FROMVOLUME(*volser*) is an optional parameter that specifies that the data set was uncataloged and that it resided on the volume specified by the *volser* when DFSMShsm created the backup version. For *volser*, substitute the serial number of the volume where the uncataloged data set resided when DFSMShsm created the backup version.

If FROMVOLUME is used to direct DFSMShsm to restore a data set from a dump copy, the dump copy made from the specified volume will be used regardless of the catalog status of the data set when the dump copy was made. The data set will be restored to the FROMVOLUME specified and left uncataloged.

If the FROMVOLUME is not specified, the volume on which the data set is currently cataloged, or where an incremental backup version was found, is used to locate an eligible dump copy.

Abbreviations

The TSO abbreviation convention applies for FROMVOLUME. There are no additional abbreviations.

Defaults

None.

Restrictions

- You must use the FROMVOLUME parameter to recover a data set if the data set was uncataloged at the time DFSMShsm backed it up.
- You cannot use the FROMVOLUME parameter for cataloged data sets.
- When you specify the FROMVOLUME parameter, DFSMShsm does not catalog the recovered backup version or dump copy.
- The FROMVOLUME parameter does *not* apply to VSAM data sets.

GENERATION, DATE, and VERSION: Specifying the particular data set backup version to recover

These parameters apply to both SMS-managed and non-SMS-managed data sets or UNIX files.

Explanation

GENERATION(*gennum*) | DATE(*date*) | VERSION(*vernum*) are mutually exclusive, optional parameters used to identify the backup version of the data set or data sets, or UNIX file that you want to recover.

GENERATION specifies that you want to recover a particular backup version of a specific data set or UNIX file. For *gennum*, substitute the relative generation number of the backup version of the data set or UNIX

file that you want to recover. Zero is the latest created backup version, one is the next to the latest created version, and so forth, up to the maximum number of versions existing for the data set or UNIX file. You cannot specify GENERATION with retained backup copies.

DATE specifies that you want to recover the latest backup version or dump copy created on or before a particular date. For *date*, substitute the date in the following format for the backup or dump copy of the data set that you want to recover:

- *yy/mm/dd* or *mm/dd/yy*, if you issue the command before 1 January 2000
- *yyyy/mm/dd*, if you issue the command after 31 December 1999

The backup or dump copy to be recovered is the newest one created on or before the date specified. A leading zero is not required for a one-digit month or day.

TIME is an optional parameter that specifies the exact time in hours, minutes, and seconds (hhmmss) when the backup version was created. The valid range for hours is 00–23, and for minutes and seconds is 00–59. If you specify TIME, you must also specify DATE, otherwise the HRECOVER command fails. If you specify a partially qualified data set, the DATE and TIME are applied to all of the data sets that meet the filter criteria. If you specify DATE and TIME, DFSMShsm recovers the exact backup copy that was created at the specified date and time. If you specify DATE and do not specify TIME, DFSMShsm recovers the most recent backup copy created on or before the specified date. You can use the LIST command to determine the creation DATE and TIME of the data sets or UNIX files that you want to recover. If a copy with specified DATE and TIME does not exist, the HRECOVER command fails. You cannot specify TIME on a volume recovery request.

VERSION(*vernum*) specifies that you want to recover a particular unique version of a specific data set or UNIX file. For *vernum*, substitute a decimal number from 1 to 999 for the particular backup version you would like to recover. If DFSMShsm is unable to find the specified backup version, the recover fails and message ARC1128I is issued. You cannot specify VERSION with retained backup copies.

Abbreviations

The TSO abbreviation convention applies for GENERATION, DATE, and VERSION. There are no additional abbreviations.

Defaults

If you do not specify GENERATION, DATE, or VERSION, DFSMShsm recovers the latest created backup version or dump copy of the data set or UNIX file. If you issue the command before 1 January 2000 and specify the date in the form *mm/dd*, the year (*yy*) defaults to the current year.

Restrictions

If either the GENERATION or VERSION parameters are specified, DFSMShsm will select only from incremental backups and will not recover from physical dump copies, even if the physical dump is more recent.

NEWDIR: Recovering files to a different directory

This parameter applies to both SMS-managed and non-SMS-managed data sets.

Explanation

During a file recovery request, this optional parameter specifies a target directory that the recovered files should be placed into. For an existing directory, the specified *newdirpath* must be an absolute path that ends with a forward slash. The requesting user must have write and search permission for the directory.

Restrictions

The total length of the recovered file names plus the length of the new directory cannot exceed 1023 characters.

NEWNAME: Specifying a new data set name for the recovered data set

This parameter applies to both SMS-managed and non-SMS-managed data sets.

Explanation

NEWNAME(*newdsname*) is an optional parameter used to specify a new data set name for the recovered backup version or dump copy of the data set. For *newdsname*, substitute the name to be given to the recovered data set. If a data set already exists with the same name as the new name you are specifying, you must specify the REPLACE parameter to replace the existing data set.

For *password*, substitute the correct password and include the preceding slash (/). TSO does not prompt you for the password.

- If a password-protected non-VSAM data set currently exists with the name specified by NEWNAME, you must supply the password that allows you to write to the data set.
- If a password-protected VSAM data set currently exists with the name specified by NEWNAME, you must supply the master password of the base cluster.

Abbreviations

The TSO abbreviation convention applies for NEWNAME. There are no additional abbreviations.

Defaults

None.

Restrictions

- If you want to keep both versions of the data set, you must specify NEWNAME when a data set exists with the same name as the data set you are recovering.
- It is inconsistent to specify the NEWNAME parameter when you are recovering more than one data set with each HRECOVER command.
- When you specify NEWNAME, you may have to consider the following conditions:

If	Then
You are recovering a VSAM data set and you specify NEWNAME,	The new data set name and the original data set name must be cataloged in the same catalog. Additionally, the catalog entry for the original data set name must exist so that the original data and index component names can be found. The base cluster data component name and the base cluster index component name of the data set being recovered must be the same as the base cluster data component name and the base cluster index name exported.
You specify TOVOLUME with NEWNAME and the VSAM data set is cataloged in a non-ICF catalog,	The volume must be owned by the catalog where the VSAM data set being recovered will be cataloged.
The newname data set is an already existing VSAM data set,	DFSMShsm uses the base cluster data component and base cluster index component name when creating the newname data set.
The newname data set does not exist,	DFSMShsm generates a name for the base cluster data component and the base index component.
There is a path defined on the base cluster of a VSAM data set,	You cannot rename the VSAM data set.

If	Then
If you are recovering a VSAM data set and the original data set exists, but no backup copy exists (only a dump copy exists), and you specify NEWNAME,	The recover command fails. DFSMSdss does not support the NEWNAME parameter for VSAM data sets, so the restore function must use the original data set name.
If you are recovering a non-VSAM data set and you specify NEWNAME,	The new data set name should be cataloged and must have the same data set organization as the backup version.

- DFSMShsm does not process individual partitioned data set members. If you specify a partitioned data set with a member name, DFSMShsm fails the HRECOVER request.

Note: When you issue the following command:

HRECOVER *dsname* NEWNAME (*newdsname*) REPLACE

consider the following:

- If the original data set and newname data set are both VSAM data sets, password-protected, RACF-protected, and you have the proper RACF authority to the data sets, this HRECOVER command will delete the newname data set (including the catalog entry and the RACF profile of the newname data set) and rename the recovered version to the newname data set.
- If the original data set and the newname data set are both non-VSAM data sets, this HRECOVER command will not change the protection of the original data set. The data set VTOC entry of the newname data set indicates that the newname data set now has the combined protection of the original data set and the newname data set.

REPLACE: Specifying that the recovered data set or UNIX file version is to replace any existing data set or UNIX file of the same name

This parameter applies to both SMS-managed and non-SMS-managed data sets.

Explanation

REPLACE is an optional parameter used to specify that the recovered backup version or dump copy of the data set replaces any existing data set or UNIX file with the same data set or UNIX file name on the receiving volume or on any volume if the data set is cataloged. If you specify NEWNAME and the new name is the same as the name of an existing data set, you must specify the REPLACE parameter or DFSMShsm does not process the HRECOVER command for that data set. The data set being replaced is uncataloged (if it was cataloged) and scratched.

Abbreviations

The TSO abbreviation convention applies for REPLACE. There are no additional abbreviations.

Defaults

None.

Restrictions

- When a data set with the specified name already exists on the receiving volume or on any volume if the data set is cataloged and if you do not specify the REPLACE or NEWNAME parameters, DFSMShsm does not process the HRECOVER command for that data set.

- The data set to be replaced must have the same data set organization as the data set from which the backup version was created. For example, a sequential data set can not be recovered into a partitioned data set member.
- If the backup version is being recovered and both the backup version and the target data set are cataloged, then DFSMShsm will fail the HRECOVER request when the data set organizations do not match.

TOVOLUME: Specifying the volume to receive the recovered data set

This parameter applies only to data that will be returned to a non-SMS-managed DASD volume.

Explanation

TOVOLUME(*volser*) is an optional parameter used to specify the volume that is to receive the recovered data set. For *volser*, substitute the serial number of the volume that you want to receive the recovered data set.

Abbreviations

The TSO abbreviation convention applies for TOVOLUME. There are no additional abbreviations.

Defaults

If you do not specify TOVOLUME, DFSMShsm recovers the data set:

- To the volume where the catalog entry that specifies the data set currently exists;
- If no catalog entry exists, to the volume where it resided at the time DFSMShsm backed it up unless DFSMShsm created the backup version from a migrated data set;
- If DFSMShsm backed up a data set while it was migrated, to the volume from which the data set last migrated.

Restrictions

- If you specify TOVOLUME, you must also specify UNIT and *unittype*. If you are recovering a VSAM data set cataloged in a non-ICF catalog, you can only specify with the TOVOLUME parameter a volume owned by the catalog where the VSAM data set being recovered is cataloged or will be cataloged.
- The volume you specify for TOVOLUME cannot be a migration volume.

UNIT: Specifying the type of unit for the receiving volume

This parameter applies only to data that will be returned to a non-SMS-managed DASD volume.

Explanation

UNIT(*unittype*) is an optional parameter used to specify the type of unit where the receiving volume can be allocated. For *unittype*, substitute the type of unit where the volume that is to receive the recovered data set can be allocated. The valid types of units are: 3380, 3390, and 9345.

Abbreviations

The TSO abbreviation convention applies for UNIT. There are no additional abbreviations.

Defaults

None.

Restrictions

- If you specify TOVOLUME, you must also specify UNIT and *unittype*. If you specify UNIT, you must also specify TOVOLUME.

- If the device to which you are recovering the backup version has a smaller track capacity than the block size of the users data set, the track overflow feature must be on in both the software and hardware.

WAIT and NOWAIT: Specifying whether to wait for the data set or UNIX file to be recovered

These parameters apply to both SMS-managed and non-SMS-managed data sets or UNIX files.

Explanation

WAIT | NOWAIT are mutually exclusive, optional parameters used to specify whether to wait for the HRECOVER command to complete.

WAIT specifies that you want to wait for the HRECOVER command to complete. When DFSMShsm successfully completes the HRECOVER process, the ARC1000I message is issued. If the HRECOVER process does not complete successfully, the ARC1001I message is issued. If you press the TSO Attention key before DFSMShsm completes the command, DFSMShsm issues the ARC1800I message and does not issue the ARC1000I message.

NOWAIT specifies that you do not want to wait for the HRECOVER command to complete. When DFSMShsm successfully receives the request, the ARC1007I message is issued. If you are recovering data sets or UNIX files from tape, a volume mount request message (ARC0612I) is issued. After DFSMShsm successfully completes the HRECOVER command, the ARC1000I message is issued. If the HRECOVER command does not complete successfully, the ARC1001I message is issued.

Abbreviations

The TSO abbreviation convention applies for WAIT and NOWAIT. There are no additional abbreviations.

Defaults

The default is NOWAIT.

Restrictions

You can specify either WAIT or NOWAIT, but not both.

RECURSE: Examine subdirectories of the specified UNIX file path

Explanation

RECURSE(CROSSMOUNTS|CMT|NOCROSSMOUNTS|NCM) Examines subdirectories of the specified path while looking for files that match pattern to recover from the DFSMShsm backup inventory.

- NOCROSSMOUNTS specifies not to recover files that came from a different file system than the initial specified path. It is the default.
- CROSSMOUNTS examines directories that are in a different file system from the file system that contains the starting location when choosing files to recover. The default is not to examine subdirectories for files to recover.

Default

Subdirectories are not examined for files to recover.

Examples of different ways to code the HRECOVER command

The examples below present different ways to code the HRECOVER command. The values are examples only. Do not interpret them as values that you should use for your system.

Recovering a specific data set by generation number and waiting for completion

In this example, you are issuing the HRECOVER command to recover the third latest backup version of the cataloged data set GRPA.OUTTESTS.TESTLIST. Because you are not specifying the REPLACE option in the command, a data set with this name does not currently exist. The WAIT parameter indicates that you want to wait for DFSMShsm to complete the recovery of the data set.

```
HRECOVER 'GRPA.OUTTESTS.TESTLIST' GENERATION(2) WAIT
```

Recovering a data set and requesting to see the return code and reason code

In this example, you are issuing the HRECOVER command from a TSO session to recover the latest version of the data set TESTS.TEXTVER4.TEXT. The WAIT EXTENDRC parameter indicates that you want to see the extended return and reason codes.

```
HRECOVER 'TESTS.TEXTVER4.TEXT' WAIT EXTENDRC
```

Recovering a non-SMS password-protected data set, renaming it, and waiting for completion

In this example, you are issuing the HRECOVER command to recover the latest backup version of the uncataloged data set CLCE.TEXTVER1.TEXT created on or before 1/05/89 and protected by the password WRITE. You are naming the recovered version CLCE.VER1TEXT.TEXT and placing it on volume VOL001, specifying 3380 as the type of unit. VOL003 is the volume where the uncataloged data set resided when DFSMShsm backed it up. The WAIT parameter indicates that you want to wait for DFSMShsm to complete the recovery of the data set.

```
HRECOVER 'CLCE.TEXTVER1.TEXT'/WRITE FROMVOLUME(VOL003) -
         DATE(1/05/89) NEWNAME('CLCE.VER1TEXT.TEXT') -
         TOVOLUME(VOL001) UNIT(3380) WAIT
```

Recovering a non-SMS data set to replace an existing data set and not waiting for completion

In this example, you are issuing the HRECOVER command to recover the latest version of the data set USER01.PARTSTST.CNTL to volume VOL007 to replace an existing cataloged data set of the same name. A 3390 is the type of unit that volume VOL007 can reside on. Your user ID prefix is USER01. The NOWAIT parameter indicates that you do not want to wait for DFSMShsm to complete the recovery and replacement of the data set.

In this example, the original data set is uncataloged and scratched.

```
HRECOVER PARTSTST.CNTL TOVOLUME(VOL007) UNIT(3390) -
         REPLACE NOWAIT
```

Recovering a DA (BDAM) data set to a volume with a different track length than the last L0 volume from which the backup version was created

In this example, a non-SMS-managed direct access (DA) data set is to be recovered for relative block accessing to a target volume with a smaller track size than the L0 volume from which the backup version was created.

```
HRECOVER PMJS73.SERVICE.DATA -
TOVOLUME(VOL001) UNIT(3380) -
DAOPTION(RELBLK)
```

Using the UNIX shell (exrecover)

DFSMShsm provides a command, **hrecover**, to allow UNIX shell users a way to recover a backup version of their own UNIX files.

Description

The **hrecover** command communicates with DFSMShsm to recover backups of UNIX files.

You can recover:

- One file.
- Multiple files within a specified directory.
- A tree of files that start at the specified directory.

If any directories in a path do not exist, they are created by using information that is gathered at the time of the backup.

RACF authority for UNIX file backups:

In order to perform a recovery of a UNIX file, the user must have write permission to the file as it was at backup time, or be the file owner. Additionally, at least Search permission for the existing directories in the path up until the directory where the file needs to be created. Additionally, that directory needs at least Write permission. If any directories in the path need to be re-created, write permission is required in each of the directories as well. Write permission to the file is additionally required. If a user does not have write permission for the file, but is the file owner, the recover can be performed.

Format

hrecover [-hXRfvw] [-d *date*] [-t *time*] [-g *gennum*] [-V *version*] [-p *max_sub_tasks*] -e *exclude_listfile* ... *file* ...

file can be any of the following options:

- The absolute path to a specific file.

```
/u/username/dir1/file1.txt
```

- A single file name.

```
file1.txt
```

- A partial file name.

```
/u/username/dir1/file?.txt
```

or

```
*.txt
```

(The UNIX shell matches files within the directory.)

- A directory name.

```
/u/username/dir1/
```

- A directory name in the current working directory.

```
dir1/
```

Single quotation marks or double quotation marks around the name can be used to pass the file name or pattern as-is to DFSMShsm. If a file name is specified (the name does not start with a forward slash (/)), the current working directory is prepended and passed on to DFSMShsm for processing.

Wildcard characters

The asterisk (*) character when specified, means to match 0 or more characters. The question mark (?) character matches only 1 character in that position. If the files do not exist in the directory, the UNIX shell cannot expand the names that match the wildcard. Specify single or double quotation marks around the requested wildcard to bypass the UNIX shell expansion of the wildcard and allow DFSMShsm to find the matching files in its inventory. If the file name contains an asterisk, question mark, or backslash (\) character, the backslash (\) character must be used to escape the wildcard processing by the UNIX shell or DFSMShsm. Single or double quotation marks around the requested name are required when using the backslash escape character.

You can specify multiple file or directory names to the **hrecover** command.

Options

-d *date*
Specifies to recover the most recent backup of the file on or before the specified date. The date must be specified in `yyyy/mm/dd` format.

-e
Requests files or directories to be excluded from processing. Filename patterns that are specified in the exclude list can contain any valid filename characters and may contain the question mark (?) and asterisk (*) wildcard characters. The forward slash character is not allowed in the filename pattern.

- If the pattern file contains any of the specific ?, *, or \ characters, the backslash character (\) must be used to escape that character to indicate it is not a wildcard. For example, \?, *, or \\).
- An asterisk (*) can be used to match any number of characters within a file name. It can also be used at any position in the pattern.
- A second asterisk may also be used at the end of the pattern to indicate any number of characters following the pattern is acceptable.
- A question mark (?) can be used to represent any single character in the file name. Multiple question mark characters are allowed.
- A directory wildcard may be specified in the directory portion of a criterion by specifying /.../ (<forward slash><period><period><period><forward slash>). A directory wildcard can match with 0 or more directories.
- A filename pattern can begin with an absolute or relative path, however wildcard characters can only be used in the filename pattern. A directory path containing an asterisk (*) or question mark (?) is considered an invalid pattern.

If the requested filename pattern does not include any wildcard characters, then that exact name is used to compare with files that are found in the subdirectories processed.

Directory names that are specified in the exclude list must end in a forward slash character. If the directory name begins with a forward slash character, then it is considered to be an absolute path. If the directory name does not begin with a forward slash character, it is considered to be a relative path that begins at the directory requested on the command.

A maximum of 1023 characters can be specified in the list. Do not use the comma (,) character in filename patterns or directory names.

-E
This specifies the UNIX path to a file that contains the exclude criteria to be applied to the UNIX files examined during Unix File recover processing. The file path can be an absolute path or a path relative tot he current working directory. Double quotes may need to be used to avoid additional processing by the UNIX shell.

This option is mutually exclusive with the -e option.

The consent of the exclude criteria files must conform to the following rules:

- Line starting with a blank character is a comment.

- Each line can only contain one criterion.
- A single line cannot be longer than 1023 characters.
- Total length of all exclude criteria with added commas to separate them cannot exceed 32767 characters. For 'n' number of criteria, 'n-1' number of COMMA should also be accounted for to calculate the total size.
- Absolute directory path, beginning and ending with a forward-slash character.
- Partial directory path, ending with a forward slash-character. If the directory name begins with a forward-slash character, then it is considered an absolute path. If the directory name does not begin with a forward slash character, it is considered a relative path that begins at the directory requested on the command. A directory name that is a relative path is considered relative to the directory requested on the command only, even when the command requests recursion.
- Filename pattern (does not contain forward slashes). Can contain * or ? wildcards. An asterisk (*) can match with 0 or more characters in a filename. A question mark (?) can match with a single character. Wildcard characters may be escaped with the backslash character if desired.
- A filename pattern can begin with an absolute or relative path, however wildcard characters can only be used in the filename pattern. A directory path containing an asterisk (*) or question mark (?) is considered an invalid pattern.
- If a filename contains special characters that are not to be treated as wildcards or escape characters i.e. an asterisk (*), or question mark (?), or backslash (\), these characters must be escaped using a backslash (\). If these characters are not escaped, they will be treated as wildcards or escape characters.
- Hidden directories are represented by /.../ (<forward slash><period><period><period><forward slash>). This syntax functions as a directory wildcard pattern and can match with 0 or more directories.
- If a criterion begins with a hidden directory pattern (/.../) then it is treated as a relative path although the rifest character is a forward slash.
- A comma cannot be used within the exclude criterion.
- A single criterion cannot exceed 1023 characters.
- As single forward slash or a single asterisk are treated as invalid patterns.
- A directory path cannot contain consecutive forward slashes.

The example below shows sample criteria in a file specified by the EXCLUDEF keyword. The same criteria could be specified on the command using the EXCLUDE keyword where each criterion is separated by a comma.

```
Useful comment (maybe with commas) <= blank in 1st position - ignored
                                        <= empty line - ignored
/a/b/c/                                 <= absolute directory
/a/b/c/x1.txt                           <= absolute directory with filename
/a/.../d/.../g/syslog1.txt              <= absolute directory with wildcards
/a/.../d/.../g/*log?.txt                <= absolute directory and filename with
wildcards
e/f/g                                   <= relative directory
e/f/g/mvs.log                           <= relative directory with filename
d/e/f/g/*log?.txt                       <= relative directory with filename wildcard
d/.../g/sys*.*                          <= relative directory and filename with
wildcards
/.../d/.../g/sys*.*                     <= relative directory and filename with
wildcards
*.log                                   <= filename with wildcards
*.log2                                  <= blank in 1st position makes a comment,
ignored
\*abc                                   <= escaping wildcards - files with exact name
*abc
\\abc                                   <= escaping wildcards - files with exact name
\abc
```

-N

Specifies a new directory for the recovered files. Write and search permission to the directory is required.

- The specified directory may be a relative, or an absolute path to an existing directory.
- The directory name must end in a forward slash.
- The total length of the recovered file names plus the length of the new directory cannot exceed 1023 characters.

-f
Specifies that DFSMShsm can replace an existing file with the same name as what is being recovered.

-g *gennum*
Specifies that you want to recover a particular incremental backup version of a specific UNIX file. Substitute the relative generation number of the backup version of the UNIX file to be recovered. A `0` specifies the latest version, `1` specifies the next to the latest version, and so on, to the maximum number of versions that exists for the UNIX file. The *gennum* can be up to three digits long

-h
Specifies that the list of acceptable options is written to stdout. No further processing is performed.

-p *max_sub_tasks*
Requests the DFSMShsm **hrecover** client to start to *max_sub_tasks* processes to process file names passed on the command line. The default number of tasks is 4 and the maximum allowable is 32. This value does not affect the number of tasks the DFSMShsm address space uses to process recover requests.

-t *time*
Specifies the exact time in hours, minutes, and seconds (hhmmss) when the backup version was created. The valid range for hours is 00–23, and for minutes and seconds is 00–59. If you specify `-t`, you must also specify **-d**, otherwise the **hrecover** command fails. If you specify a partial file name, or directory, the date and time are applied to all of the files that meet the filter criteria. If you specify `-d` and `-t`, DFSMShsm recovers the exact backup copy that was created at the specified date and time. You can use the LIST command to determine the creation date and time of the files that you want to recover. If a copy with specified date and time does not exist, the **hrecover** command fails.

-R
Specifies that DFSMShsm recover backups of all files in the directory tree starting at the specified directory, including files within subdirectories. If backups of files from a different file system are encountered, it is acceptable to recover them as well.

-X
Specifies that DFSMShsm recover backups of all files in the directory tree. The backup starts at the specified directory, including files within subdirectories but should not cross mount points into a different file system. If the backups came from a different file system, they would not be recovered when this option is specified.

-v
Requests verbose output as processing is performed.

-V *vernum*
Specifies that you want to recover a particular version of a backed-up UNIX file. For *vernum*, substitute a decimal number from 1 to 999 for the particular backup version you want to recover. If DFSMShsm is unable to find the specified backup version, the recover fails and message ARC1128I is issued.

-w
This option specifies that you don't want to wait for the **hrecover** command to complete. The command completes and no messages are issued.

If this option is not specified, then you do want to wait for the **hrecover** command to complete. After DFSMShsm successfully completes the **hrecover** command, the ARC1000I message is issued. If the **hrecover** command does not complete successfully, the ARC1001I message is issued.

Chapter 28. HRECOVU: Recovering data sets or UNIX files

The HRECOVU command is an alias to HRECOVER. All parameters for HRECOVER are valid for this command.

HRECOVU does not have an abbreviation.

Part 3. DFSMShsm application programming interface

This topic describes the user macros you can use from application programs to issue DFSMShsm.

Chapter 29. Using DFSMShsm user macros

This topic contains general-use programming interface and associated guidance information that allow the customer to write programs that use the services of DFSMShsm.

DFSMShsm has macros available that allow you to request DFSMShsm service from your application programs. When you provide information to the macro and process it from your application program, the macro builds the required DFSMShsm control information and issues the request for DFSMShsm service. The macros are in *execute* form only. There is no *list* form provided.

The following user macros are currently supported in DFSMShsm:

- ARCFMWE frees up storage in common storage area (CSA)
- ARCHBACK backs up a specific data set
- ARCHBDEL deletes backed up versions of a data set
- ARCHDEL deletes a migrated data set
- ARCHMIG migrates a specific data set
- ARCHRCAL recalls a data set
- ARCHRCOV recovers a data set
- ARCHSEND sends a command to DFSMShsm
- ARCXTRCT extracts data from DFSMShsm

Note: When these macros are invoked from a application program that runs APF Authorized, in System Key (0 or 7), or Supervisor State, then DFSMShsm bypasses SAF calls for the data sets that are processed. The application owner must ensure that their application program does not introduce a security exposure by enabling unauthorized users access to data via these DFSMShsm macros.

Register usage for return codes

Use the parameters of the macro to specify an explicit value or an address of a data field. They can be specified in any order. When the address of a data field is specified, registers 2 through 12 can be used. For example, SNAPDCB=(3) or a symbol, SNAPDCB=DCBAREA, can be used.

The application program must ensure that register 13 contains the address of a standard 18-word save area. The following return codes are placed in register 15 upon completion of the invocation:

Return code
Description

0
Function is successful

100
DFSMShsm is not running or the request could not be communicated to DFSMShsm

400
Invalid request ID

401
Attempt to free a MWE for an incomplete function (applies to ARCFMWE only)

402
Data set locate failure (applies to ARCHRCAL and ARCHMIG only)

403
Data set name specified was * or *blank*

404
The date specified with ARCHRCOV has format *yyddd*, but the system date is later than 1999.

806
Link error

Any other nonzero
Function fails

See “Individual macros and their messages” on page 235.

Supported unit types and their UCBs

When working with uncataloged data sets, the UNIT and VOLUME parameters must be specified. The unit address is a four-byte field that contains the UCB device type. Table 13 on page 196 presents the unit types and their UCBs that are supported by the user macros in this section.

Table 13. Supported Unit Types and Their UCBs

Unit Type	UCB
3380	X'3010200E'
3390	X'3010200F'
9345	X'00002004'

Asynchronous processing with DFSMShsm

Asynchronous processing of the ARCHRCAL and ARCHBACK macros is provided by the ASYNC parameter. This parameter is to be used in conjunction with a *no-wait* or *wait* request:

no-wait
Sends a request to DFSMShsm and returns control to the user as soon as the request is queued. The user is not notified of the request processing other than a completion message, if the user is logged onto TSO at the time the request ends.

wait
Sends a request to DFSMShsm and does not receive control back until the request has completed. In the return notification, a return code and reason code indicate whether the processing was successful.

The ASYNC=YES parameter allows you, as a program submitter, a way to send requests to DFSMShsm and immediately receive control back so that you can do other things while DFSMShsm is processing your request. DFSMShsm notifies you when the request is complete and returns a return code and reason code.

Before ASYNC=YES will successfully run in your requesting user program, you, as a program submitter, must perform the following tasks:

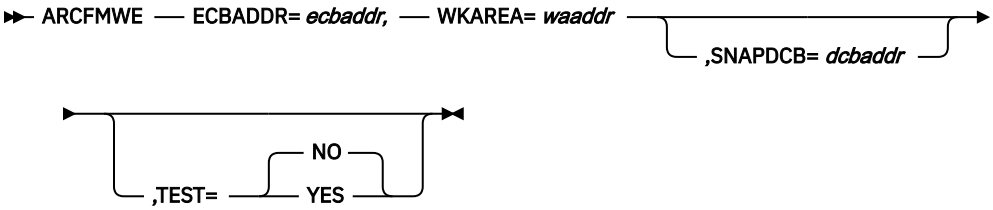
- Ensure that the requesting user program is an authorized program because protected CSA storage is used to communicate the request.
- Specify the ASYNC=YES option and the WAIT=YES option when you code the requested user macro.
- Save the ECB address that is returned in register 1 and do not free this area until the ECB is posted. When the request is queued in CSA, control is returned to the requester. Register 1 contains the address of an ECB that is posted when the request is finished. For certain errors during an asynchronous request, register 1 contains zero indicating that an ECB is not passed. Check the return and reason codes under these conditions.
- After the ECB has been posted, issue the ARCFMWE user macro to free the CSA storage used in this method by specifying the saved ECB address. Upon return from the ARCFMWE macro, the return code is in register 15 and a reason code is in register 0.

ARCFMWE: Freeing up storage in common storage area

The ARCFMWE macro allows you to free up storage space for management work elements and is used only when the ASYNC=YES option is specified with the ARCHRCAL or ARCHBACK user macros.

Syntax

The following diagram presents the syntax of the ARCFMWE macro:



Required parameters

The following are the required parameters of the ARCFMWE macro:

ECBADDR
specifies the address of the ECB in a work area (management work element) that is obtained when the ASYNC=YES is specified for an ARCHRCAL or ARCHBACK request. The requesting application must be authorized program facility (APF) authorized. For *ecbaddr*, substitute the address that has returned in register 1 from the ARCHRCAL or ARCHBACK request.

Note: The ASYNC request must have been completed (ECB posted), before issuing the macro.

WKAREA
specifies the address of a 200-byte work area that contains the information specified in the macro. For *waaddr*, substitute the address of the work area. The work area should be below the 16MB line. The work area serves as a temporary storage area for the macro processing.

Optional parameters

The following are the optional parameters of the ARCFMWE macro:

SNAPDCB
specifies the address of an open DCB that can be used for SNAP macro processing. This feature is intended for problem determination. If you specify this parameter, review "Usage notes" on page 197. For *dcbaddr*, specify the address of an open DCB.

TEST
specifies whether to refrain from sending a request for service to DFSMShsm. If YES is specified the service request is not sent. If NO is specified, a service request is sent to DFSMShsm. In both cases the parameters are checked for correctness. A 4*xx* return code will result for invalid parameters. The default is NO.

Usage notes

1. If a return code of 4*xx* is returned and SNAPDCB is specified, a SNAP macro is issued and the request made to DFSMShsm is dumped. The dumped storage area will include the data set name, volume serial number, and function requested.
2. If SNAPDCB and TEST=YES were specified, and there was an error flagged in the MWERC, then a SNAP macro is issued and the MWE is dumped.

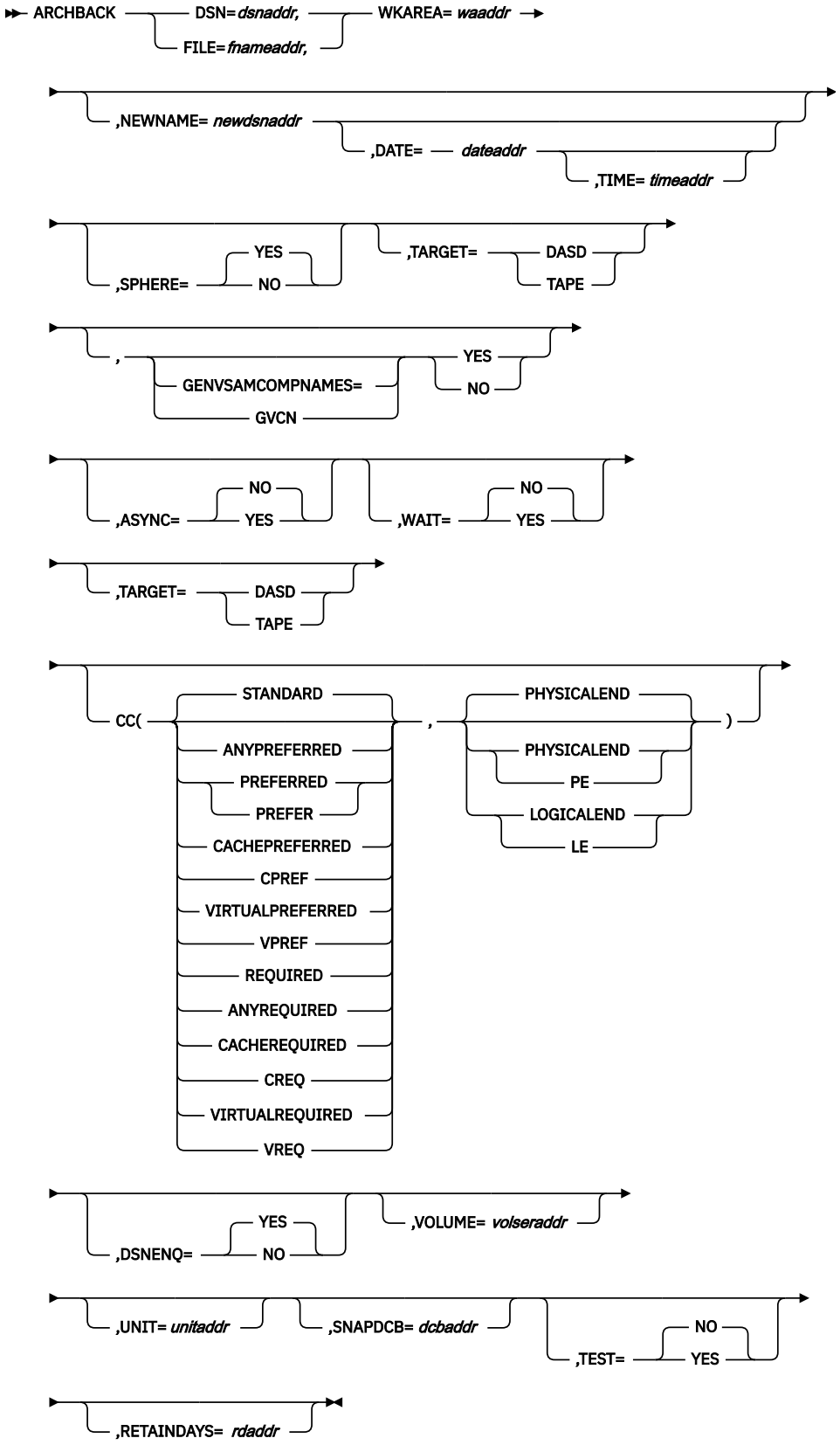
ARCHBACK: Backing up a specific data set

The ARCHBACK macro allows you to create a backup version of a specific data set. This macro can handle only one data set at a time. Consequently, the macro must be invoked for each data set processed. This macro also allows you to create a backup version of a specific UNIX file.

Note: All memory areas passed to DFSMShsm through the macro must be in 24-bit addressing mode and below the 16MB line.

Syntax

The following diagram presents the syntax of the ARCHBACK macro for SMS-managed data sets, non-SMS managed data sets, and UNIX files.



Required parameters

The following are the required parameters of the ARCHBACK macro:

DSN
specifies the address of a field that contains the fully qualified name of the data set to be processed. For *dsnaddr*, use the address of the 44-byte data area that contains the data set name. The data set name must be left-justified and padded with blanks. This data set can be either SMS-managed or non-SMS-managed.

FILE
specifies the address of a field that contains the full path of the requested UNIX file name. For *fnameaddr*, use the address of a structure where the first two bytes contain the length of the file name, and bytes 3-1025 contain the EBCDIC file name. This parameter is mutually exclusive with DSN. A backup of the file is taken regardless of whether the file has changed since the last backup date.

WKAREA
specifies the address of a 200-byte work area that will contain the information specified in the macro. For *waaddr*, substitute the address of the work area. The work area must be below the 16MB line. The work area serves as a temporary storage area for the macro processing and becomes available to you as soon as the macro returns to your program.

Optional parameters

The following are the optional parameters of the ARCHBACK macro:

DATE
specifies the address of a field which contains the backup date to assign to the new backup version that will be created via the ARCHBACK macro. DATE can ONLY be specified with NEWNAME or the invocation will fail. For *dateaddr*, substitute the address of a data area that contains the backup date. The field referenced by *dateaddr* must contain 7 characters in the form of *yyyyddd*. This parameter applies to both SMS-managed and non-SMS-managed data sets.

NEWNAME
specifies the data set name to assign to the new backup version that is created by specifying the BACKDS command. The NEWNAME parameter must be fully-qualified and in the standard data set name format.

When using the FILE parameter, specifies a pointer to a structure containing the new file path the UNIX file should be backed up with. This new file path must be a subset of the requested name that does not match the beginning of the requested name, and must end in a forward slash. The first two bytes of the structure contain the length of the new file path. The following 1023 bytes of the structure contain the ECBCDIC file path.

RETAINDAYS
specifies the number of days to retain a specific backup copy of a data set. For *rdaddr* substitute the address of the 5–byte data area that contains the RETAINDAYS value. RETAINDAYS specifies the minimum number of days (0–50000) that DFSMShsm retains the backup copy. If you specify 99999, the data set backup version never expires. Any value greater than 50000 (and other than 99999) causes a failure with an ARC1605I error message. A retain days value of 0 indicates that:

- the backup version might expire within the same day that it was created if EXPIREBV processing takes place,
- the backup version is kept as an active copy before roll-off occurs,
- the backup version is not managed as a retained copy.

SPHERE
specifies whether the AIX and PATH components of a VSAM data set will be backed up with the base cluster. SPHERE can ONLY be specified with NEWNAME or the invocation will fail. If NO is specified, a backup of the base cluster will be performed, but backup for any associated AIXs and/or PATHs will not be performed. If YES, the default, is specified, a backup of the entire VSAM SPHERE will be performed. The following restrictions apply when using the SPHERE parameter:

- No more than one PATH can be defined for the data set to back up, and no more than one PATH can be defined for the NEWNAME data set.

- No more than one AIX can exist for the data set to back up, and no more than one AIX can exist for the NEWNAME data set.

This parameter applies to both SMS-managed and non-SMS-managed data sets.

TIME
specifies the address of a field which contains the backup time to assign to the new backup version that will be created via the ARCHBACK macro. TIME can ONLY be specified when NEWNAME AND DATE are also specified. For *timeaddr*, substitute the address of a data area that contains the backup time. The field referenced by *timeaddr* must contain 6 characters in the form of *hhmmss*. For *hhmmss*, substitute the time to assign to the backup version. If the seconds are unknown, specify '00' for *ss*. If TIME is not specified, DFSMShsm will set a time of 120000. This parameter applies to both SMS-managed and non-SMS-managed data sets.

GVCN
overrides the SETSYS DSBACKUP(GENVSAMCOMPNAMES) setting. If GVCN=YES is specified, and the NEWNAME data set represents a VSAM base cluster that is either migrated or uncataloged, DFSMShsm will process the request, and default names will be assigned to the VSAM data and index components. If GVCN=NO is specified, and the NEWNAME data set represents a VSAM base cluster that is either migrated or uncataloged, the data set backup command will fail. DFSMShsm ignores the GVCN specification when the NEWNAME data set is cataloged to a volser other than MIGRAT. This parameter applies to both SMS-managed and non-SMS-managed data sets.

If the old component's name is equal to the old cluster name (plus any suffix), then the new component name will equal the new cluster name, plus the same suffix of the old component. For more information on how component (default) names are derived during rename processing see *z/OS DFSMSdss Storage Administration*.

ASYNC
specifies whether the special asynchronous backup processing is requested. The requesting application must be authorized by the authorized program facility (APF) to request the ASYNC option. If ASYNC=YES is specified, the WAIT parameter must also be specified as YES to allow the ECB to be posted back to the user when DFSMShsm completes the function. The default is NO. This parameter applies to both SMS-managed and non-SMS-managed data sets.

If YES is specified, storage for the generated MWE is obtained in the requester's private storage, and an event control block (ECB) address is returned in register 1 when control is returned to the requester. The application program is responsible for freeing this storage area; however, do not free it until the ECB is posted. You must use the ARCFMWE macro to free the storage area by supplying the ECB address. In cases where a zero value is returned for the ECB address, the request has failed and storage is not obtained for the MWE. Upon return from the ARCFMWE macro, the return code is in register 15 and a reason code is in register 0. If register 15 contains a return code of 400, 401, or 806, this error is from the completion of the ARCFMWE macro. All other return codes contained in register 15 are from the completion of the ARCHBACK macro. The last reported, nonzero return code is in register 15. For example:

If the return code from ARCHBACK is:	And the return code from ARCFMWE is:	Then the return code placed in register 15 is from:
Zero	Nonzero	ARCFMWE
Nonzero	Zero	ARCHBACK
Nonzero	Nonzero	ARCFMWE

WAIT
specifies whether you want the application to wait until DFSMShsm has processed this request. If you specify YES without ASYNC=YES, the application does not receive control back until DFSMShsm completes processing of the request. The default is NO. This parameter applies to both SMS-managed and non-SMS-managed data sets.

TARGET
specifies whether tape or DASD will be the target of the backup output data set. If you specify TAPE, the backup data set goes to tape. If you specify DASD, the backup data set goes to DASD. If you specify neither, DFSMShsm decides the target for this data set.

CC
specifies whether you want to use concurrent copy and which notification options that you want. If you specify PREFERRED, CACHEPREFERRED or VIRTUALPREFERRED, you have indicated that you want to use concurrent copy, if it is available. However, processing continues even if concurrent copy is not available. If you specify REQUIRED, CACHEREQUIRED or VIRTUALREQUIRED then a form of concurrent copy is a requirement, and the command fails if that form of concurrent copy is not available. If you specify STANDARD, you do not want to use concurrent copy. The default is STANDARD.

If you specify PHYSICALEND, you will receive notice when the physical end of the backup has completed. If you specify LOGICALEND, you will receive notice when the concurrent copy initialization has completed. The default is PHYSICALEND.

Note:

1. If you use the CC option with LE or PE, you must also specify the option WAIT=YES.
2. You can abbreviate PHYSICALEND and LOGICALEND as PE and LE, respectively. You can abbreviate PREFERRED as PREFER. You can abbreviate CACHEPREFERRED as CPREF, VIRTUALPREFERRED as VPREF, CACHEREQUIRED as CREQ, and VIRTUALREQUIRED as VREQ.

DSNENQ
specifies whether the data set is serialized by DFSMShsm during backup processing. If NO is used, the data set is not enqueued during backup processing, and the application program is responsible for data set serialization. The data set is not allocated and the SYSDSN resource is not obtained if NO is chosen. If YES is chosen, normal serialization occurs. The default is YES.

VOLUME
specifies the address of a field that contains the volume serial number of a volume that contains the requested uncataloged data set. For *volseraddr*, use the address of the six-character field that contains the volume serial number. The volume serial number must be left-justified and padded with blanks. This parameter applies only to non-SMS-managed data sets.

Note: Do not specify the VOLUME parameter if the data set to be backed up is a cataloged data set. If you specify the VOLUME parameter, you must also specify the UNIT parameter.

UNIT
specifies the address of a field that contains the unit type of the non-DFSMShsm-managed volume that contains the uncataloged data set. For *unitaddr*, use the address of the four-byte field that contains the UCB device type. For example, X'3010200E' is the UCB unit type for a 3380 device. For a table showing the supported unit types and UCBs, see Table 13 on page 196. This parameter applies only to non-SMS-managed data sets.

Note: Do not specify the UNIT parameter if the data set to be backed up is a cataloged data set. If you specify the UNIT parameter, you must also specify the VOLUME parameter.

SNAPDCB
specifies the address of an open DCB that can be used for SNAP macro processing. This feature is intended for problem determination. If you specify this parameter, review “Usage notes” on page 203. For *dcbaddr*, specify the address of an open DCB.

TEST
specifies whether to refrain from sending a request for service to DFSMShsm. If YES is specified, the service request is not sent. If NO is specified, a service request is sent to DFSMShsm. In both cases the parameters specified to the macro are checked for correctness. A 4*xx* return code results for invalid parameters. The default is NO.

Usage notes

1. If you issue ARCHBACK on a system prior to the current release, where new parameters were added to current release, a warning message is issued that informs you that DFSMShsm is processing the backup request, but ignoring all new parameters.
2. If a return code of 4*xx* is returned and SNAPDCB is specified, a SNAP macro is issued and the request made to DFSMShsm is dumped. The dumped storage area will include the data set name, volume serial number, and function requested.
3. If SNAPDCB and TEST=YES were specified, and there was an error flagged in the MWERC, then a SNAP macro is issued and the MWE is dumped.

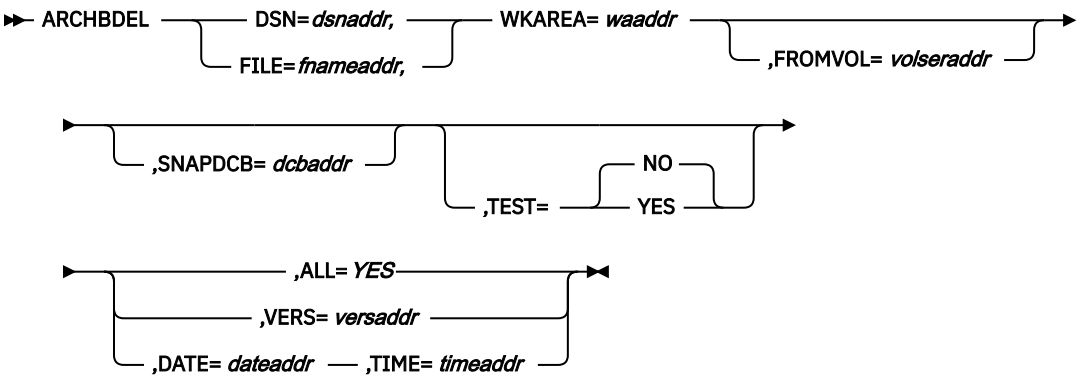
ARCHBDEL: Deleting a backed up version of data sets

The ARCHBDEL macro allows you to delete a backup version of a data set or UNIX file. This macro can handle only one data set at a time. Consequently, the macro must be invoked for each data set processed.

Note: All memory areas passed to DFSMShsm through the macro must be in 24-bit addressing mode and below the 16MB line.

Syntax

The following diagram presents the syntax of the ARCHBDEL macro for SMS-managed data sets, non-SMS-managed data sets, and UNIX files.



Required parameters

The following are the required parameters of the ARCHBDEL macro:

ALL
DATE
TIME
VERS
are mutually exclusive required parameters.

ALL
specifies that all backup versions are to be deleted, including both active and retained backup versions. ALL does not delete retired versions.

DATE
specifies the address of a field that contains the date when the backup version to be deleted was created. For *dateaddr*, specify the address of a data area that contains the backup date. The field referenced by *dateaddr* must contain 7 digits in the form of *yyyyddd*.

TIME
specifies the address of the field that contains the time when the backup version to be deleted was created. For *timeaddr*, specify the address of the data area that contains the backup time. The field referenced by *timeaddr* must contain 6 digits in the form of *hhmmss*.

VERS
specifies a list of versions to delete. Specify the address of a structure that contains a 2-byte number of entries on the list, followed by entries (2-bytes each) containing the version number (001–999) that you want to delete. You can use the ARCXTRCT macro to extract data for version numbers that currently exist. For more information on this macro, see "ARCXTRCT: Extracting data from DFSMShsm" on page 215. You cannot use the VERS keyword to delete retained backup copies.

DSN
specifies the address of a field that contains the fully qualified name of the data set to be processed. For *dsnaddr*, use the address of the 44-byte data area that contains the data set name. The data set name must be left-justified and padded with blanks. This data set can be either SMS-managed or non-SMS-managed.

FILE
specifies the address of a field that contains the full path of the UNIX file name to be processed. For fnameaddr, use the address of a structure where the first two bytes contain the length of the file name, and bytes 3-1025 contain the EBCDIC file name. This parameter is mutually exclusive with DSN.

WKAREA
specifies the address of a 200-byte work area that will contain the information specified in the macro. For *waaddr*, substitute the address of the work area. The work area must be below the 16MB line. The work area serves as a temporary storage area for the macro processing that is available to you as soon as the macro returns control to your program.

Optional parameters

The following are the optional parameters of the ARCHBDEL macro:

FROMVOL
specifies the address of a field that contains the volume from which uncataloged data sets were backed up. For *volseraddr*, substitute the address of the six-character field that contains the volume serial number. The volume serial number must be left-justified and padded with blanks. FROMVOL applies only to non-SMS-managed data sets that were uncataloged at the time they were backed up.

SNAPDCB
specifies the address of an open DCB that can be used for SNAP macro processing. This feature is intended for problem determination. If you specify this parameter, review "Usage notes" on page 204. For *dcbaddr*, specify the address of an open DCB.

TEST
specifies whether to refrain from sending a request for service to DFSMShsm. If YES is specified, the service request is not sent. If NO is specified, a service request is sent to DFSMShsm. In both cases, the parameters specified to the macro are checked for correctness. A 4*xx* return code results for invalid parameters. The default is NO.

Usage notes

1. You can use the DATE and TIME parameters to delete active and retained backup copies.
2. You can use the LIST command or ARCXTRCT macro to extract data from DFSMShsm to obtain the creation date and time for available backup versions.
3. If a return code of 4*xx* is returned and SNAPDCB is specified, a SNAP macro is issued and the request made to DFSMShsm is dumped. The dumped storage area will include the data set name, volume serial number, and function requested.
4. If SNAPDCB and TEST=YES were specified, and there was an error flagged in the MWERC, then a SNAP macro is issued and the MWE is dumped.

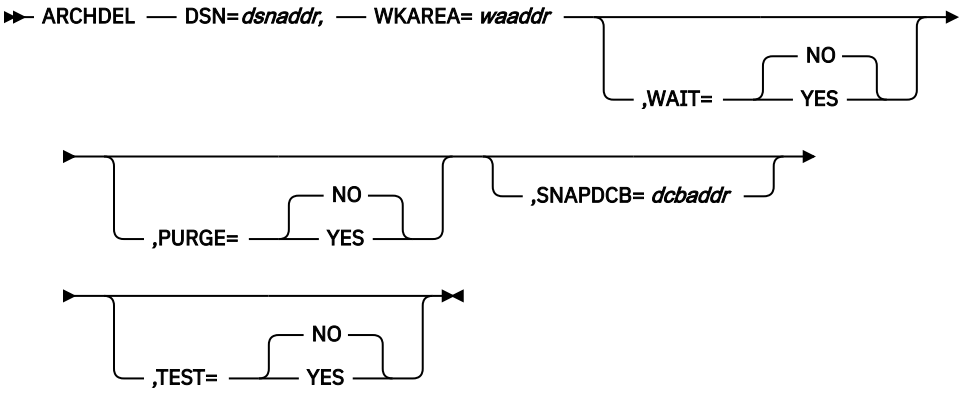
ARCHDEL: Deleting migrated data sets

The ARCHDEL macro allows you to delete a migrated data set. This macro can handle only one data set at a time. Consequently, the macro must be invoked for each data set processed.

Note: All memory areas passed to DFSMShsm through the macro must be in 24-bit addressing mode and below the 16MB line.

Syntax

The following diagram presents the syntax of the ARCHDEL macro for both SMS-managed and non-SMS-managed data sets:



Required parameters

The following are the required parameters of the ARCHDEL macro:

DSN
specifies the address of a field that contains the fully qualified name of the data set to be processed. For *dsnaddr*, use the address of the 44-byte data area that contains the data set name. The data set name must be left-justified and padded with blanks. This data set can be either SMS-managed or non-SMS-managed.

WKAREA
specifies the address of a 200-byte work area that will contain the information specified in the macro. For *waaddr*, substitute the address of the work area. The work area must be below the 16MB line. The work area serves as a temporary storage area for the macro processing that becomes available to you as soon as DFSMShsm returns control to your program.

Optional parameters

The following are the optional parameters of the ARCHDEL macro:

WAIT
specifies whether you want the application to wait until DFSMShsm has processed this request. If YES is specified, the application waits until DFSMShsm completes processing of the request. The default is NO. This parameter applies to both SMS-managed and non-SMS-managed data sets.

PURGE
specifies whether or not the data set is to be deleted even though the expiration date has not been reached. If YES is specified, the data set is deleted. The default is NO. This parameter applies to both SMS-managed and non-SMS-managed data sets.

SNAPDCB
specifies the address of an open DCB that can be used for SNAP macro processing. This feature is intended for problem determination. If you specify this parameter, review "Usage notes" on page 206. For *dcbaddr*, specify the address of an open DCB.

TEST
specifies whether to refrain from sending a request for service to DFSMShsm. If YES is specified, the service request is not sent. If NO is specified, a service request is sent to DFSMShsm. In both cases the parameters of the macro are checked for correctness. A 4*xx* return code results for invalid parameters. The default is NO.

Usage notes

1. If a return code of 4*xx* is returned and SNAPDCB is specified, a SNAP macro is issued and the request made to DFSMShsm is dumped. The dumped storage area will include the data set name, volume serial number, and function requested.
2. If SNAPDCB and TEST=YES were specified, and there was an error flagged in the MWERC, then a SNAP macro is issued and the MWE is dumped.

ARCHMIG: Migrating data sets

The ARCHMIG macro allows you to migrate a data set, and in the case of an SMS-managed data set:

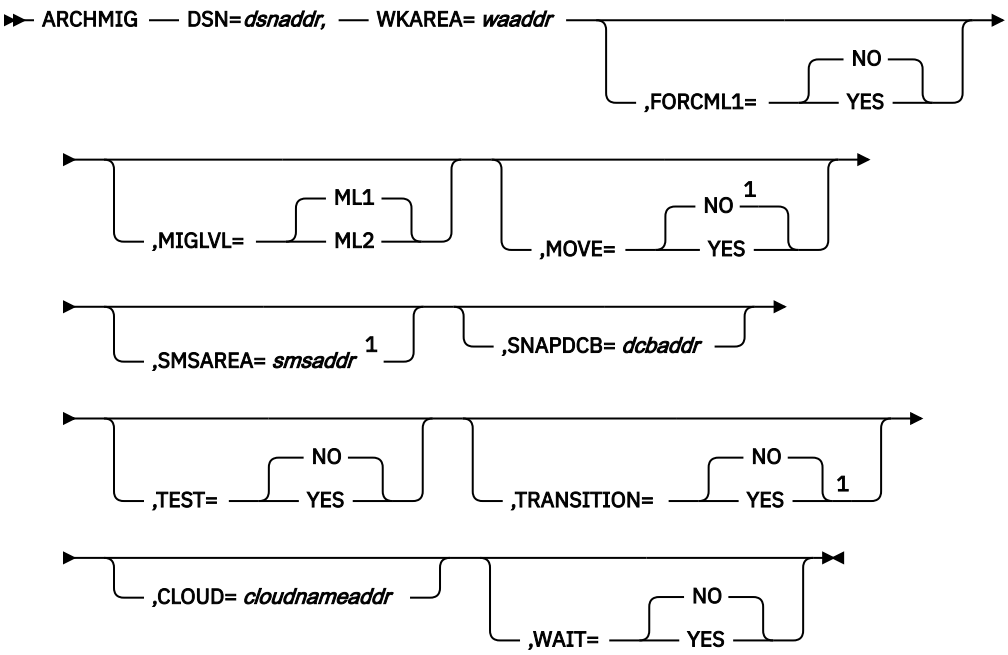
- perform class transition and optionally specify the address of a data area containing SMS parameters for class transition processing
- or specify that the data set that is to go through moving processing.

This macro can handle only one data set at a time. Therefore, the macro must be invoked for each data set processed.

Note: All memory areas that are passed to DFSMShsm through the macro must be in 24-bit addressing mode and below the 16MB line.

Syntax

The following diagram presents the syntax of the ARCHMIG macro for both SMS-managed and non-SMS-managed data sets:



Notes:

[1] MOVE, SMSAREA, and TRANSITION apply only to SMS-managed data sets.

Required parameters

The following are the required parameters of the ARCHMIG macro:

DSN
specifies the address of a field containing the fully qualified name of the data set to be processed. For *dsnaddr*, use the address of the 44-byte data area that contains the data set name. The data set name must be left-justified and padded with blanks. This data set can be either SMS-managed or non-SMS-managed.

WKAREA
specifies the address of a 200-byte work area that will contain the information specified in the macro. For *waaddr*, substitute the address of the work area. The work area must be below the 16MB line. The work area serves as a temporary storage area for the macro processing and becomes available to you as soon as the macro returns control to your program.

Optional parameters

The following are the optional parameters of the ARCHMIG macro:

CLOUD
specifies the address of a 30-byte area containing the name of an SMS network connection construct. The data is migrated to the cloud storage defined in the SMS network connection construct, and overrides any other specification in the management class of the data set, other than eligibility for migration. Non-SMS managed data sets are not eligible for migration to cloud storage. The name must be left-aligned and padded with blanks. The CLOUD keyword cannot be specified with MIGLVL.

FORCML1
specifies whether to override the management class parameter of ML1DAYS(0) and force this data set to migrate to ML1. If YES is specified, the data set is migrated to ML1 without compaction. If NO is specified, the management class criteria are used to determine whether the data set is to migrate to ML1 or ML2. The default is NO.

MIGLVL
specifies the migration level, ML1 or ML2, to which you want to migrate the data set. The default is ML1. This parameter applies to both SMS-managed and non-SMS-managed data sets.

MOVE
specifies that the data set is to go through moving processing. MOVE is mutually exclusive with the migration-related parameters (FORCML1, MIGLVL, and TRANSITION) and processed only for the SMS-managed data sets. The default value is NO.

SMSAREA
specifies the address of data area containing the optional SMS parameters for class transition processing. If at least one SMS parameter is specified, then the specified value or values are used and the ACS routines are not called during class transition processing. The omitted values of management class, storage class, or storage group are taken from the data set's SMS network connection construct.

The format of SMS area:

```
MCLENGTH DS    H       MGMT Class name length
MCNAME   DS    CL30    MGMT Class name
SCLENGTH DS    H       STRG Class name length
SCNAME   DS    CL30    STRG Class name
STGLCNT  DS    AL1     Number of storage group list
         DS    CL3     Reserved
SGDEF    DS    0H      Storage group definition
SGLENGTH DS    H       Length of storage group name
SGNAME   DS    CL30    Name of storage group
```

Notes:

- If the management class or storage class is not specified, the name length must be zero.
- If the storage group list is not specified, the number of storage group lists must be zero.

SNAPDCB
specifies the address of an open DCB that can be used for SNAP macro processing. This feature is intended for problem determination. If you specify this parameter, review "Usage notes" on page 208. For *dcbaddr*, specify the address of an open DCB.

TEST
specifies whether to refrain from sending a request for service to DFSMShsm. If YES is specified, the service request is not sent. If NO is specified, a service request is sent to DFSMShsm. In both cases, the parameters that are specified on the macro are checked for correctness. A 4*xx* return code results for invalid parameters. The default is NO.

TRANSITION
specifies whether the data set is to go through transition processing. TRANSITION is mutually exclusive with the migration-related parameters (FORCML1=YES and MIGLVL=ML2) and is valid only for SMS-managed data sets. The default value is NO.

WAIT
specifies whether you want the application to wait until DFSMShsm has processed this request. If YES is specified, the application waits until DFSMShsm completes processing of the request. The default is NO. This parameter applies to both SMS-managed and non-SMS-managed data sets.

Usage notes

1. If a return code of 4*xx* is returned and SNAPDCB is specified, a SNAP macro is issued and the request made to DFSMShsm is dumped. The dumped storage area will include the data set name, volume serial number, and function requested.
2. If SNAPDCB and TEST=YES were specified, and there was an error flagged in the MWERC, then a SNAP macro is issued and the MWE is dumped.

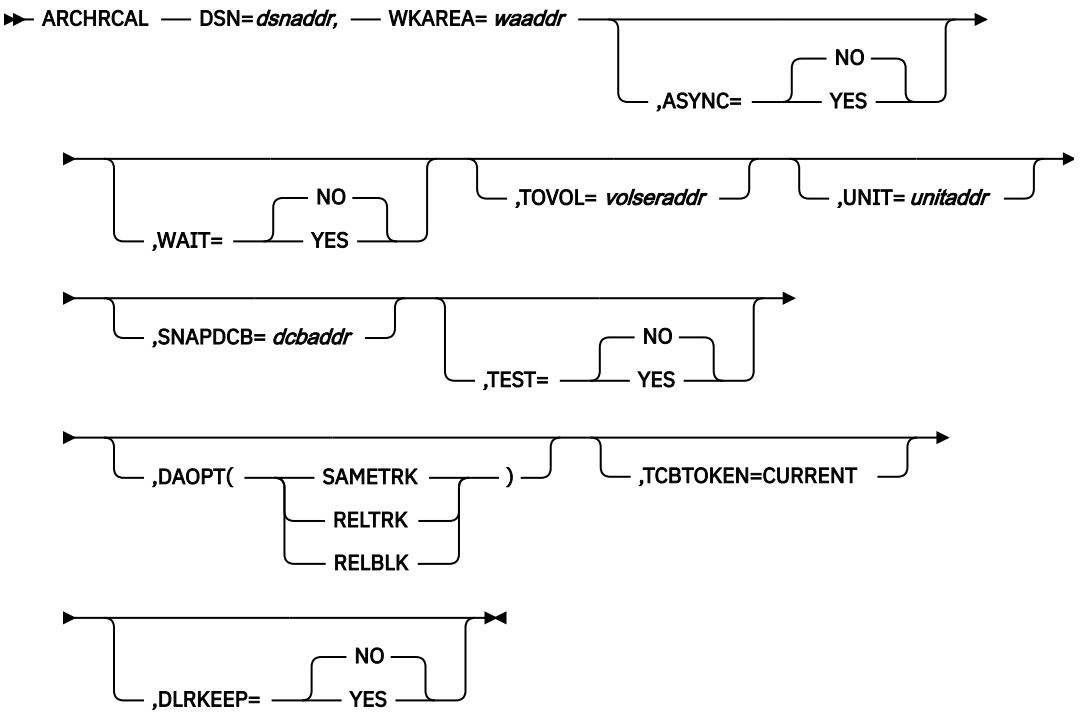
ARCHRCAL: Recalling a data set

The ARCHRCAL macro allows you to recall a migrated data set. This macro can handle only one data set at a time. Consequently, the macro must be invoked for each data set processed.

Note: All memory areas passed to DFSMShsm through the macro must be in 24-bit addressing mode and below the 16MB line.

Syntax

The following diagram presents the syntax of the ARCHRCAL command for both SMS-managed and non-SMS-managed data sets:



Required parameters

The following are the required parameters of the ARCHRCAL macro:

DSN
specifies the address of a field containing the fully qualified name of the data set to be processed. For *dsnaddr*, use the address of the 44-byte data area that contains the data set name. The data set name must be left-justified and padded with blanks. This data set can be either SMS-managed or non-SMS-managed.

WKAREA
specifies the address of a 200-byte work area that will contain the information specified in the macro. For *waaddr*, substitute the address of the work area. The work area must be below the 16MB line. The work area serves as a temporary storage area for the macro processing and becomes available to you as soon as the macro returns control to your program.

Optional parameters

The following are the optional parameters of the ARCHRCAL macro:

ASYNC
specifies whether the special asynchronous recall processing is requested. The requesting application must be authorized by the authorized program facility (APF) to request the ASYNC option. If ASYNC=YES is specified, the WAIT parameter must also be specified as YES to allow the ECB to be posted back to the user when DFSMShsm completes the function. The default is NO. This parameter applies to both SMS-managed and non-SMS-managed data sets.

If YES is specified, storage for the generated MWE is obtained in the requester's private storage, and an event control block (ECB) address is returned in register 1 when control is returned to the requester. The application program is responsible for freeing this storage area; however, it must not be freed until the ECB is posted. The ARCFMWE macro must be used to free the storage area by supplying the ECB address. In cases where a zero value is returned for the ECB address, the request has failed and storage is not obtained for the MWE. Upon return from the ARCFMWE macro, the return code is in register 15 and a reason code is in register 0. If register 15 contains a return code of 400, 401, or 806, this error is reported from the completion of the ARCFMWE macro. All other return codes

contained in register 15 are from the completion of the ARCHRCAL macro. The last reported, nonzero return code is placed in register 15. For example:

If the return code from ARCHRCAL is:	And the return code from ARCFMWE is:	Then the return code placed in register 15 is from:
Zero	Nonzero	ARCFMWE
Nonzero	Zero	ARCHRCAL
Nonzero	Nonzero	ARCFMWE

DLRKEEP
specifies whether or not to keep the date-last-referenced (DLR) after recall of the data set. If YES is specified, the DLR after the recall remains the same and the date is not updated to the current recall date. If NO is specified, the DLR after recall is equal to the recall date. The default is NO.

WAIT
specifies whether you want the application to wait until DFSMShsm has processed this request. If YES is specified, the application waits until DFSMShsm completes processing of the request. The default is NO. This parameter applies to both SMS-managed and non-SMS-managed data sets.

TOVOL
specifies the address of a field containing the volume serial number of the volume to which the data set is recalled. For *volseraddr*, substitute the address of the six-byte area that contains the specified volume serial number. The volume serial number must be left-justified and padded with blanks. SMS-managed data sets are recalled to the volume determined by SMS.

Note: When the TOVOL parameter is used, the UNIT parameter must also be used.

UNIT
specifies the address of a field containing the unit type of the volume to which the data set is to be recalled. For *unitaddr*, use the address of the four-byte field that contains the UCB device type. For example, X'3010200F' is the UCB unit type for a 3390 device. For a table presenting the supported unit type and UCBs, see Table 13 on page 196. If the data set is SMS-managed, SMS determines the unit type.

Note: When the UNIT parameter is used, the TOVOL parameter must also be used.

SNAPDCB
specifies the address of an open DCB that can be used for SNAP macro processing. This feature is intended for problem determination. If you specify this parameter, review "Usage notes" on page 211. For *dcbaddr*, specify the address of an open DCB.

TEST
specifies whether to refrain from sending a request for service to DFSMShsm. If YES is specified the service request is not sent. If NO is specified, a service request is sent to DFSMShsm. In both cases the parameters specified to the macro are checked for correctness. A 4*xx* return code results for invalid parameters. The default is NO.

DAOPT
specifies the type of data set accessing required after the recall of a direct access data set. This, in turn, implies the allowable target volume DASD types. The recalled data set must be non-SMS-managed. For details on DAOPT see "DAOPTION: Selecting target volume track length" on page 164.

TCBTOKEN=CURRENT
specifies that the current TCB TOKEN will be used to validate the ECB on POST. If not specified, the JOBSTEP TCB TOKEN will be used.

Note: When the TCBTOKEN=CURRENT parameter is used, both the ASYNC=YES and WAIT=YES parameters must also be used.

Usage notes

1. If a return code of 4*xx* is returned and SNAPDCB is specified, a SNAP macro is issued and the request made to DFSMShsm is dumped. The dumped storage area will include the data set name, volume serial number, and function requested.
2. If SNAPDCB and TEST=YES were specified, and there was an error flagged in the MWERC, then a SNAP macro is issued and the MWE is dumped.

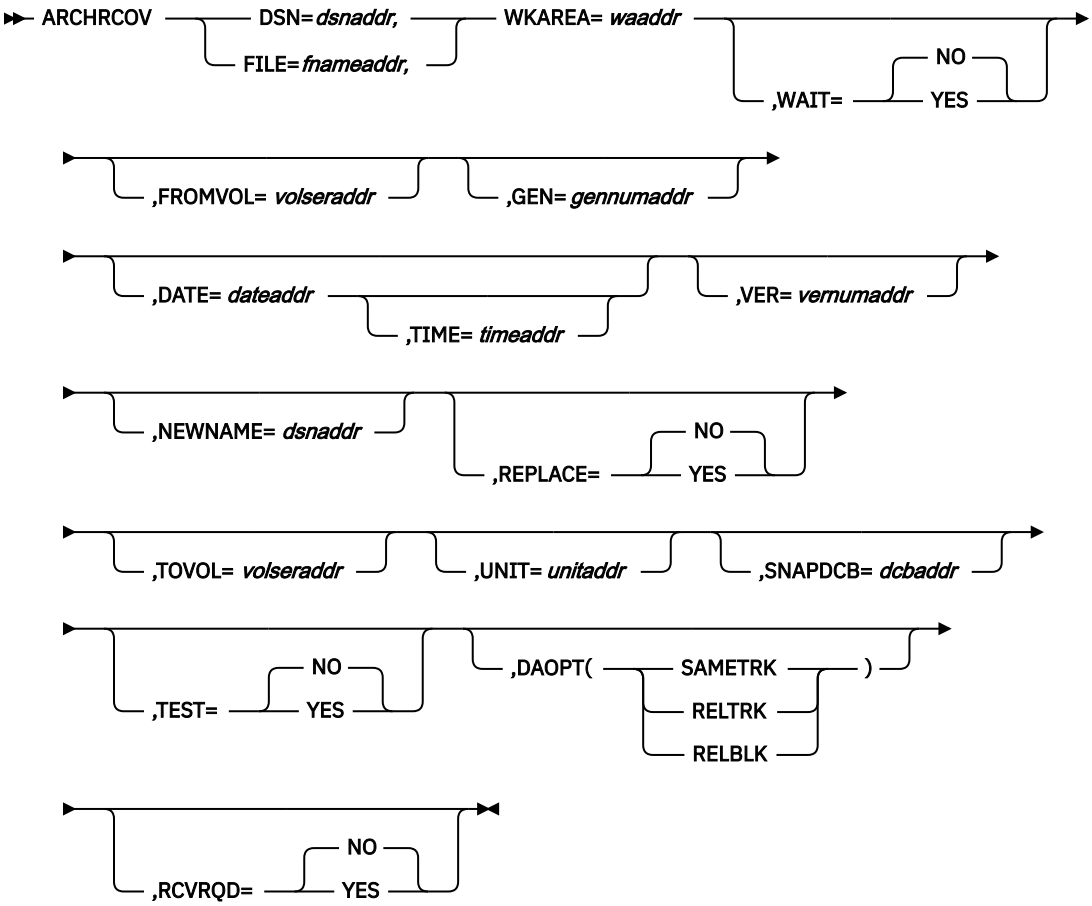
ARCHRCOV: Recovering a data set

The ARCHRCOV macro allows you to recover a backup version or a dump copy of a data set, or a backup version of a UNIX file. This macro can handle only one data set at a time. Consequently, the macro must be invoked for each data set processed.

Note: All memory areas passed to DFSMShsm through the macro must be in 24-bit addressing mode and below the 16MB line.

Syntax

The following diagram presents the syntax of the ARCHRCOV macro for SMS-managed data sets, non-SMS-managed data sets, and UNIX files.



Required parameters

The following are the required parameters of the ARCHRCOV macro:

DSN
specifies the address of a field containing the fully qualified name of the data set to be processed. For *dsnaddr*, use the address of the 44-byte data area that contains the data set name. The data set name must be left-justified and padded with blanks. This data set can be either SMS-managed or non-SMS-managed.

FILE
specifies the address of a field that contains the full path of the UNIX file name to be processed. For *fnameaddr*, use the address of a structure where the first two bytes contain the length of the file name, and bytes 3-1025 contain the EBCDIC file name. This parameter is mutually exclusive with DSN.

WKAREA
specifies the address of a 200-byte work area that will contain the information specified in the macro. For *waaddr*, substitute the address of the work area. The work area must be below the 16MB line. The work area serves as a temporary storage area for the macro processing and becomes available to you as soon as the macro returns control to your program.

Optional parameters

The following are the optional parameters of the ARCHRCOV macro:

DAOPT
specifies the type of data set accessing required after the recover of a direct access data set. This, in turn, implies the allowable target volume DASD types. The recovered data set must be non-SMS-managed. For details on DAOPT, see "DAOPTION: Selecting target volume track length" on page 176.

DATE
specifies the address of a field containing the date of creation of a backup version number that you wish to recover. For *dateaddr*, substitute the address of a field containing the date of the backup version you wish to recover in one of the following forms:

- If the system date is after 1999, that field must contain 7 digits in the format *yyyyddd*.
- If the system date is before 1 January 2000, that field may contain either (a) 7 digits in the format *yyyyddd*, where the first two digits are 19, 20, or 21; or (b) 5 digits in the format *yyddd*, where the first two digits (prefixed by 19 to form year 19*yy*) must be greater than 21.

The backup version that is recovered is the newest one created on or before the specified date. GEN and DATE are mutually exclusive parameters. You can use the ARCXTRCT macro in "ARCXTRCT: Extracting data from DFSMShsm" on page 215 to obtain this backup version number creation date for backup versions that exist. This parameter applies to both SMS-managed and non-SMS-managed data sets.

FROMVOL
specifies the address of a field containing the volume serial number of the volume from which uncataloged data sets were backed up. For *volseraddr*, substitute the address of the six-character field that contains the volume serial number. The volume serial number must be left-justified and padded with blanks. FROMVOL applies only to non-SMS-managed data sets that were uncataloged at the time they were backed up.

GEN
specifies the address of a field containing the relative generation number that you wish to recover. For *gennumaddr*, substitute the address of a four-byte field that contains the fullword (binary) generation number to be recovered. You can use the ARCXTRCT macro in "ARCXTRCT: Extracting data from DFSMShsm" on page 215 to extract data for the generation numbers that currently exist. This parameter applies to both SMS-managed and non-SMS-managed data sets. GEN applies only to active backup copies. You cannot use GEN with retained copies.

NEWNAME
specifies the address of a field containing a new name for the recovered data set. For *dsnaddr*, substitute the address of the 44-byte area that contains the data set name. The data set name must be left-justified and padded with blanks. This parameter applies to both SMS-managed and non-SMS-managed data sets.

RCVRQD
specifies whether to set the recovery required indicator on in the target data set. This parameter should only be used by forward recovery applications. The default is NO. This parameter applies to both SMS-managed and non-SMS-managed data sets.

REPLACE
specifies whether an existing data set with the same name is to be replaced. The default is NO. This parameter applies to both SMS-managed and non-SMS-managed data sets.

SNAPDCB
specifies the address of an open DCB that can be used for SNAP macro processing. This feature is intended for problem determination. If you specify this parameter, review "Usage notes" on page 214. For *dcbaddr*, specify the address of an open DCB.

TEST
specifies whether to refrain from sending a request for service to DFSMShsm. If YES is specified, the service request is not sent. If NO is specified, a service request is sent to DFSMShsm. In both cases the parameters specified for the macro are checked for correctness. A 4*xx* return code results for invalid parameters. The default is NO.

TIME
specifies the address of the field containing the creation time of the backup version that you want to recover. For *timeaddr*, substitute the address of the field that contains the time that the backup version was created in following form: *hhmmss*, where the first two digits are hours, the next two digits are minutes, and the last two digits are seconds. The range for hours is 00–23 and the range for minutes and seconds is 00–59. If a backup copy with the specified data and time does not exist, the request fails. You can use the ARCXTRCT macro to obtain the creation date and time of the backup version of an existing data set. TIME applies to both SMS-managed and non-SMS-managed data sets.

Note: If you specify TIME, you must specify DATE. If you specify TIME without DATE, the ARCHRCOV macro fails.

TOVOL
specifies the address of a field containing the volume serial number of the volume to which the data set is recovered. For *volseraddr*, substitute the address of the six-byte area that contains the specified volume serial number. The volume serial number must be left-justified and padded with blanks. This parameter only applies to non-SMS-managed data sets.

Note: When the TOVOL parameter is specified, the UNIT parameter must also be specified.

UNIT
specifies the address of a field containing the unit type of the volume to which the data set is to be recovered. For *unitaddr*, use the address of the four-byte field that contains the UCB device type. For example, X'3010200F' is the UCB unit type for a 3390 device. For a table presenting the supported unit types and UCBs, see Table 13 on page 196. This parameter only applies to non-SMS-managed data sets.

Note: When the UNIT parameter is specified, the TOVOL parameter must also be specified.

VER
specifies the address of a field containing the unique version number of the particular active backed up data set that you would like to recover. For *vernumaddr*, substitute the address of a four-byte field that contains the fullword (binary) version number for the specified backup version. If DFSMShsm is unable to find the specified backup version, the recover fails and message ARC1128I is issued. This parameter applies to both SMS-managed and non-SMS-managed data sets. VER applies only to active backup copies. You cannot use VER with retained copies.

WAIT
specifies whether you want the application to wait until DFSMShsm has processed this request. If YES is specified, the application waits until DFSMShsm completes processing of the request. The default is NO. This parameter applies to both SMS-managed and non-SMS-managed data sets.

Usage notes

1. If a return code of 4*xx* is returned and SNAPDCB is specified, a SNAP macro is issued and the request made to DFSMShsm is dumped. The dumped storage area will include the data set name, volume serial number, and function requested.
2. If SNAPDCB and TEST=YES were specified, and there was an error flagged in the MWERC, then a SNAP macro is issued and the MWE is dumped.

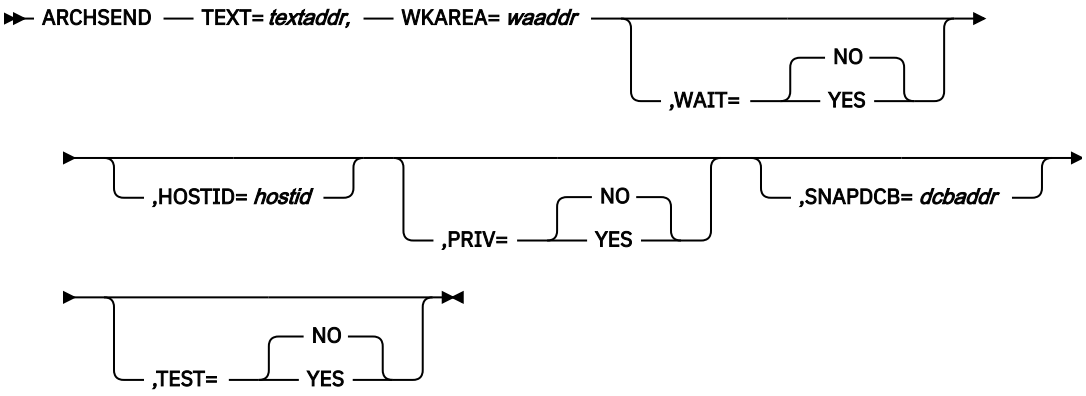
ARCHSEND: Sending a command to DFSMShsm

The ARCHSEND macro allows you to send authorized user commands to DFSMShsm. You must be a DFSMShsm-authorized user to use this macro.

Note: All memory areas passed to DFSMShsm through the macro must be in 24-bit addressing mode and below the 16MB line.

Syntax

The following diagram presents the syntax of the ARCHSEND macro:



Required parameters

The following are the required parameters of the ARCHSEND macro:

TEXT
specifies the address of a field containing the command text that is to be passed to DFSMShsm by the HSENDCMD command. For *textaddr*, substitute the address of a variable length area (on a halfword boundary) that contains a halfword of the length of the text string (including the halfword length field), followed by the text string of the command to be passed to DFSMShsm.

WKAREA
specifies the address of a 200-byte work area that will contain the information specified in the macro. For *waaddr*, substitute the address of the work area.

Optional parameters

The following are the optional parameters of the ARCHSEND macro:

WAIT
specifies whether you want the application to wait until DFSMShsm has processed this request. If YES is specified, the application waits until DFSMShsm completes processing of the request. The default is NO.

HOSTID
is a one-character host identifier that is used to distinguish which active DFSMShsm (main or auxiliary) host is to receive the command. The specified host ID must match one of the currently active DFSMShsm host IDs. For requirements of the *hostid* value, see the topic about startup procedure keywords in *z/OS DFSMShsm Implementation and Customization Guide*.

SNAPDCB
specifies the address of an open DCB that can be used for SNAP macro processing. This feature is intended for problem determination. If you specify this parameter, review "Usage notes" on page 215. For *dcbaddr*, specify the address of an open DCB.

TEST
specifies whether to refrain from sending a request for service to DFSMShsm. If YES is specified the service request is not sent. If NO is specified, a service request is sent to DFSMShsm. In both cases the parameters are checked for correctness. A 4*xx* return code will result for invalid parameters. The default is NO.

PRIV
specifies a reserved keyword for the internal interface from the CATALOG function to DFSMShsm. If YES is specified, the interface is used. If NO is specified, the interface is not used. The default is NO.

Usage notes

1. If a return code of 4*xx* is returned and SNAPDCB is specified, a SNAP macro is issued and the request made to DFSMShsm is dumped. The dumped storage area will include the data set name, volume serial number, and function requested.
2. If SNAPDCB and TEST=YES were specified, and there was an error flagged in the MWERC, then a SNAP macro is issued and the MWE is dumped.

ARCXTRCT: Extracting data from DFSMShsm

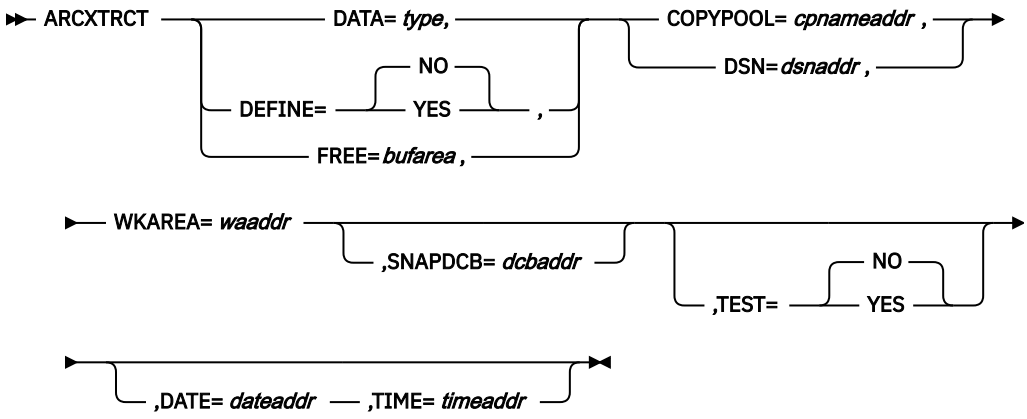
The ARCXTRCT macro allows you to extract DFSMShsm data within a program. The data can be used to issue other DFSMShsm user macros.

Notes:

1. All memory areas passed to DFSMShsm through the macro must be in 24-bit addressing mode and below the 16 MB line.
2. The Common Recall Queue (CRQ) structure size can reach 15360 K size. Therefore, when the macro is issued with DATA=CRQREAD parameter, the memory that is passed back to the macro issuer must be in 31-bit addressing mode and above the 16MB line.

Syntax

The following diagram presents the syntax of the ARCXTRCT macro.



Required parameters

There are three usage forms for ARCXTRCT, specified by DATA=*type*, DEFINE=YES, and FREE=*bufarea*, respectively. These are mutually exclusive keywords; only one can be specified per invocation. The three usage forms are described as follows:

DATA: Extracting the data into an extract buffer

The DATA keyword determines the type of data to be extracted. The following values, COPYPOOL, BUVERS, and CRQREAD, are mutually exclusive values for *type*.

- **COPYPOOL:** The COPYPOOL parameter is used to extract data about each backup version of the specified copy pool. The extract buffer is a header that is followed by one or more entries describing each valid backup version. There can be up to 85 versions that are returned for a single copy pool. Data that is associated with each copy is returned.

  Requirement: When you specify DATA=COPYPOOL, you must specify the COPYPOOL=*cpnameaddr* keyword.

  The COPYPOOL keyword specifies the pointer to the name of the copy pool for which a list of backup versions is to be returned. For *cpnameaddr*, substitute the address of the copy pool name. The area pointed to by *cpnameaddr* must be a 30-byte area containing the copy pool name, left-aligned, and padded with blanks.

  Table 14 on page 216 shows the layout for the extract header.

Table 14. Extract Header Layout

Offsets		Type	Bytes	Name	Description
Dec	Hex				
0	(0)	Character	8	XHEADER	Extract area header.
0	(0)	Fixed	1	XSUBPOOL	Extract Data subpool.
1	(1)	Fixed	3	XLENGTH	Extract area size (total).
4	(4)	Fixed	2	XENTRIES	Number of entries that follow.
6	(6)	Fixed	2	XENTRLEN	Size of each entry.

Table 15 on page 217 shows the layout of each DATA=COPYPOOL backup version entry.

Table 15. Entry for DATA=COPYPOOL backup version

Offsets		Type	Bytes	Name	Description
Dec	**Hex**				
0	(0)	Character	108	CPENT	Entry for copy pool backup version.
0	(0)	Fixed	4	CPVER	Version number 001-999.
4	(4)	Fixed	4	CPGEN	Generation number 00-84.
8	(8)	Bitstring	2	CPFLAG	Flags.
		`1... ....`		CPFVALID	When set to 1, the DASD copy is valid. When set to 0, the version is in a state ineligible for recover processing. It might fail or the copy pool is formatted for use in a z/OS V1R8 or later environment.
		`.1.. ....`		CPFNVTOC	When set to 1, NOVTOCENQ was specified.
		`..1. ....`		CPFRECVR	When set to 1, DASD copy is recoverable.
		`...1 ....`		CPFDMPRC	When set to 1, all required dump copies are complete.
		`.... 1...`		CPFDMPAC	When set to 1, all dump copies are complete.
		`.... .1..`		CPFDMPPC	When set to 1, dump is partial.
		`.... ..1.`		CPFINC	When set to 1, the copy pool version is incremental.
		`.... ...1`		CPFINCMP	When set to 1, copy pool recovery is incomplete.
		`1... ....`		CPFCATIN	When set to 1, catalog information was captured.
		`.1.. ....`		CPFFCCG	When set to 1, copy pool backup version was created with the FlashCopy consistency group option.
		`..xx xxxx`		*	Reserved.
10	(A)	Character	4	CPDATE	Date when backup made. Format: YYYYDDDF
14	(E)	Character	4	CPTIME	Time when backup made. Format: HHMMSSTH
18	(12)	Character	40	CPTOKEN	Token.
58	(3A)	Character	9(5)	CPDINFO	Array containing dump class info.

Table 15. Entry for DATA=COPYPOOL backup version (continued)					
Offsets		**Type**	**Bytes**	**Name**	**Description**
Dec	**Hex**				
58	(3A)	Character	8	CPDCNAME	Dump class name.
66	(42)	Bitstring	1	CPDFLAGS	Flags for this dump class.
		`1...  ....`		CPDCMPLT	When set to 1, the dump for this dump class is complete.
		`.1..  ....`		CPDREQD	When set to 1, a dump class is required.
		`..1.  ....`		CPDCLOUD	When set to 1, the dump for this dump class resides in cloud object storage.
		`...x  ....`		*	Reserved.
103	(67)	Character	5	*	Reserved.

- **BUVERS:** The BUVERS parameter is used to extract data about the backup versions for an individual data set. The extract buffer is a header that is followed by one or more entries describing each valid backup version. There can be up to 100 versions that are returned for a single data set. Because uncataloged data sets can have the same name as cataloged data sets, a bit indicates whether this version is for the cataloged or uncataloged data set.

  The DATA=BUVERS information returned can be used for ARCHBDEL and ARCHRCOV macros. It is the caller's responsibility to free the extract buffer when no longer required. See the FREE=*keyword* description below.

  Requirement: When you specify BUVERS, you must specify the DSN=*dsnaddr* keyword.

  Table 14 on page 216 shows the layout for the extract header. and Table 16 on page 218 shows the layout of each DATA=BUVERS backup version entry.

Table 16. Entry for DATA=BUVERS backup version					
Offsets		**Type**	**Bytes**	**Name**	**Description**
Dec	**Hex**				
0	(0)	Character	108	BUVEENT	Entry for backup version.
0	(0)	Fixed	4	BUVEVER	Version number 000-999. (Version=000 indicates the version was created with the NEWNAME and DATE keywords).
4	(4)	Fixed	4	BUVEGEN	Generation number 00-84.
8	(8)	Character	4	BUVEDATE	Date when backup made. Format: YYYYDDDF
12	(C)	Character	4	BUVETIME	Time when backup made. Format: HHMMSSTH
16	(10)	Character	16	BUVEOWNR	Resource owner.
32	(20)	Character	8	BUVEDATA	Resource data.
40	(28)	Bitstring	4	BUVEFLAG	Status flags.

Table 16. Entry for DATA=BUVERS backup version (continued)

Offsets		Type	Bytes	Name	Description
Dec	Hex				
		1...		BUVEFBWO	When set to 1, backup-while-open candidate.
		.1..		BUVENONQ	When set to 1, no enqueue attempted, since DFSMShsm directed not to.
		..1.		BUVEFCAT	When set to 1, cataloged when backup made.
		...1		BUVEFRRR	When set to 1, RLS recovery required indicator.
		.... 1...		BUVENQN1	When set to 1, enqueue attempted, but failed.
		.... .1..		BUVENQN2	When set to 1, enqueue attempted, backup retried, enqueue failed again.
		.... ..1.		BUVENRCM	When set to 1, notify recovery control manager.
		1		BUVEFNN	When set to 1, NEWNAME specified at time of backup.
		1...		BUVEFSNO	When set to 1, the backup version was created using the SPHERE(NO) option.
		.1..		BUVEFGVN	When set to 1, the backup version was created using the GENVSAMCOMPNAMES option.
		..1.		BUVEMAS	When set to 1, more entries available
		...1		BUVEFRD	When set to 1, RETAINDAYS was specified at the time of backup
		.... 1...		BUFEFNEX	When set to 1, this version never expires. Only valid when BUVEFRD is set to 1.
		..xx xxxx		*	Reserved.
44	(2C)	Character	8	BUVERLSG	RLS recovery timestamp (GMT).
52	(34)	Character	8	BUVERLSL	RLS recovery timestamp local.
60	(3C)	Fixed	2	BUVERDYS	RETAINDAYS value, only valid when BUVEFRD is set to 1 and BUVEFNEX is set to 0.
62	(3E)	Character	46	*	Reserved.

- **CRQREAD:** The CRQREAD parameter is used to extract data about the Common Recall Queue (CRQ). Register 15 contains the return code and register 0 contains the reason code. Register 1 contains the address of the extract area. The extract area is a header describing the five CRQ arrays that follow header:

  Control List (CL), Tape List(TL), Primary Unselected Request (PUR) List, Secondary Unselected Request (SUR) List, and Selected Request (SR) List

  Each CRQ list is an array of the corresponding CRQ list entries. The header contains the control information about the CRQ lists arrays. For example,

  – The address of each CRQ list array.
  – The number of entries in each CRQ list array.
  – The number of bytes in each CRQ list array.
  – The total number of bytes of the extracted area.

  Each entry of each CRQ list contains the length of this entry. This length is needed to get the address of the next entry of the array.

  Requirement: When you specify CRQREAD, you must specify the SNAPDCB=*addr* keyword.

  Table 17 on page 220 shows the layout for the extract header.

Table 17. Extract Header Layout

Offsets		Type	Bytes	Name	Description
Dec	Hex				
0	(0)	Structure	72	CRQ	CRQ area header.
0	(0)	Fixed	4	CRQ_HDR#	CRQ header size.
4	(4)	Fixed	4	CRQ_C@	Control list ptr.
8	(8)	Fixed	4	CRQ_T@	Tape list ptr.
12	(C)	Fixed	4	CRQ_PUR@	PUR list ptr.
16	(10)	Fixed	4	CRQ_SUR@	SUR list ptr.
20	(14)	Fixed	4	CRQ_SR@	SR list ptr.
24	(18)	Fixed	4	CRQ_C_TOT	Number of CL entries.
28	(1C)	Fixed	4	CRQ_T_TOT	Number of TL entries.
32	(20)	Fixed	4	CRQ_PUR_TOT	Number of PURL entries.
36	(24)	Fixed	4	CRQ_SUR_TOT	Number of SURL entries.
40	(28)	Fixed	4	CRQ_SR_TOT	Number of SRL entries.
44	(2C)	Fixed	4	CRQ_C#	Control list size.
48	(30)	Fixed	4	CRQ_T#	Tape list size.
52	(34)	Fixed	4	CRQ_PUR#	PUR list size.
56	(38)	Fixed	4	CRQ_SUR#	SUR list size.
60	(3C)	Fixed	4	CRQ_SR#	Selected reqst list size.
64	(40)	Fixed	4	CRQ_LEN	Total CRQ structure size.
68	(44)	Fixed	4	CRQ_SENT	Total bytes received.

Table 18 on page 221 shows the layout for the CRQ Control List entry.

Table 18. Entry for CRQ control list

Offsets		Type	Bytes	Name	Description
Dec	Hex				
0	(0)	Structure	128	CRQ_CL_ENT	Array containing control list entry.
0	(0)	Fixed	4	CRQ_CL_FWD	Forward pointer.
4	(4)	Fixed	4	CRQ_CL_BWD	Backward pointer.
8	(8)	Fixed	4	CRQ_CL_LEN	Control list entry size.
12	(C)	Character	16	CRQ_CL_AUTHORITY	List authority value.
12	(C)	Character	18	CRQ_CL_HSMPLEX	HSMplex name.
20	(14)	Character	8	*	Reserved.
28	(1C)	Character	12	CRQ_CL_ENTRYID	Control list entry ID.
28	(1C)	Character	3	CRQ_CL_IDTYPE	Type of entry: – 'CES' for the CES entry. – Hostid||'4000'x for host entry.
28	(1C)	Character	2	CRQ_CL_HID	For host entries.
30	(1E)	Character	1	*	Reserved.
31	(1F)	Character	9	*	Reserved.
40	(28)	Character	16	CRQ_CL_ENTRYKEY	Control list entry key.
40	(28)	Character	3	CRQ_CL_KTYPE	Type of entry: – 'CES' for the CES entry. – Hostid||'4000'x for host entry.
40	(28)	Character	2	CRQ_CL_HKEY	For host entries.
42	(2A)	Character	1	*	Reserved.
43	(2B)	Character	13	*	Reserved.
56	(38)	Character	64	CRQ_CL_ADJAREA	Control list adjunct area.
56	(38)	Fixed	1	CRQ_CL_CES	CRQ eligibility status.
56	(38)	Bitstring	1	CRQ_CL_CES_FLAGS	CES flags.
		`.1.. ....`		CRQ_CL_NOT_ELIG	1= Not Elig RECALL or CQ(RECALL) or CQ(RECALL(SELECTION)) held.
		`...1 ....`		CRQ_CL_TP_HELD	1= RECALL TAPE held.
		`.... .1..`		CRQ_CL_TPTSO_HELD	1= RECALL TAPE(TSO) held.
57	(39)	Character	1	CRQ_CL_POP	Processing options.
57	(39)	Character	1	CRQ_CL_POP_FLAGS	POP flags.

Table 18. Entry for CRQ control list (continued)

Offsets		Type	Bytes	Name	Description
Dec	Hex				
		1...		CRQ_CL_FBID_ORD	1= Recall from tape in asc FBID order.
58	(3A)	Character	62	*	Reserved.
120	(78)	Character	8	CRQ_CL_VERSION	Version for host entries.
120	(78)	Character	4	CRQ_CL_CONNVERSION CF	Connection version.
124	(7C)	Character	4	X'00000000'	

Table 19 on page 222 shows the layout for the CRQ tape list entry.

Table 19. Entry for CRQ tape list

Offsets		Type	Bytes	Name	Description
Dec	Hex				
0	(0)	Structure	104	CRQ_TL_ENT	Array containing tape list entry.
0	(0)	Fixed	4	CRQ_TL_FWD	Forward pointer.
4	(4)	Fixed	4	CRQ_TL_BWD	Backward pointer.
8	(8)	Fixed	4	DS CRQ_TL_LEN	Tape list entry size.
12	(C)	Character	12	CRQ_TL_ENTRYID	Tape list entry ID.
12	(C)	Character	6	CRQ_TL_IDVOLSER	Tape volser name.
18	(12)	Character	6	*	Reserved.
24	(18)	Character	16	CRQ_TL_ENTRYKEY	Tape list entry key.
24	(18)	Character	6	CRQ_TL_VOLSER	Tape volser name.
30	(1E)	Character	10	*	Reserved.
40	(28)	Character	64	CRQ_TL_ADJAREA	Tape list adjunct area.
40	(28)	Fixed	2	CRQ_TL_PRIORITY	Highest priority of any single tape request needing tape.
42	(2A)	Character	12	CRQ_TL_HI_EID	Entry ID of highest priority single tape request needing this tape.
54	(36)	Character	2	CRQ_TL_HOSTID	Host ID of the host that has tape currently selected for recall.
56	(38)	Bitstring	2	CRQ_TL_FLAGS	Flags.
		1...		CRQ_TL_INUSE	1=In-Use. **Note:** If this flag is ON, then SNGL_TAPE_PROC flag is also ON if single tape is being processed. It is ON if single tape is being processed.

Table 19. Entry for CRQ tape list (continued)

Offsets		Type	Bytes	Name	Description
Dec	Hex				
		.1..		CRQ_TL_SNGL_TAPE_REQ	1= Single tape request.
		...1		CRQ_TL_FIRST_VOL	1=First volume of volume request.
		.... 1...		CRQ_TL_LAST_VOL	1=Last volume of multivolume request.
58	(3A)	Fixed	2	CRQ_TL_FIRST_VOL_CNT	Number of requests needing the tape as the first volume.
60	(3C)	Fixed	2	CRQ_TL_LAST_VOL_CNT	Number of requests needing tape as the last volume.
62	(3E)	Character	8	CRQ_TL_CTS	Time stamp TL created.
62	(3E)	Fixed	4	CRQ_TL_CTIME	Time the TL created.
66	(42)	Fixed	4	CRQ_TL_CDATE	Date the TL created. The date is obtained from the TIME DEC macro in format X'Ocyyddds'.
70	(46)	Character	34	*	Reserved.

Table 20 on page 223 shows the layout for the CRQ primary unselected list entry.

Table 20. Entry for CRQ primary unselected list

Offsets		Type	Bytes	Name	Description
Dec	Hex				
0	(0)	Structure	624	CRQ_PURL_ENT	Array containing PUR list entry.
0	(0)	Fixed	4	CRQ_PURL_FWD	Forward ptr.
4	(4)	Fixed	4	CRQ_PURL_BWD	Backward ptr.
8	(8)	Fixed	4	CRQ_PURL_LEN	PURL entry size.
12	(C)	Character	12	CRQ_PURL_ENTRYID	PURL entry ID.
12	(C)	Character	2	CRQ_PURL_ENTRYID_HOSTID	Host ID.
14	(E)	Character	2	*	Reserved.
16	(10)	Fixed	4	CRQ_PURL_ENTRYID_REQNUM MWE	Request number.
20	(14)		4	*	Reserved.
24	(18)	Character	16	CRQ_PURL_ENTRYKEY	List key.
24	(18)	Fixed	2	CRQ_PURL_PRIORITY	Priority.

Table 20. Entry for CRQ primary unselected list (continued)

Offsets		Type	Bytes	Name	Description
Dec	**Hex**				
26	(1A)	Fixed	2	CRQ_PURL_USER_PRIORITY	User priority value.
28	(1C)	Character	8	CRQ_PURL_USERID	USERID: – If nowait with priority=50 - '0'B. – If W/noWait request with priority <> 50.
36	(24)	Character	4	*	Reserved.
40	(28)	Character	64	CRQ_PURL_ADJAREA	PUR list adjunct area.
40	(28)	Character	44	CRQ_PURL_ADJ_DSNAME	Dataset name.
84	(54)	Character	8	CRQ_PURL_ADJ_USERID	User ID.
92	(5C)	Fixed	4	CRQ_PURL_ADJ_RETRY	Earliest retry recall time.
96	(60)	Bitstring	4	CRQ_PURL_ADJ_FLAGS	Flags.
		`1... ....`		CRQ_PURL_ADJ_TAPE	Requires Tape.
		`.1.. ....`		CRQ_PURL_ADJ_TPTSO	TSO request requires tape.
		`..1. ....`		CRQ_PURL_ADJ_EXT	Extent reduction from EAV.
		`...1 ....`		CRQ_PURL_ADJ_CLTR	Class transition candidate.
		`.... 1...`		CRQ_PURL_ADJ_CLOUD	Dataset mig copy in cloud.
100	(64)	Character	4	*	Reserved.
104	(68)	Character	512	CRQ_PURL_DATA_ELEMENT	Data element.
104	(68)	Character	512	CRQ_PURL_MWE	PUR list MWE.
616	(268)	Character	8	CRQ_PURL_VERSION	Version-used to quickly find the last request from a particular user.

Table 20. Entry for CRQ primary unselected list (continued)

Offsets		Type	Bytes	Name	Description
Dec	**Hex**				
616	(268)	Character	8	CRQ_PURL_VER_USERID	USERID: – If nowait request with priority = 50. – '0'B for: - Wait requests. - Non-wait with priority 0-49, 51-100.

Table 21 on page 225 shows the layout for the CRQ secondary unselected list entry.

Table 21. Entry for CRQ secondary unselected list

Offsets		Type	Bytes	Name	Description
Dec	Hex				
0	(0)	Structure	616	CRQ_SURL_ENT	Array containing SUR list entry.
0	(0)	Fixed	4	CRQ_SURL_FWD	Forward pointer.
4	(4)	Fixed	4	CRQ_SURL_BWD	Backward pointer.
8	(8)	Fixed	4	CRQ_SURL_LEN	SUR list entry size.
12	(C)	Character	12	CRQ_SURL_ENTRYID	SUR list entry ID.
12	(C)	Character	2	CRQ_SURL_ENTRYID_HOSTID	Host ID.
14	(E)	Character	2	*	Reserved.
16	(10)	Fixed	4	CRQ_SURL_ENTRYID_REQNUM	MWE request number.
20	(14)		4	*	Reserved.
24	(18)	Character	16	CRQ_SURL_ENTRYKEY	List key.
24	(18)	Character	6	CRQ_SURL_VOLSER	Tape volser.
30	(1E)	Fixed	2	CRQ_SURL_PRIORITY	MWE priority.
32	(24)	Fixed	4	CRQ_SURL_FBIDCOMP	Compliment of FBID.
36	(24)	Character	4	*	Reserved.
40	(28)	Character	64	CRQ_SURL_ADJAREA	SUR list adjunct area.
40	(28)	Character	44	CRQ_SURL_ADJ_DSNAME	Dataset name.
84	(54)	Character	8	CRQ_SURL_ADJ_USERID	User ID.

Table 21. Entry for CRQ secondary unselected list (continued)					
92	(5C)	Fixed	4	CRQ_SURL_ADJ_RETRY	Earliest retry recall time.
96	(60)	Bitstring	4	CRQ_SURL_ADJ_FLAGS	Flags.
		`1...  ....`		CRQ_SURL_ADJ_TAPE	Requires Tape.
		`.1.. ....`		CRQ_SURL_ADJ_TPTSO	TSO request requires tape.
		`..1. ....`		CRQ_SURL_ADJ_EXT	Extent reduction from EAV.
		`...1 ....`		CRQ_SURL_ADJ_CLTR	Class transition candidate.
		`.... 1...`		CRQ_SURL_ADJ_CLOUD	Dataset mig copy in cloud.
100	(64)	Character	4	*	Reserved.
104	(68)	Character	512	CRQ_SURL_DATA_ELEMENT	Data element.
104	(68)	Character	512	CRQ_SURL_MWE	SUR list MWE.

Table 22 on page 226 shows the layout for the CRQ selected list entry.

Table 22. Entry for CRQ selected list					
Offsets		**Type**	**Bytes**	**Name**	**Description**
Dec	**Hex**				
0	(0)	Structure	616	CRQ_SRL_ENT	Array containing SR list entry.
0	(0)	Fixed	4	CRQ_SRL_FWD	Forward pointer.
4	(4)	Fixed	4	CRQ_SRL_BWD	Backward pointer.
8	(8)	Fixed	4	CRQ_SRL_LEN	SR list entry size.
12	(C)	Character	12	CRQ_SRL_ENTRYID	SR list entry ID.
12	(C)	Character	2	CRQ_SRL_ENTRYID_HOSTID	Host ID.
14	(E)	Character	2	*	Reserved.
16	(10)	Fixed	4	CRQ_SRL_ENTRYID_REQNUM MWE	Request number.
20	(14)	Character	4	*	Reserved.
24	(18)	Character	16	CRQ_SRL_ENTRYKEY	SR list entry key.
24	(18)	Character	2	CRQ_SRL_HOSTID	Processing ID of the host.
26	(1A)	Character	2	*	Reserved.

Table 22. Entry for CRQ selected list (continued)

Offsets		Type	Bytes	Name	Description
Dec	Hex				
28	(1C)	Fixed	4	CRQ_SRL_REQNUM	MWE request number.
32	(20)	Character	8	*	Reserved.
40	(28)	Character	64	CRQ_SRL_ADJAREA	SR list adjunct area.
40	(28)	Character	44	CRQ_SRL_ADJ_DSNAME	Dataset name.
84	(54)	Character	8	CRQ_SRL_ADJ_USERID	User ID.
92	(5C)	Fixed	4	CRQ_SRL_ADJ_RETRY	Earliest retry recall time.
96	(60)	Bitstring	4	CRQ_SRL_ADJ_FLAGS	Flags.
		`1... ....`		CRQ_SRL_ADJ_TAPE	Requires tape.
		`.1.. ....`		CRQ_SRL_ADJ_TPTSO	TSO request requires tape.
		`..1. ....`		CRQ_SRL_ADJ_EXT	Extent reduction from EAV.
		`...1 ....`		CRQ_SRL_ADJ_CLTR	Class transition candidate.
		`.... 1`		CRQ_SRL_ADJ_CLOUD	Dataset mig copy in cloud.
100	(64)	Character	4	*	Reserved.
104	(68)	Character	512	CRQ_SRL_DATA_ELEMENT	Data element.
104	(68)	Character	512	CRQ_SRL_MWE	SR list MWE.

The DSN keyword determines the data set from which the information is needed. DATA determines what type of data is requested. A GETMAIN request for the extract buffer is performed automatically and returned in register 1. For *dsnaddr*, use the address of the 44-byte data area that contains the fully-qualified data set name. The data set name must be left-aligned, and padded with blanks. This data set can be either SMS-managed or non-SMS-managed.

The WKAREA keyword specifies the address of a 200-byte work area that contains the information specified in the macro. For *waaddr*, substitute the address of the work area. The work area must be below the 16MB line. The work area serves as a temporary storage area for the macro processing and becomes available to you as soon as the macro returns control to your program.

DEFINE: Defining a DSECT for the data returned

The extract buffer address contains an area with a header, followed by a list of entries. Both the header and entry definitions are generated. DEFINE=YES specifies that a DSECT is to be generated. DEFINE=NO is the default. Table 14 on page 216 and Table 15 on page 217 show the layouts of the data buffer that is returned.

FREE: Free the extract buffer

The FREE keyword specifies the address of the extract buffer that was returned by a previous extract request. If the extract request did not obtain storage, register 1 would be zero. If register 1 is not zero, it is the caller's responsibility to free the storage as described by its first four bytes of the extract header layout (shown in Table 14 on page 216).

Optional parameters

The following are the optional parameters of the ARCXTRCT macro:

DATE
specifies the date and time that the backup version to be extracted was created. For *dateaddr*, specify the address of a data area that contains the backup date. The field referenced by *dateaddr* must contain 7 digits in the form of *yyyyddd*. The default value for date is 0.

TIME
specifies the time that the backup version to be extracted was created. For *timeaddr*, specify the address of the data area that contains the backup time. The field referenced by *timeaddr* must contain 6 digits in the form of *hhmmss*. The default value for time is 0.

SNAPDCB
specifies the address of an open DCB that can be used for SNAP macro processing. This feature is intended for problem determination. If you specify this parameter, review "Usage notes" on page 228. For *dcbaddr*, specify the address of an open DCB.

TEST
specifies whether to refrain from sending a request for service to DFSMShsm. If YES is specified the service request is not sent. If NO is specified, a service request is sent to DFSMShsm. In both cases the parameters are checked for correctness. A 4*xx* return code will result for invalid parameters. The default is NO.

Usage notes

1. You must specify DATE and TIME together and they are valid only with the DATA=BUVERS form of the macro. Otherwise, the macro fails.
2. The ARCXTRCT DATA=BUVERS output can contain information for up to 100 backup versions. If there are more than 100 backup copies of the specified data set, DFSMShsm sets the BUVEFMAS flag in the last entry of the output. To obtain information on the additional backup copies, issue the request again and specify the DATE and TIME parameters. DFSMShsm returns up to 100 versions that are created before the specified date and time.
3. If a return code of 4*xx* is returned and SNAPDCB is specified, a SNAP macro is issued and the request that is made to DFSMShsm is dumped. The dumped storage area includes the data set name, volume serial number, and function requested. DFSMShsm also dumps the extract buffer.
4. If SNAPDCB and TEST=YES is specified, and there is an error flagged in the MWERC, then a SNAP macro is issued and the MWE is dumped.
5. If ARCXTRCT DATA=CRQREAD is issued, the return code 109 is received. Thus, the CRQ data was extracted and during its transferring, DFSMShsm restarted and the rest of the CRQ data was lost. Therefore, the ARCXTRCT request must be reissued.
6. If ARCXTRCT DATA=CRQREAD is issued, the return code 110 is received. Thus, the CRQ data is extracted and during its transferring, when the DFSMShsm must return the next portion of CRQ data, the number of bytes sent and received mismatch. Therefore, the ARCXTRCT request must be reissued.

Appendix A. DFSMShsm and ISMF line operator reference summary

Table 23 on page 229 presents the DFSMShsm/ISMF line operators, summarizes their functions, and gives the minimum abbreviation that you can use when entering them in the foreground.

Table 23. DFSMShsm/ISMF Line Operators

Line Operator	Minimum Abbreviation	Description
CONDENSE	CON	Frees unused space at the end of a partitioned or sequential data set; compresses a PDS.
DELETE	DE	Deletes a DFSMShsm-migrated data set or an online data set.
HALTERDS	HA	Changes the maximum number of backup versions of a data set; changes the minimum frequency of incremental backup. Cannot be used on SMS-managed data sets, which are controlled by the data sets management class parameters. If used on SMS-managed data sets, the command fails and an error message is issued.
HBACKDS	HBA	Creates a backup version of a data set.
HBDELETE	HBD	Deletes backup versions of a data set.
HMIGRATE	HMI	Migrates a data set to a DFSMShsm level one or level two volume.
HRECALL	HRECA	Recalls a data set that has been migrated by DFSMShsm.
HRECOVER	HRECO	Recovers a backup version of a data set.

Appendix B. Return codes from DFSMShsm commands

The following DFSMShsm commands issue return codes to indicate the success or failure of their operation:

- HBACKDS
- HDELETE
- HMIGRATE
- HRECALL
- HRECOVER

Return codes are assigned in register 15. This allows the success or failure of the commands to be tested in a CLIST or batch job. Return codes come from one of two sets: default and extended.

The default set of return codes appear during normal DFSMShsm operations and provides a return code that indicates success or one of several errors.

The extended set of return codes is functional only when DFSMShsm commands are running in a truly interactive mode (TSO or foreground). This extended set of return codes, which appear when the EXTENDRC and the WAIT parameters are specified, provides a more detailed indication of processing results by returning both a return code and a reason code. The EXTENDRC parameter does not apply when it is used by a terminal monitor program (TMP) or when DFSMShsm commands are issued from a batch job; although DFSMShsm does not fail the command, the parameter is ignored. Because the extended set of return and reason codes may not be completed until after physical completion of backup processing, the HBACKDS command fails if you use both the CC and EXTENDRC keywords together.

Return codes from the default set

Table 24 on page 231 lists the return codes (*retcode*) that belong to the default set.

Table 24. Default Set Return Codes

Retcode	Meaning
0	No errors are detected. **Note:** It is not considered an error when an HRECALL command finds that the data set is not cataloged to volume MIGRAT. The informational message ARC1102I will be issued and zero will be returned in register 15.
12	DFSMShsm functional failure has occurred or more than one type of error was detected as a multiple data set request was processed. DFSMShsm received the request and tried to process it, but was unsuccessful. DFSMShsm issued an error message between messages: ARC1101I and ARC1900I. To obtain this return code, the WAIT option must be specified on the command. Otherwise, only the success or failure of communication with DFSMShsm is reported.
14	Data set error has occurred and the request was not communicated to DFSMShsm. A data set error occurs when the data set is not cataloged for a command that requires a cataloged data set or if the data set name syntax is incorrect.
16	DFSMShsm SVC path error has occurred. An error has occurred in attempting to communicate with DFSMShsm. DFSMShsm has not received the request.
18	A command syntax error was detected.

Table 24. Default Set Return Codes (continued)	
Retcode	**Meaning**
24	The command failed prior to being sent to DFSMShsm.

The default set of return codes is returned in register 15. The following JCL is an example of using a DFSMShsm command and testing the return code while running in a batch job:

```
//LISTDS   JOB...
//*RECOVER DATA SET
//RECOVER EXEC PGM=IKJEFT01
//SYSIN    DD  DUMMY
//SYSPRINT DD  SYSOUT=A
//SYSTSPRT DD  SYSOUT=A
//SYSTSIN  DD  *
  HRECOVER DATA.SET.NAME REPLACE WAIT
/*
//*PRINT DATA SET IF RECOVERY IS SUCCESSFUL
//PRINT  EXEC PGM=IDCAMS,COND=(0,NE)
//SYSPRINT DD  SYSOUT=A
//SYSIN    DD  *
  PRINT INDATASET(DATA.SET.NAME)
/*
```

Return codes from the extended set

When the EXTENDRC parameter is specified on the HBACKDS, HDELETE, HRECALL, HRECOVER or HMIGRATE commands, DFSMShsm assigns both a return code and a reason code in register 15 that provides a more detailed indication of the results from processing the request. In most cases, the return codes correspond to the message number that DFSMShsm issues to provide an explanation when the request fails. If there is a reason code associated with the failure, it is also returned.

Important: The return code is returned in the high-order two bytes of register 15. The reason code is returned in the low-order two bytes of register 15.

To obtain the corresponding message number from the contents of register 15, the following algorithms are used:

For return code: HSMRC = (contents of register 15 / 65536)
For reason code: HSMREAS = (contents of register 15 - (HSMRC × 65536))

The following example shows how to obtain the return code, the corresponding message number, and any associated reason code from the contents of register 15. For this example, when we tried to migrate a data set that was not eligible for migration, we received the following values:

Table 25. Return codes from the extended set example: register 15 values	
Decimal Value	**HEX Value**
1310724	00140004

- Return code:

  HSMRC = (1310724 / 65536)
  HSMRC = 20.000061
  HSMRC = 20

  The HSMRC variable contains the return code value of 20. The return code (or **nn**) can be used to locate the corresponding message number; in our migration example, ARC12**nn** or ARC1220.

- Reason code:

  HSMRC = 20 (return code must be obtained before reason code)
  HSMREAS = (1310724 - (20 × 65536))
  HSMREAS = (1310724 - 1310720)

HSMREAS = 4

The HSMREAS variable contains the reason code value of 4. Look for this reason code under the corresponding message number; in our migration example, message ARC1220 and reason code of 4.

When you are using a TSO CLIST, the return and reason codes are both provided in register 15 for access as the CLIST variables: &LASTCC or &MAXCC; The CLIST example (see below) shows how to separate the return and reason codes set by DFSMShsm from the &LASTCC variable.

When you are using ISPF, the return and reason codes are both provided in register 15 and can be obtained by using the HELP function. Use the given algorithms to obtain the return code, the corresponding message number, and any associated reason code.

The EXTENDRC parameter is best used when single data set requests are issued. When a multiple data set request is issued, multiple failures are reported with a single, generic return code of 112.

Table 26 on page 233 lists the return codes that belong to the extended set. These return codes are returned in the high-order two bytes of register 15 with the exception of return code 18, which is returned in the low-order two bytes of register 15.

Table 26. Extended set return codes

Retcode	Meaning
0	No errors are detected.
18	A command syntax error is detected. The return code is reported in the low-order two bytes of register 15.
112	For a multiple data set request, more than one type of error was detected, or more than one functional failure has occurred.
114	A data set error has occurred. A data set error occurs when the data set is not cataloged for a command that requires a cataloged data set or if the data set name syntax is incorrect. DFSMShsm did not receive the request.
116	A DFSMShsm SVC path error has occurred. An error has occurred in communicating with DFSMShsm. DFSMShsm did not receive the request.
120	An ABEND occurred.
124	The command failed prior to being sent to DFSMShsm. A non-zero reason code nnnn may be provided. Refer to message ARCnnnn for further details on the failure
nn	A DFSMShsm functional failure occurred (the WAIT option was specified) and the MWE return code of the functional failure coincides with ARC*xx***nn** messages as follows: • Failing recall/recovery/delete messages ARC1101 to ARC1199 have return codes 1 to 99. **Note:** It is not considered an error when an HRECALL command finds that the data set is not cataloged to volume MIGRAT. The informational message ARC1102I will be issued and zero will be returned in register 15. • Failing migration messages ARC1201 to ARC1299 have return codes 1 to 99. • Failing backup messages ARC1301 to ARC1399 have return codes 1 to 99. • Failing DFSMShsm command messages ARC1601 to ARC1699 have return codes 1 to 99. • Attention message ARC1800 has return code 100. This return code is returned when the request is interrupted with a TSO attention request. • Abnormal ending message ARC1900 of the preceding function has a return code of 120.

These reason codes have meaning only with specific return codes. Reason codes are described with the corresponding messages. See *z/OS MVS System Messages, Vol 2 (ARC-ASA)*.

The following fragment is an example of checking return codes when issuing DFSMShsm commands from a CLIST running in the foreground:

```
  /*ERROR EXIT TO GET RETURN AND REASON CODES FROM REGISTER 15*/
ERROR DO
        SET   HSMRC = &EVAL(&LASTCC; / 65536)
        SET   HSMREAS = &EVAL(&LASTCC - &EVAL(&HSMRC * 65536))
        RETURN
      END
   /*RECOVER THE DATA SET */
   HRECOVER DATA.SET.NAME REPLACE WAIT EXTENDRC
   IF &HSMRC = 45 THEN -
     /*IF DATA SET IS MIGRATED, RECALL THE DATA SET */
    DO
      SET HSMRC = 0
      SET HSMREAS = 0
      HRECALL DATA.SET.NAME WAIT EXTENDRC
      IF &HSMRC = 0 THEN -
        /*IF RECALL IS SUCCESSFUL, ATTEMPT DATA SET RECOVER
        HRECOVER DATA.SET.NAME REPLACE WAIT EXTENDRC
      ELSE -
        /*IF RECALL IS NOT SUCCESSFUL, ISSUE MESSAGE */
        DO
         WRITE RECALL NOT SUCCESSFUL
         EXIT
        END
    END
   ELSE -
     /*IF DATA SET IS NOT MIGRATED OR RECOVERY NOT SUCCESSFUL
     /*ISSUE MESSAGE */
     DO
       WRITE RECOVERY NOT SUCCESSFUL
       EXIT
     END
EXIT
```

Programming Interface Information

Return codes from user macros

When using the user macros, DFSMShsm sets a return code in register 15 that indicates the result of processing the request. In most cases, the return codes correspond to the message number that DFSMShsm issues to provide an explanation when the request fails. If there is a reason code associated with the failure, it is returned in register 0.

Table 27 on page 234 lists the return codes that are placed in register 15 upon completion of the invocation of the macro.

Table 27. User Macros Return Codes

Retcode	Meaning
0	Function is successful
100	DFSMShsm is not running or the request could not be communicated to DFSMShsm
400	Invalid request ID
401	Attempt to free a MWE for an incomplete function (applies to ARCFMWE only)
402	Data set locate failure (applies to ARCHRCAL and ARCHMIG only)
403	Data set name specified was * or blank
404	The date specified with ARCHRCOV has format *yyddd*, but the system date is later than 1999
407	An internal error occurs with the ARCHBACK command.

Table 27. User Macros Return Codes (continued)	
Retcode	**Meaning**
806	Link error
Any other nonzero	Function fails

End Programming Interface Information

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Individual macros and their messages

Table 28 on page 235 lists individual macros and their related messages. *xx* is the nonzero value returned in register 15. This hexadecimal value must be converted to decimal before the corresponding message number can be obtained. For most of the macros, WAIT *must* be coded in the macro to get an "any other nonzero" return code.

Table 28. Messages from Individual Macros	
Macro	**Message**
ARCFMWE	None.
ARCHBACK	See ARC13*xx* for return codes (use WAIT to get a *retcode*).
ARCHBDEL	See messages ARC0182 and ARC0183.
ARCHDEL	See message ARC11*xx* for return codes (use WAIT to get a *retcode*).
ARCHMIG	See message ARC12*xx* for return codes (use WAIT to get a *retcode*).
ARCHRCAL	See message ARC11*xx* for return codes (use WAIT to get a *retcode*).
ARCHRCOV	See message ARC11*xx* for return codes (use WAIT to get a *retcode*).
ARCHSEND	Dependent on the text sent. For instance, if the text indicated MIGRATE, then see message ARC12*xx* (use WAIT to get a *retcode*).
ARCXTRCT	See message ARC0184I.

End Programming Interface Information

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