

z/OS



DFSMSHsm Managing Your Own Data

z/OS



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Note

Before using this information and the product it supports, be sure to read the general information under "Notices" on page 179.

Second Edition, March 2002

This edition applies to Version 1 Release 3 of z/OS™ (5694-A01) and to all subsequent releases and modifications until otherwise indicated in new editions.

This edition replaces SC35-0420-00.

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About This Book

This publication is intended to aid application programmers and TSO terminal users who know DFSMS/MVS™ concepts and terminology and want to manage their own data sets.

Major Divisions of This Book

This book 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 47 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 147 describes the user macros you can use from application programs to issue DFSMSHsm commands.

“Appendix A. DFSMSHsm/ISMF Line Operator Reference Summary” on page 169 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 171 describes the return codes issued by DFSMSHsm after processing DFSMSHsm commands or requests from DFSMSHsm user macros.

This publication also contains a glossary of terms and abbreviations and an index.

Required Product Knowledge

To use this book effectively, you should be familiar with the following information:

- IBM® support and how it is structured
- Basic dump analysis
- Diagnostic techniques

Referenced Publications

The following publications are referenced in this book:

Publication Title	Order Number
<i>z/OS DFSMSHsm User Commands Reference Summary</i> is a quick reference card summarizing the syntax of the DFSMSHsm commands available to the user.	SX35-5063
<i>z/OS MVS System Messages, Vol 1 (ABA-AOM)</i> lists messages (ABA-AOM) issued by DFSMSHsm and includes the explanation, system action, operator response, programmer response, and problem determination. It is written for people who operate, maintain, and use DFSMSHsm.	SA22-7631

Publication Title	Order Number
<i>z/OS MVS System Messages, Vol 2 (ARC-ASA)</i> lists messages (ARC-ASA) issued by DFSMSHsm and includes the explanation, system action, operator response, programmer response, and problem determination. It is written for people who operate, maintain, and use DFSMSHsm.	SA22-7632
<i>z/OS DFSMSHsm Implementation and Customization Guide</i>	SC35-0418
<i>z/OS DFSMSHsm Storage Administration Guide</i> describes in detail the concepts of DFSMSHsm.	SC35-0421
<i>z/OS MVS System Codes</i> provides abnormal end (abend) codes.	SA22-7626
<i>z/OS MVS Programming: Authorized Assembler Services Reference ALE-DYN</i>	SA22-7609
<i>z/OS MVS Programming: Authorized Assembler Services Reference ENF-IXG</i>	SA22-7610
<i>z/OS MVS Programming: Authorized Assembler Services Reference LLA-SDU</i>	SA22-7611
<i>z/OS MVS Programming: Authorized Assembler Services Reference SET-WTO</i>	SA22-7612
<i>z/OS MVS Programming: Authorized Assembler Services Guide</i>	SA22-7608
<i>z/OS DFSMS Access Method Services</i> describes access method services commands and conventions, including general language considerations.	SC26-7394
<i>z/OS DFSMS Macro Instructions for Data Sets</i> provides data management macro instructions for QSAM, BSAM, BDAM, BPAM, and ISAM.	SC26-7408
<i>z/OS DFSMS Access Method Services</i> provides information on return codes.	SC26-7394
<i>z/OS DFSMSdfp Utilities</i> describes the utility programs available for program, device, and data management.	SC26-7414
<i>z/OS Security Server RACF General User's Guide</i> describes the syntax and functions of RACF commands.	SA22-7685
<i>z/OS TSO/E Programming Guide</i> describes how to write TSO command processors.	SA22-7788
<i>z/OS TSO/E Programming Services</i> describes how to write TSO command processors.	SA22-7789

Accessing z/OS DFSMS Books on the Internet

In addition to making softcopy books available on CD-ROM, IBM provides access to unlicensed z/OS softcopy books on the Internet. To find z/OS books on the Internet, first go to the z/OS home page: <http://www.ibm.com/servers/eserver/zseries/zos>

From this Web site, you can link directly to the z/OS softcopy books by selecting the Library icon. You can also link to IBM Direct to order hardcopy books.

Using LookAt to look up message explanations

LookAt is an online facility that allows you to look up explanations for z/OS messages, system abends, and some codes. Using LookAt to find information is faster than a conventional search because in most cases LookAt goes directly to the message explanation.

You can access LookAt from the Internet at:

<http://www.ibm.com/servers/eserver/zseries/zos/bkserv/lookat/lookat.html>

or from anywhere in z/OS where you can access a TSO command line (for example, TSO prompt, ISPF, z/OS UNIX System Services running OMVS).

To find a message explanation on the Internet, go to the LookAt Web site and simply enter the message identifier (for example, IAT1836 or IAT*). You can select a specific release to narrow your search. You can also download code from the *z/OS Collection*, SK3T-4269 and the LookAt Web site so you can access LookAt from a PalmPilot (Palm VIIx suggested).

To use LookAt as a TSO command, you must have LookAt installed on your host system. You can obtain the LookAt code for TSO from a disk on your *z/OS Collection*, SK3T-4269 or from the LookAt Web site. To obtain the code from the LookAt Web site, do the following:

1. Go to <http://www.ibm.com/servers/eserver/zseries/zos/bkserv/lookat/lookat.html>.
2. Click the **News** button.
3. Scroll to **Download LookAt Code for TSO and VM**.
4. Click the ftp link, which will take you to a list of operating systems. Select the appropriate operating system. Then select the appropriate release.
5. Find the **lookat.me** file and follow its detailed instructions.

To find a message explanation from a TSO command line, simply enter: **lookat message-id**. LookAt will display the message explanation for the message requested.

Note: Some messages have information in more than one book. For example, IEC192I has routing and descriptor codes listed in *z/OS MVS Routing and Descriptor Codes*. For such messages, LookAt prompts you to choose which book to open.

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 - World Wide Web: <http://www.storage.ibm.com/software/sms/sms/home.htm>

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- Fill out one of the forms at the back of this book and return it by mail or by giving it to an IBM representative. If the form has been removed, address your comments to IBM Corporation, Department 61C/9032, 9000 South Rita Road, Tucson, Arizona 85744-0001, U.S.A.

Summary of Changes

This book contains terminology, maintenance, and editorial changes. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

You may notice changes in the style and structure of some content in this book--for example, headings that use uppercase for the first letter of initial words only or procedures that have a different look and format. The changes are ongoing improvements to the consistency and retrievability of information in our books.

Summary of Changes for SC35-0420-01 z/OS Version 1 Release 3

This book contains information previously presented in *z/OS Version 1 Release 1 DFSMSHsm Managing Your Own Data* (SC35-0420-00).

The following section summarizes the changes to that information.

Changed Information

The following information was changed in this edition:

- Sample printer lists on pages 101, 103, and 106 were changed as a result of the Large Volume special programming enhancement.

Part 1. Introduction

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 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 overallocated 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** are:
 - Volumes containing data sets that DFSMSHsm moved from level 0 volumes.
 - Volumes containing backup versions 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.

What Is the Storage Management Subsystem?

DFSMSHsm is a member of the DFSMS/MVS™ product family. DFSMS/MVS, 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/MVS. 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 manual.

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.

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 newname 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

DFSMSHsm User Command	DFSMSHsm Function	RACF Resource Access Authority Required
HRECALL	Recalls one or more migrated data sets.	EXECUTE
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 newname data set. If profile recovery is necessary, you also need authority to create a RACF discrete profile for the newname data set.

For more information on the use of RACF, refer to the *z/OS Security Server RACF General User'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.

DFSMSHsm User Command	Password You Must Supply
HRECALL	The password in the system password data set that allows you to read the data set.
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 newname 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 newname data set.

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 chapter 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, 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_
      1 SPF      - SPF PROGRAM DEVELOPMENT FACILITY      USERID  - K665941
      . . . . . - . . . . .                          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, use this command:
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 15 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 DFSMSshm 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

- Press ENTER to generate the data set list. A list that conforms to your selection criteria appears (Figure 3). Refer to *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
Data Columns 3-6 of 39

Enter Line Operators below:

LINE          OPERATOR          DATA SET NAME          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.SPFL0G1.LIST        2623    1311    50  ???
                USER20.TEMP.DATASET        4684     93     98  ???
                ----- BOTTOM OF DATA -----

Command ==>
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/ISMF Line Operator Reference Summary” on page 169.

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.

```
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.

Notes:

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 22. Using DFSMSHsm User Macros” on page 149.

Chapter 5. Space Management

The purpose of space management is to manage DASD storage efficiently. This chapter 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
 - 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 and interval 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 **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 21 and Figure 6 on page 22 for an overview of the flow for the automatic migration and the automatic recall functions.

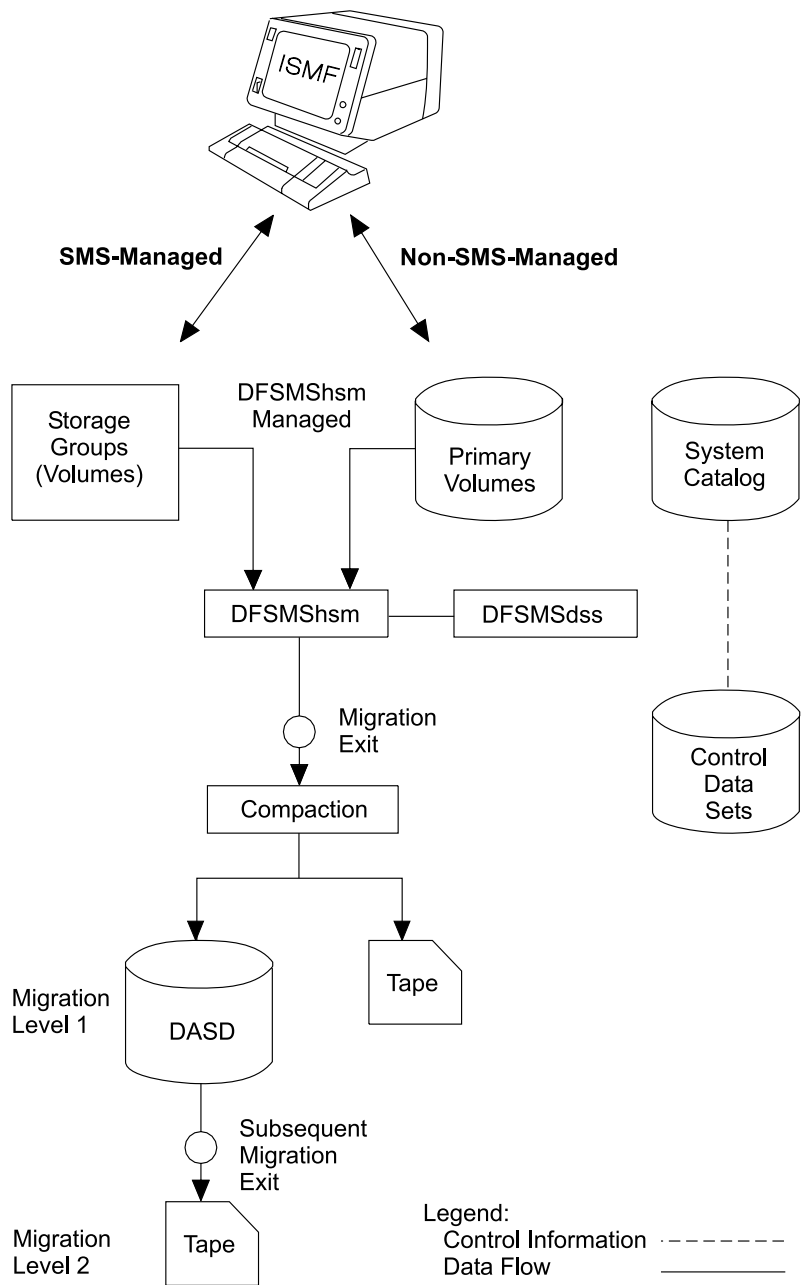


Figure 5. Flow of Automatic Migration

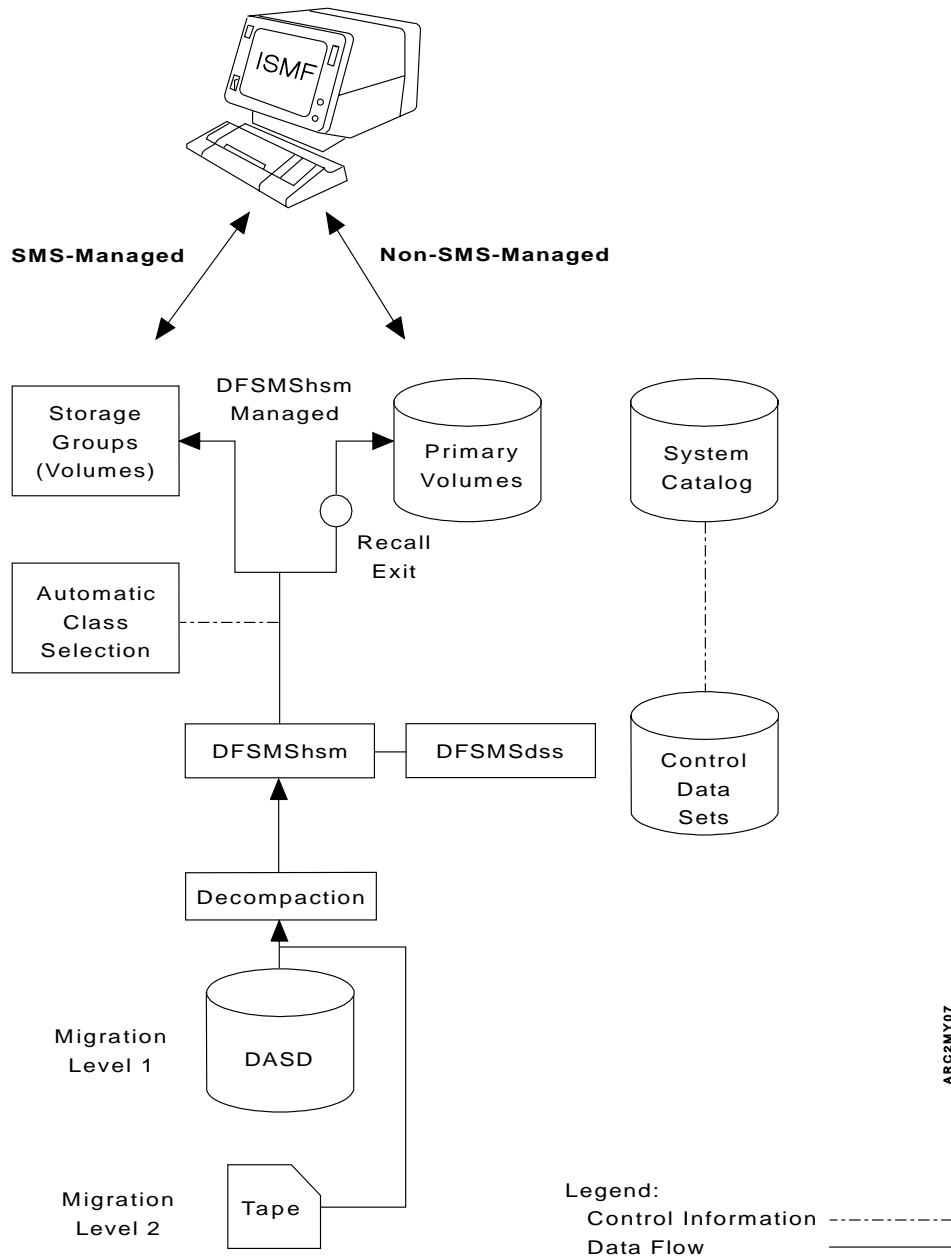


Figure 6. Flow of Automatic Recall

ARC2MY07

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 45.

Chapter 6. Availability Management

Availability management ensures that lost or damaged data sets can be retrieved at the most current possible level. This chapter 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).

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 set's 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 27 and Figure 8 on page 28 for an overview of the flow for the automatic incremental backup and the recovery/restore functions.

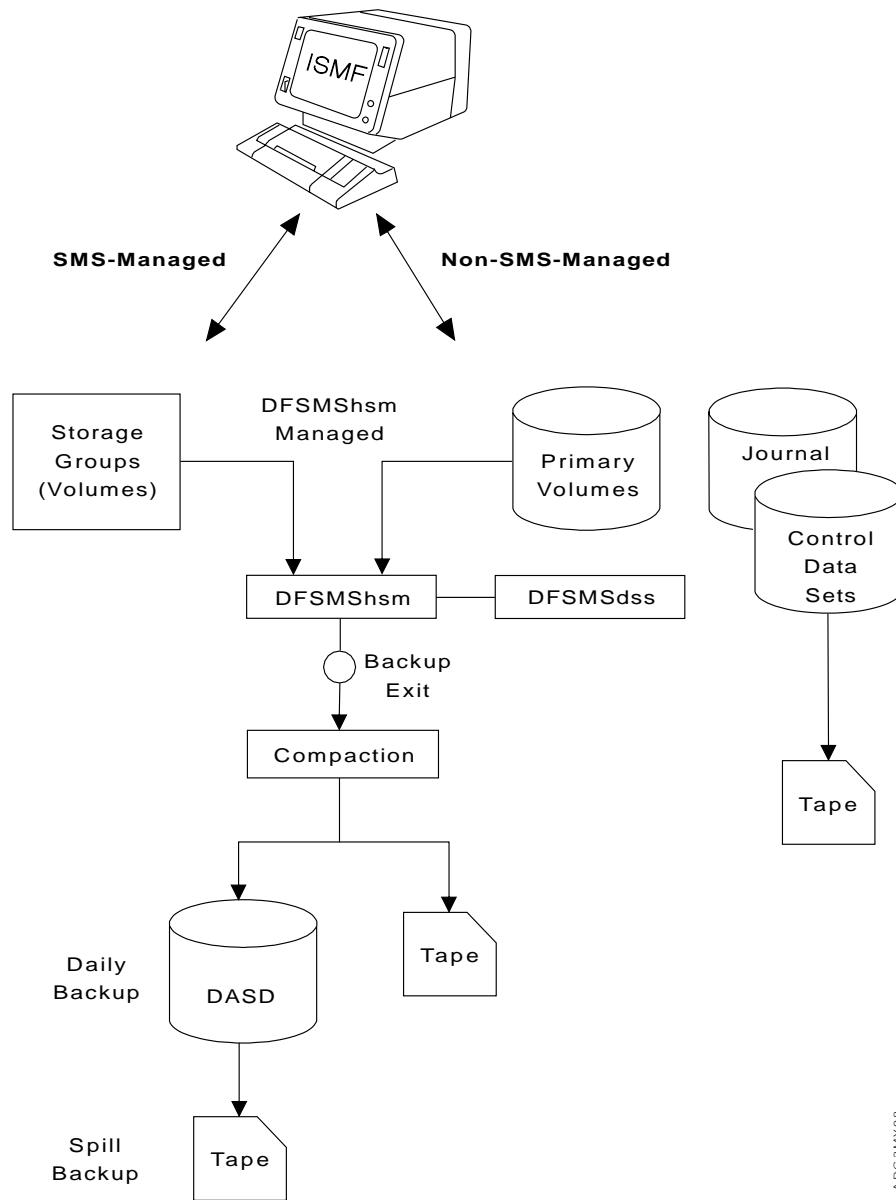


Figure 7. Flow of Automatic Incremental Backup

AFC2MY08

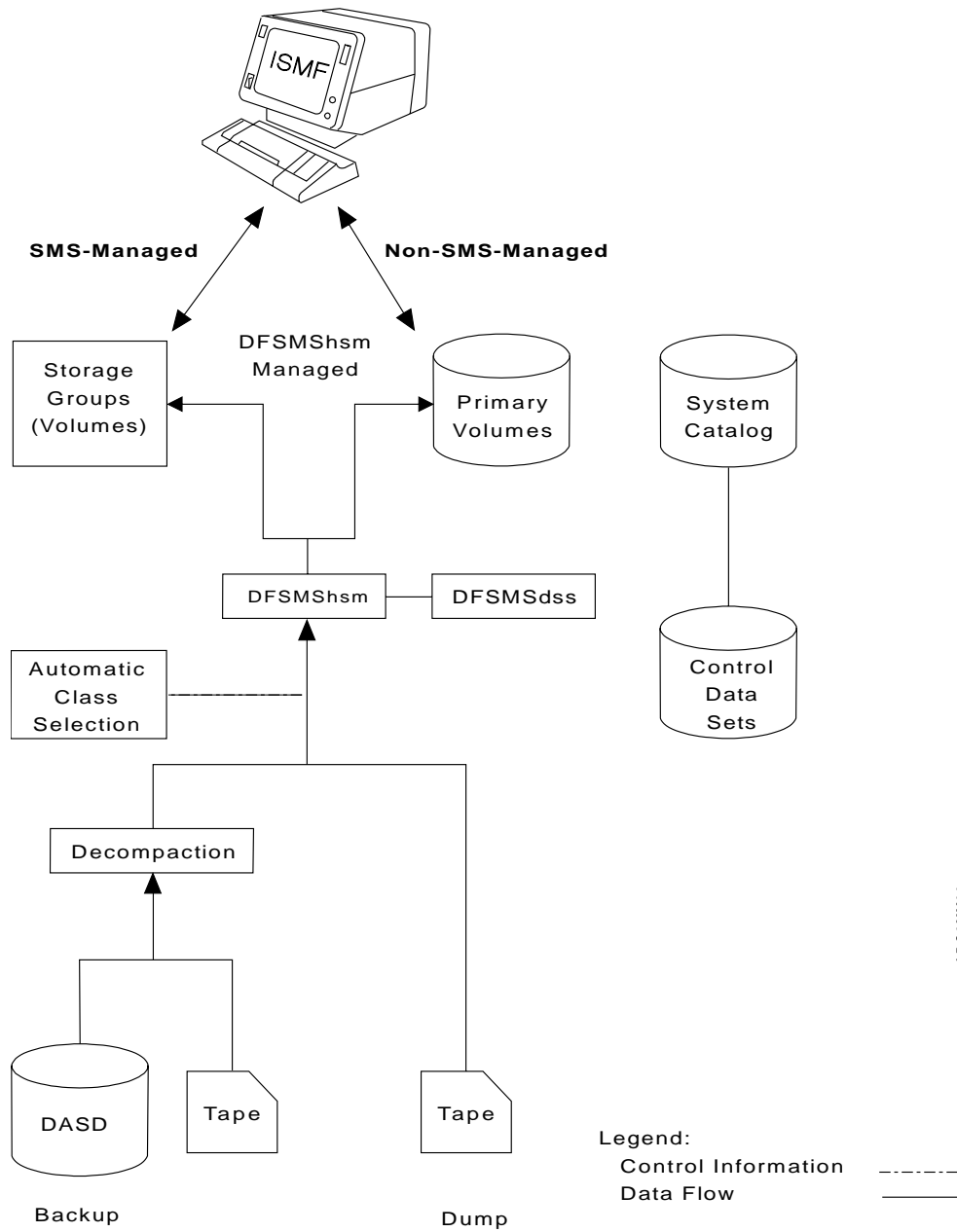


Figure 8. Flow of Recovery/Restore Functions

ARC2MY09

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 45.

Chapter 7. Space Management and Availability Management Capabilities

This chapter 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/MVS 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 chapter 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 45.

Chapter 9. Syntax and Notational Conventions

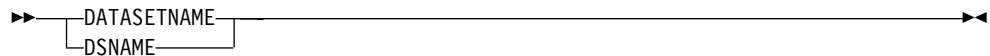
This chapter describes the syntax of DFSMSHsm user commands and the notational conventions used in this publication.

How to Read Syntax Diagrams

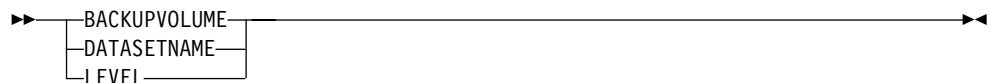
To read syntax diagrams, follow one line at a time from the beginning to the end, and code everything you encounter on that line.

The following conventions apply to all syntax diagrams for DFSMSHsm commands:

- Read the syntax diagrams from left to right and top to bottom.
- Each syntax diagram begins with a double arrowhead (▶▶) and ends with opposing arrows (◀▶).
- An arrow (→) at the end of a line indicates that the syntax continues on the next line. A continuation line begins with an arrow (←).
- Some commands and keywords have alternative abbreviations; these appear as part of the stack for that command or keyword. For example, the alternative abbreviation for DATASETNAME is DSNAME.



- Words in all lowercase letters represent information you supply. For example, *volser* or *dsname*.
- You must provide all items enclosed in parentheses, (), and you must include the parentheses.
- Where you can choose from two or more keywords, the choices are stacked one above the other. If one choice within the stack lies on the main path, you must choose a keyword. In the following example you must choose either BACKUPVOLUME, DATASETNAME, or LEVEL.



- If one or more keywords are below the main path, they are optional. In the following example WAIT and NOWAIT are optional keywords. You can choose one, or the other, or none.



- If a stack of keywords is below the main path and one keyword is above the main path, the use of the keyword is optional, and the above item is the default. In the following example, if no keywords are specified, the default TERMINAL is taken.



- The repeat symbol is shown below:

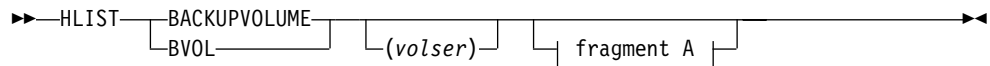


The repeat symbol appearing above keywords and variables indicates that you can specify those keywords and variables more than once. If a comma appears in the repeat symbol, you must separate repeated keywords or variables with a comma or any valid separator. For example, after the keyword VERSIONS, you can enter multiple version numbers separated by commas.



- Substitution blocks are used to simplify the diagrams. They indicate that blocks of the syntax diagram are located outside of the main diagram. You insert the keywords for that block where the symbol appears, and return to the main diagram to continue with the command.

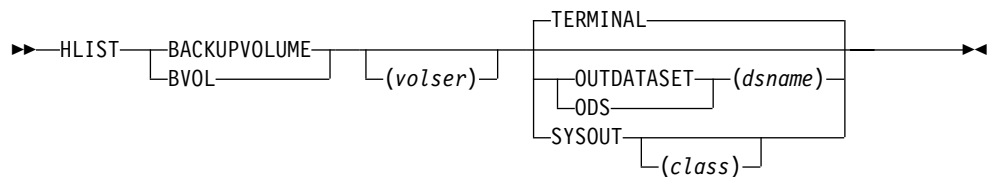
In the following example the fragment block, **A**, points to a block of the syntax diagram that follows the BACKUPVOLUME keyword.



A: BACKUPVOLUME Optional Parameters



The above example is equivalent to the following:



Using DFSMSHsm Commands

A command consists of a command name usually followed by one or more operands or parameters. This publication refers to all operands 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 book 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:

- Brackets ([]) specify an optional field or parameter.
- 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.
- **Boldface** type specifies characters that you must enter exactly as shown.
- Courier type specifies job control language and DFSMSHsm statements in examples, messages, and reports.
- *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.

Notes:

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 chapter 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 | HSEND CMD} 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
//SYSPRINT 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 chapter tells you what tasks you can perform on your data sets using DFSMSHsm user commands.

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. Syntax and Notational Conventions" on page 35.

Part 2. DFSMShsm User Tasks

Chapter 12. HALTERDS—Changing Data Set Parameters

This chapter describes how to change the data set parameters that affect backup of non-SMS-managed data sets 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. The HALTERDS Entry panel appears.

Panel List Dataset Utilities Scroll Help					
DATA SET LIST					
Enter Line Operators below:			Entries 1-1 of 1 Data Columns 3-6 of 39		
LINE OPERATOR	DATA SET NAME	ALLOC SPACE	ALLOC USED	% NOT USED	COMPRESSED 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.SPFL0G1.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
F10=Left	F11=Right	F12=Cursor			F9=Swap

Figure 9. Data Set List Panel with HALTERDS Selected

3. Complete the HALTERDS Entry panel as described in Figure 10 on page 50 for a non-SMS-managed data set.

HALTERDS

```
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 51).

```

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

- Press ENTER to alter the data set parameters and redisplay the list (see Figure 12).

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

Enter Line Operators below:                                Entries 1-1 of 1
                                                           Data Columns 3-6 of 39

LINE      ALLOC  ALLOC  % NOT  COMPRESSED
OPERATOR  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.SPFL0G1.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, refer to *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, which are controlled by the data sets' management class parameters. 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 51).

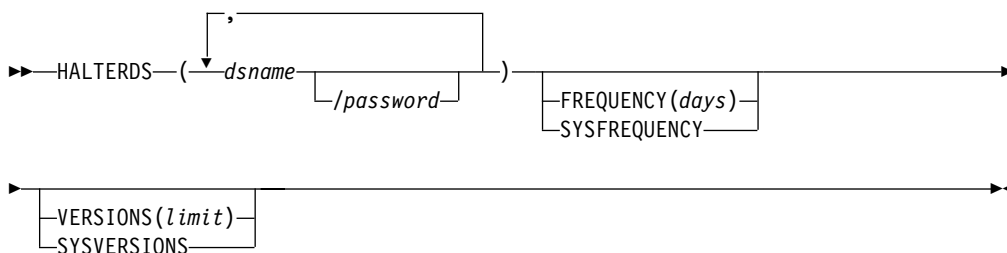
To make a change, you specify VERSIONS or SYSVERSIONS, FREQUENCY or SYSFREQUENCY, or one from each pair of parameters. If you do not specify at least one with the HALTERDS command, nothing is altered.

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

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.



Note: Parentheses around data set names are required only when multiple dsnames are specified.

Required Parameters

dsname: Specifying the Name of the Data Set Being Altered

Explanation: (*dsname/password ...*) is a required positional parameter specifying the name of the data set or list of names of data sets for which backup attributes are being changed.

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 HALTERDS.

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

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 | 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 | 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.

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.

HALTERDS

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, DFSMSShsm does not maintain any backup versions for the data set. If you reduce the number of backup versions, DFSMSShsm does not delete any existing backup versions when it processes the HALTERDS command. DFSMSShsm 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 DFSMSShsm 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 DFSMSShsm 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 DFSMSShsm 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.CNTRL', 'CRPA.COMMTEST.CLIST', -  
         'CRPA.OUTTESTS.TESTLIST') SYSVERSIONS -  
         SYSFREQUENCY
```

HALTERDS

Chapter 13. HBACKDS—Backing up Data Sets

This chapter describes how to back up data sets using ISMF, TSO, 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.

Panel List Dataset Utilities Scroll Help						
DATA SET LIST						
Enter Line Operators below:				Entries 1-1 of 1 Data Columns 3-6 of 39		
LINE OPERATOR	DATA SET NAME	ALLOC SPACE	ALLOC USED	% NOT USED	COMPRESSED 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.SPFL0G1.LIST	2623	1311	50	???	
	USER20.TEMP.DATASET	4684	93	98	???	
						BOTTOM OF DATA

Command ==>
 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 58. You may 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.

HBACKDS

```

Panel  Utilities  Help
-----
                        HBACKDS ENTRY PANEL

Optionally Specify one or more for
Data Set: USER20.ISMF.JCL

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

Concurrent copy . . . . . (R=Required, P=Preferred,
                          S=Standard or blank)
  If R or P, enter CC option (P=PHYSICAL, L=LOGICAL or blank)

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 14. HBACKDS Entry Panel

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

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 DFSMSshm if you specified *wait for completion=N*.

```

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

Enter Line Operators below:                               Entries 1-1 of 1
                                                           Data Columns 3-6 of 39

LINE      OPERATOR      DATA SET NAME      ALLOC  ALLOC  % NOT  COMPRESSED
SPACE     USED           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.SPFL0G1.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 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.

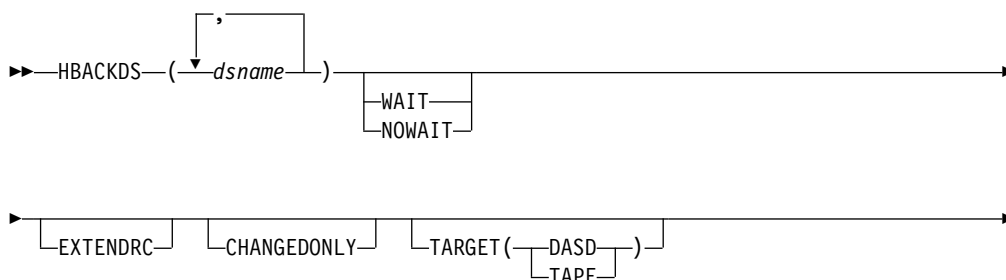
Note: When you back up a data set to DASD, it must fit on a migration level 1 volume. If it does not, the command fails.

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

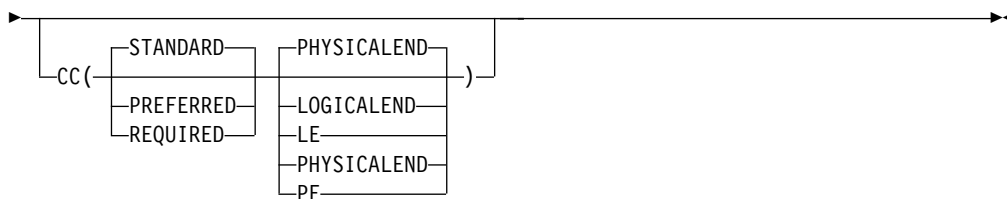
Abbreviation: The minimum abbreviation for the HBACKDS command is HBACK.

Syntax

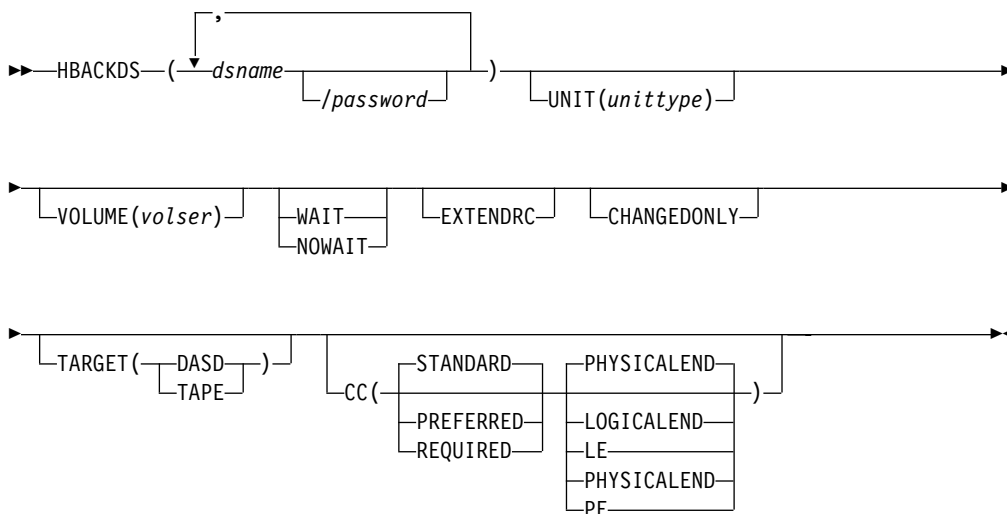
The following diagram presents the syntax of the HBACKDS command for **SMS-managed** data sets:



HBACKDS



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



Note: Parentheses around data set names are required only when multiple dsnames are specified.

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 38.

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.

Optional Parameters

CHANGEDONLY: Specifying Whether to Back Up Only Changed Data Sets

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

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.

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.

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

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 "Return Codes from the Extended Set" on page 172.

HBACKDS

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).

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.

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 | 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.

Explanation: **WAIT | NOWAIT** are mutually exclusive, optional parameters 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(DASD | TAPE): Specifying the Media Target of the Backup Data Set

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

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

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

TAPE indicates that you want the data set 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(STANDARD | PREFERRED | REQUIRED) (PHYSICALEND | LOGICALEND): Tailoring Concurrent Copy Backups for SMS and non-SMS Data Sets

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

Explanation: **CC** is an optional parameter with which you can tailor concurrent copy backups.

STANDARD indicates that you want to use standard backup methods without using concurrent copy.

PREFERRED indicates that you want to use concurrent copy as the preferred 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.

REQUIRED indicates that you want to use concurrent copy as the backup method, and that the data set backup will fail if concurrent copy is not available.

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

LOGICALEND indicates that you want control returned to the application when the concurrent copy initialization has completed.

HBACKDS

Abbreviations: The TSO abbreviation convention applies for CC. An additional abbreviation for PHYSICALEND is PE. An additional abbreviation for LOGICALEND is LE.

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 data set 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 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 that result from filter resolution.

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)
```

Using Inline Backup

The inline backup function allows you to request a backup of a data set 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 DDNAMEs 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 data set to be backed up, specify the name of the data set to be processed by including a valid DD statement with a DDNAME of BACKxxxx (where xxxx is 1–4 characters).

Note: 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.

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 one of the following return codes:

- 0 — All backups were successful.
- 4 — No DDNAMEs prefixed with BACK were found or the JFCB associated with a DDNAME could not be found.
- 8 — Backup of an uncataloged data set was attempted. Uncataloged data sets are not supported by inline backup.
- 12 — Backup of a data set failed. If the return code equals:
 - 100** DFMSHsm is not active; request rejected.
 - 1–99** For message return codes and reason codes, see message ARC13nnl, where nn is the return code.
- 4. 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 conditions can cause a SNAP dump of storage relating to inline backup:
 - 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 68 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 options. For a description of the TARGET options, see “TARGET(DASD | TAPE): Specifying the Media Target of the Backup Data Set” on page 63. For a description of the CC options, see “CC(STANDARD | PREFERRED | REQUIRED) (PHYSICALEND | LOGICALEND): Tailoring Concurrent Copy Backups for SMS and non-SMS Data Sets” on page 63.

HBACKDS

```
//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='TARGET(TAPE),
// CC(PREFERRED,PHYSICALEND)'
//ARCPRI 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 ARGINBAK program is 12, and the resulting messages for each DDNAME prefixed with BACK are described in Figure 17.

```
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 14. HBDELETE—Deleting Backup Versions

This chapter describes how to delete backup versions of 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 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.

Panel List Dataset Utilities Scroll Help					
DATA SET LIST					
Enter Line Operators below:			Entries 1-1 of 1 Data Columns 3-6 of 39		
LINE OPERATOR	DATA SET NAME	ALLOC SPACE	ALLOC USED	% NOT USED	COMPRESSED 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
F10=Left	F11=Right	F12=Cursor			F9=Swap

Figure 18. Data Set List Panel with HBDELETE Selected

The HBDELETE Entry panel appears.

3. Complete the HBDELETE Entry panel as described in Figure 19 on page 72. 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.

HBDELETE

```

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

```

Figure 19. HBDELETE Entry Panel (Part 1 of 5)

```

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

```

Figure 19. HBDELETE Entry Panel (Part 2 of 5)

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		
F10=Left		F11=Right		F12=Cursor		F7=Up		
						F8=Down		
						F9=Swap		

Figure 19. HBDELETE Entry Panel (Part 3 of 5)

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		
F10=Left		F11=Right		F12=Cursor		F7=Up		
						F8=Down		
						F9=Swap		

Figure 19. HBDELETE Entry Panel (Part 4 of 5)

HBDELETE

```

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

```

Figure 19. HBDELETE Entry Panel (Part 5 of 5)

The asterisk next to the HBDELETE in the line operator column in Figure 20 indicates that the deletion was successful.

```

Panel  List  Dataset  Utilities  Scroll  Help
-----
                        DATA SET LIST
Entries 1-1 of 1
Data Columns 3-6 of 39

Enter Line Operators below:

LINE          DATA SET NAME          ALLOC  ALLOC  % NOT  COMPRESSED
OPERATOR      DATA SET NAME          SPACE  USED   USED   FORMAT
---(1)---    -----(2)-----    --(3)-- --(4)-- -(5)-  ---(6)---
              USER20.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.SPFL0G1.LIST    2623    1311    50    ???
              USER20.TEMP.DATASET    4684    93      98    ???
              ----- BOTTOM OF DATA -----

Command ==>
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 After Function Completes

For more information on using DFSMSHsm/ISMF line operators, refer to *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 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

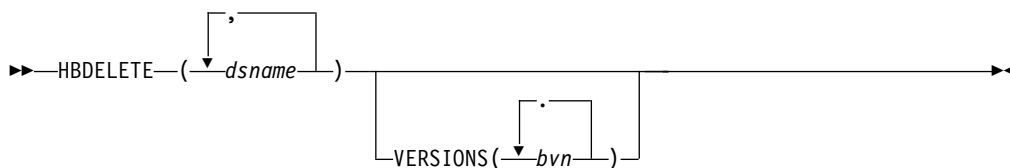
Task: Delete all backup versions of a specific cataloged or uncataloged data set or specific backup versions by version number. A retired version is a specially marked backup version that DFSMSHsm created before it deleted the original data set during the data set retirement space management process. The only way you can delete a retired version is to specify its version number.

RACF Authority: If you want 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.

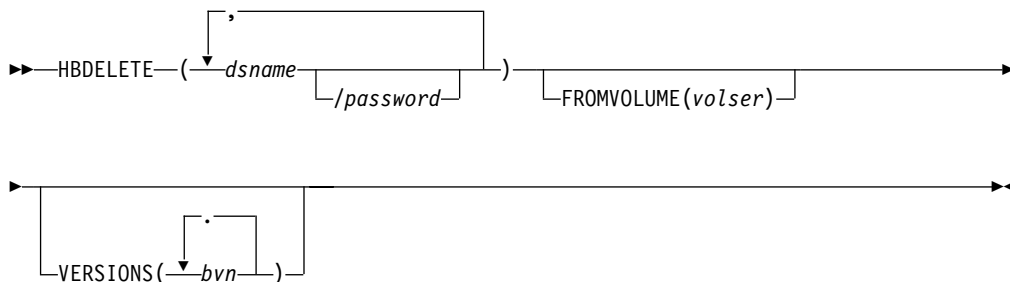
Abbreviation: The minimum abbreviation for the HBDELETE command is HBDEL.

Syntax

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



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



Note: Parentheses around data set names are required only when multiple dsnames are specified.

HBDELETE

Required Parameters

dsname: Specifying the Name of the Data Set Backup Versions to Be Deleted

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 whose backup versions you want to delete.

For *dsname*, substitute 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.

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 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 HBDELETE.

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.

Optional Parameter

FROMVOLUME: Specifying the Volume on Which the Data Set Resided When the Backup Versions Were Created

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

Explanation: **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.

Defaults: None.

Restrictions: 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.

VERSIONS: Specifying the Number of the Backup Versions to Be Deleted

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

Explanation: **VERSIONS**(*bvn* ...) is an optional parameter you use to delete specific backup versions of a data set. You can specify multiple backup version numbers. If you specify multiple data set names and multiple version numbers, DFSMSHsm applies each number you specified with VERSIONS to each data set name you specified with *dsname*. If you do not specify VERSIONS, DFSMSHsm deletes all backup versions of the specified data set.

For *bvn*, substitute the one-to-three digit decimal number of a particular backup version that DFSMSHsm is to delete. You can obtain backup version numbers by issuing an HLIST command and specifying the data set name and the BACKUPCONTROLDATASET parameter.

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

Defaults: None.

Restrictions: None.

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'
```

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)
```

HBDELETE

Chapter 15. 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.

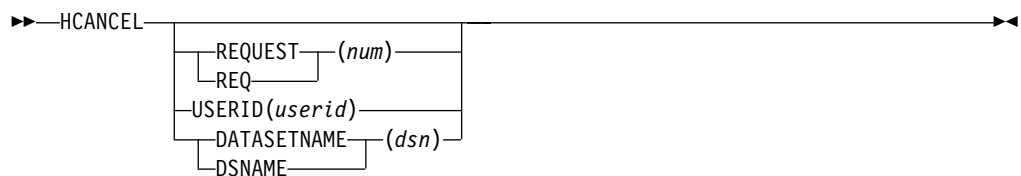
You can determine the request numbers that you have active by using the HQUERY command with the REQUEST parameter. Two commands cannot be canceled: HCANCEL and HQUERY.

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.

HCANCEL

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 user's 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 user's 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. DSNNAME 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')
```

HCANCEL

Chapter 16. HDELETE—Deleting Migrated Data Sets

This chapter 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 21.

```
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          OPERATOR          DATA SET NAME          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.SPFL0G1.LIST    2623   1311    50     ???
                USER20.TEMP.DATASET    4684    93      98     ???
-----      -----      BOTTOM OF DATA      -----

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

Figure 21. Data Set List Panel with HDELETE Selected

The HDELETE Entry panel appears.

3. Complete the HDELETE Entry panel as described in Figure 22 on page 84. (Specify Y in the *wait for completion* field if you want to wait for HDELETE to complete before returning to ISMF.)

HDELETE

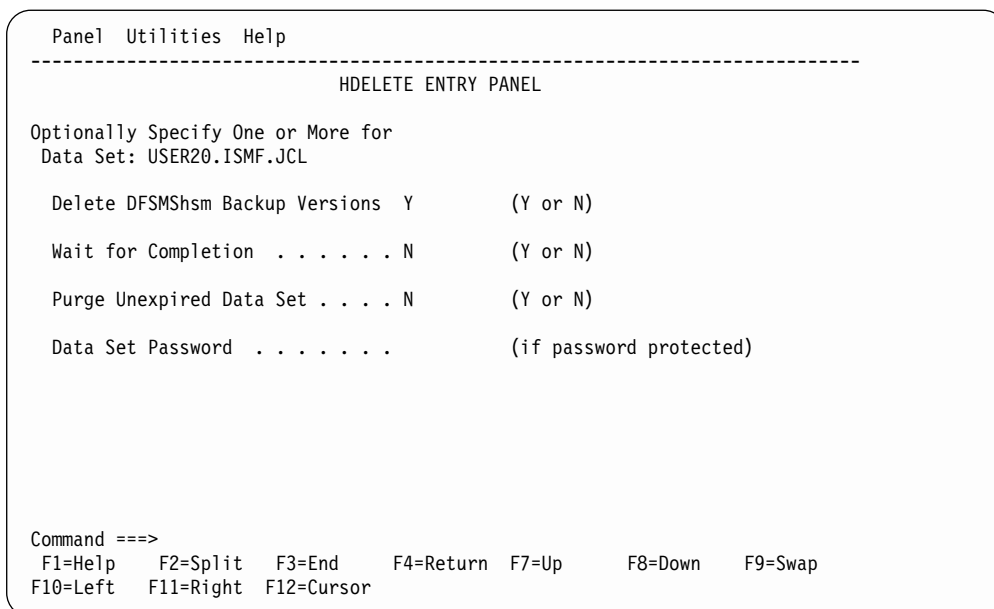


Figure 22. HDELETE Entry Panel

The Data Set List panel appears as shown in Figure 23. 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*.

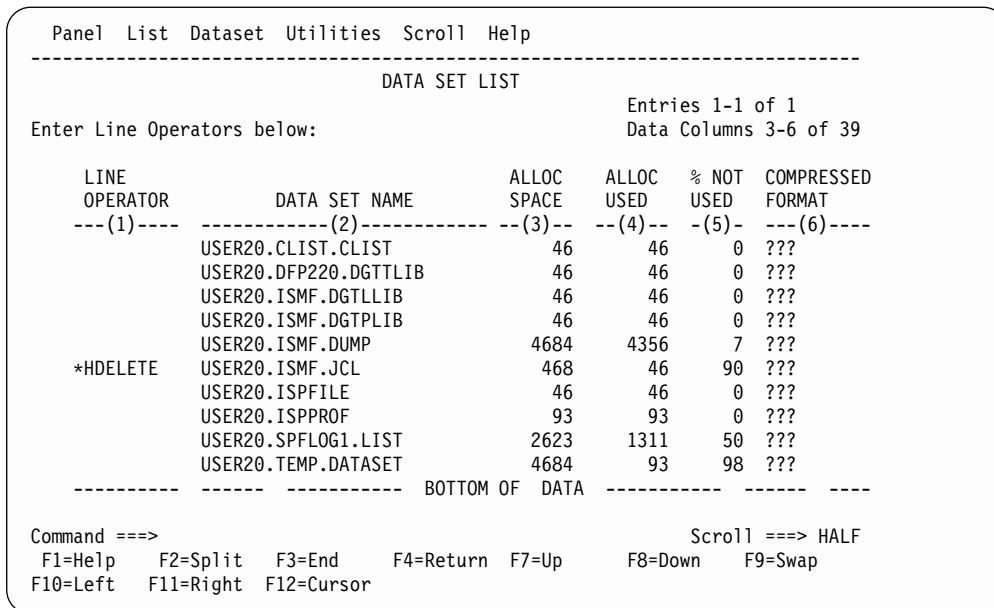


Figure 23. Data Set List Panel after Function Completes

For more information on using DFSMSHsm/ISMF line operators, refer to *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.

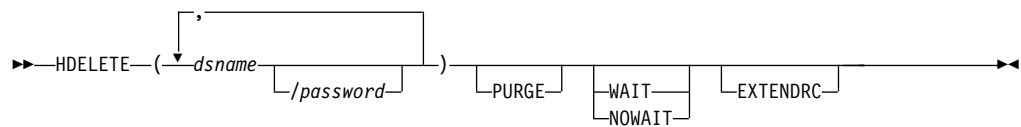
This command deletes both the migrated data set and the data set's catalog entry.

RACF Authority: If you want 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. Parentheses are required only when multiple dsnames are specified.
2. Password does not apply to SMS-managed data sets.

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 38 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.

HDELETE

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 | 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 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 171.

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
```

HDELETE

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 17. HLIST—Listing Information from the BCDS and MCDS

To list information from the BCDS and MCDS use TSO. This command can only be issued directly through TSO.

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.

DFSMSHsm maintains information about the volumes and data sets 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 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.

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
- 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

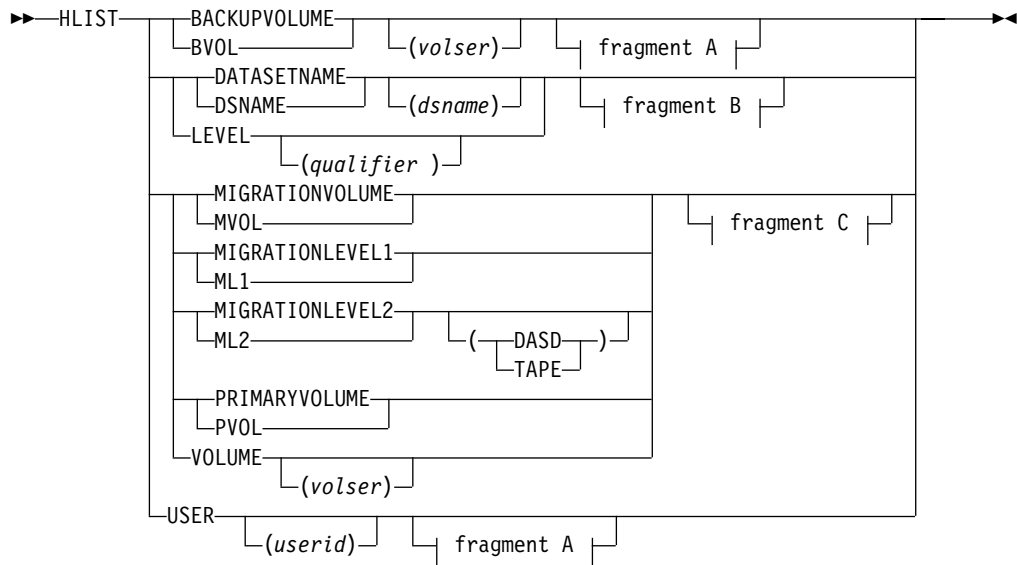
Note: For examples of lists produced by using the HLIST command, see “Sample Lists from the HLIST Command” on page 99.

Abbreviation: The minimum abbreviation for the HLIST command is HL.

HLIST

Syntax

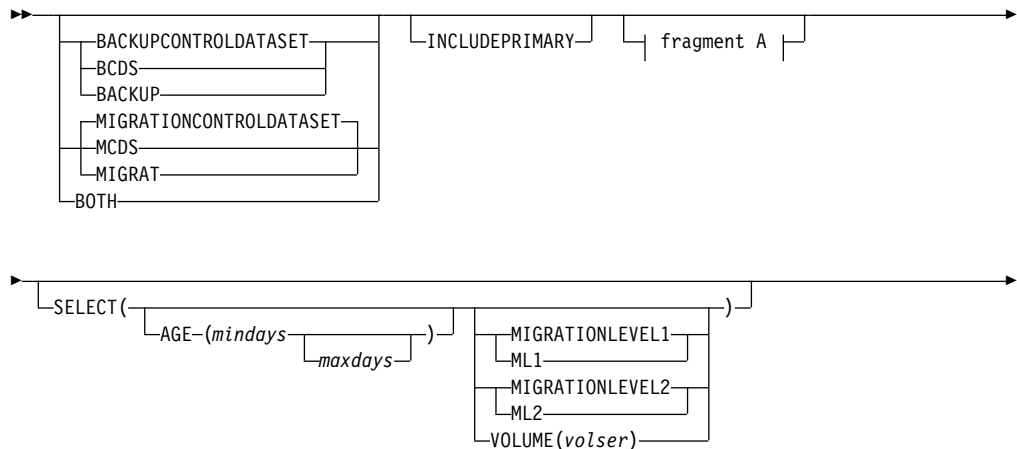
The following diagram presents the syntax of the HLIST command for **both** SMS-managed and non-SMS-managed data sets:

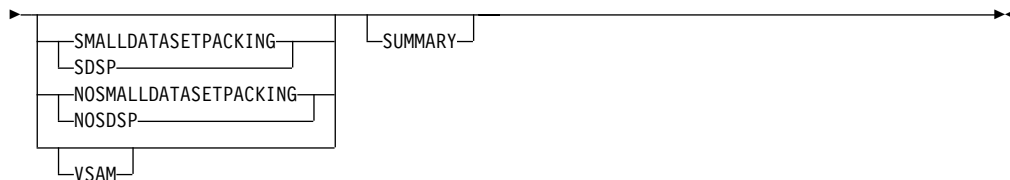


A: HLIST Optional Parameters

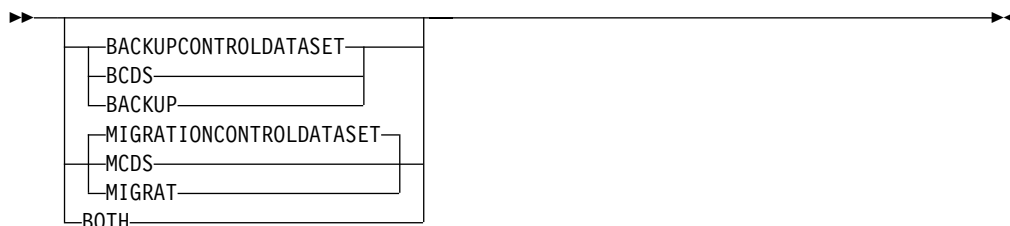


B: HLIST Optional Parameters





C: 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 | 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.

MIGRATIONVOLUME | MIGRATIONLEVEL1 | MIGRATIONLEVEL2 | PRIMARYVOLUME | 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 and Subparameters

BACKUPCONTROLDATASET | MIGRATIONCONTROLDATASET | 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, level, or volume, or for DFSMSHsm-managed volumes. BACKUP is allowed as an alias for BACKUPCONTROLDATASET.

HLIST

MIGRATIONCONTROLDATASET specifies a list of selected information from the MCDS entries for a specific data set, level, or volume, or for DFSMSShsm-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, DFSMSShsm-managed volumes, or migration volumes.

Note: Records of the DFSMSShsm-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, DFSMSShsm 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 May 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. DFSMSShsm 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, DFSMSShsm ignores it.

OUTDATASET | SYSOUT | 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 DFSMSShsm 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.

SELECT: Requesting a List of Only Those Data Set Entries That Meet Selection Criteria

Explanation: **SELECT** is an optional parameter set that you use to request a list containing only selected data set entries. When the DATASETNAME or LEVEL parameter identifies multiple data sets, you use the SELECT parameter to select a subset of data set 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 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(AGE): Selecting Entries Based on Data Set 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 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 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 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 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): 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

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 Only a Summary

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)
```

Sample Lists from the HLIST Command

This section contains examples of printer and terminal lists generated by the HLIST command.

Listing Volume Entries

Table 1 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.

HLIST

Table 1. Headings of Output When You Request Information from the Migration Control Data Set 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	DEV TYP	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, 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.
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.

Table 1. Headings of Output When You Request Information from the Migration Control Data Set for DFSMSHsm-Managed or DASD Migration Volume (continued)

Printer Output Heading	Terminal Label	Description
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	DUMPCCLASS	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 24 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 24. If you request information for more than one volume, the list has multiple entries.

```

-- DFSMSHSM CONTROL DATASET - MIGRATE VOLUME-MCDS--- LISTING ----- AT 09:59:11 ON 01/04/05 FOR SYSTEM=3090
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 1 100 *** .000 **** * NONE *** NO *** 00000K 000012K 01/04/02 23:35 *** ** ** *
MIG102 3390 LEV 1 100 *** .000 **** * NONE *** NO *** 00001K 000023K 01/04/02 23:47 *** ** ** *
MIG103 3390 LEV 1 100 *** .000 **** * NONE *** NO *** 00001K 000004K 01/04/03 00:34 *** ** ** *
----- END OF - MIGRATE VOLUME - LISTING -----

```

Figure 24. Sample Printer List of Migration Volumes from the Migration Control Data Set When You Specify MIGRATIONVOLUME and MIGRATIONCONTROLDATASET

Figure 25 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 25. If you request information for only one volume, the list has one entry.

HLIST

```

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 25. Sample Terminal List of All Volumes from the Migration Control Data Set When You Specify VOLUME and TERMINAL

Table 2 presents the headings of the output when DFSMSHsm lists information from the MCDS for tape migration level 2 volumes.

Table 2. Headings of Output When You Request Information from the 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.
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.

Table 2. Headings of Output When You Request Information from the MCDS for Tape Migration Level 2 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.

Figure 26 is a sample of the printer list of tape migration level 2 volumes when you specify the MIGRATIONLEVEL2(TAPE) parameter and MIGRATIONCONTROLDATASET parameter.

```
-- DFSMSHSM CONTROL DATASET - MIGRATE VOLUME-MCDS--- LISTING ----- AT 09:59:11 ON 01/04/05 FOR SYSTEM=3090
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 1 100 *** .000 **** * NONE *** NO *** 00000K 000012K 01/04/02 23:35 *** ** * *
MIG102 3390 LEV 1 100 *** .000 **** * NONE *** NO *** 00001K 000023K 01/04/02 23:47 *** ** * *
MIG103 3390 LEV 1 100 *** .000 **** * NONE *** NO *** 00001K 000004K 01/04/03 00:34 *** ** * *
----- END OF - MIGRATE VOLUME - LISTING -----

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 DS
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 26. Sample Printer List of Tape Migration Level 2 Volumes When You Specify MIGRATIONLEVEL2(TAPE) and MIGRATIONCONTROLDATASET parameter.

Table 3 presents the headings that appear when you request a list of DFSMSHsm-managed volume information from the backup control data set.

Table 3. Headings of Output When You Request Information for DFSMSHsm-Managed Volumes from the Backup Control Data Set

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.

HLIST

Table 3. Headings of Output When You Request Information for DFSMSHsm-Managed Volumes from the Backup Control Data Set (continued)

Printer Output Heading	Terminal Label	Description
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 27 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
VOLSER  SMS  OWNED BY ICF CATALOG      CATALOG  LAST BACKED UP
PRIM01  NO   NOT OWNED BY A ICF CATALOG    ON VOLSER DATE    TIME  DUMPCLASS DUMPED  TIME  EXP DATE
                                     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 27. Sample Printer List from the 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 4 presents the information included in the list of all backup volumes or of a specific backup volume.

Table 4. 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.

Table 4. Headings of Output When You Request Information for Backup Volumes (continued)

Printer Output Heading	Terminal Label	Description
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.
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	<i>volser</i> 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 28 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 28. If you request information for only one volume, the list has one entry.

HLIST

```

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
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 28. Sample Printer List of All the Backup Volumes When You Specify BACKUPVOLUME

Listing Data Set Entries from the Migration Control Data Set

Table 5 presents the information you receive when you request information from the MCDS for data sets.

Table 5. 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.
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: <ul style="list-style-type: none"> • 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.

Table 5. Headings of Output When You Request MCDS Information for Data Sets (continued)

Printer Output Heading	Terminal Label	Description
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 29 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.

```

----DFSMSshm 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 29. Sample Printer List When You Specify DATASETNAME and MIGRATIONCONTROLDATASET

Figure 30 is a sample printer list of data set entries when you specify the LEVEL parameter.

```

----DFSMSshm 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 30. Sample Printer List of a Group of Data Sets When You Specify LEVEL

Figure 31 is a sample terminal list of data set entries when you specify the LEVEL and TERMINAL parameters.

HLIST

```

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 31. 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 6 presents the following information from the BCDS for all data sets:

Table 6. 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.
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.

Table 6. Headings of Output for All Data Sets When You Request Information from the Backup Control Data Set (continued)

Printer Output Heading	Terminal Label	Description
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.
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.

Figure 32 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.

```

----DFSMSshm CONTROL DATASET - BACKUP DATASET-- LISTING ----- AT 12:02:16 ON 95/02/16 FOR SYSTEM=3090
DSNAME = SMSRLS2.HRL3CR8.N02.KSDS                BACKUP FREQ = 000, MAX BACKUP VERSIONS = 02
      BACKUP VERSION DATA SET NAME                BACKUP FROM  BACKUP  BACKUP  SYS GEN  VER  UNS/  RACF  BACKUP
      VOLUME VOLUME DATE   TIME   CAT  NMBR NMBR RET  IND  PROF
DFHSM.BACK.T145911.SMSRLS2.HRL2CR8.I5047         BACK13 SMS001 95/02/16 11:59:15 YES 000 002 UNS YES NO
DFHSM.BACK.T594911.SMSRLS2.HRL2CR8.I5047         MIG101 SMS001 95/02/16 11:49:59 YES 001 001 NO YES NO
---- END OF - BACKUP DATASET - LISTING ----

```

Figure 32. Sample Printer List of All Data Sets When You Specify DATASETNAME and BACKUPCONTROLDATASET

Figure 33 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.

HLIST

```

DSN=SMSRSL2.HRL2CR8.N02.KSDS                BACK FREQ = ***  MAX VERS=***

BDSN=DFHSM.BACK.T145911.SMSRSL2.HRL2CR8.I5047  BACKVOL=BACK01  FRVOL=SMS001
BACKDATE=95/02/16  BACKTIME=11:59:15  CAT=YES  GEN=000  VER=002  UNS/RET=UNS
RACF IND=NO  BACK PROF=NO

BDSN=DFHSM.BACK.T594911.SMSRSL2.HRL2CR8.I5047  BACKVOL=MIG101  FRVOL=SMS001
BACKDATE=95/02/16  BACKTIME=11:49:59  CAT=YES  GEN=001  VER=001  UNS/RET=NO
RACF IND=NO  BACK PROF=NO

```

Figure 33. Sample Terminal List of All Data Sets When You Specify DATASETNAME, BACKUPCONTROLDATASET, and TERMINAL

Listing Entries of the Latest Backup Version on Backup Volumes

Table 7 presents the following information for data sets whose latest backup version is contained on the specified backup volume:

Table 7. Headings of Output When You Request the Latest Backup Version of Data Sets on Backup Volumes

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.
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.

Figure 34 on page 111 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.

```
- DFSMSshm CONTROL DATASET - LATEST VERSION BACK01-- LISTING -- AT 12:02:20 ON 95/02/16
FOR SYSTEM=3090
```

DATA SET NAME	FROM VOLUME	BACKUP DATE	BACKUP TIME	UNS/RET
SMSRLS2.HRL2CR8.N02.KSDS	SMS001	95/02/16	11:59:15	NO
SMSRLS2.HRL2CR8.N03.KSDS	SMS001	95/02/16	11:59:30	NO
SMSRLS2.HRL2CR8.N04.KSDS	SMS001	95/02/16	11:59:40	NO
SMSRLS2.HRL2CR8.N05.KSDS	SMS001	95/02/16	11:59:49	NO
SMSRLS2.HRL2CR8.N06.KSDS	SMS001	95/02/16	11:59:59	NO

```
----- END OF - LATEST VERSION BACK01 - LISTING -----
```

Figure 34. Sample Printer List When You Specify DATASETNAME and SELECT(VOLUME(volser))

Figure 35 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= SMSRLS2.HRL2CR8.N02.KSDS          BACKVOL=BACK01
FRVOL=SMS001 BACKDATE=95/02/16 BACKTIME=11:59:15 UNS/RET=NO
```

```
ARC0140I LIST COMPLETED,
ARC0140I(CONT)          3 LINE(S) OF DATA OUTPUT
```

Figure 35. 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 29 and Figure 32. If you specify TERMINAL, the lists are in the same format as that described in Figure 33.

Listing User Authorization Status Entries

Figure 36 is a sample printer list of user entries when you specify the USER (userid) parameter.

HLIST

```

--- 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 36. Sample Printer List of User Entries When You Specify USER

Listing a Summary of Data Set Entries

Table 8 presents the following information from the MCDS for the specified data sets:

Table 8. 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 37 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 37. Sample Printer List When You Specify DATASETNAME and SUMMARY

Chapter 18. HMIGRATE—Migrating Data Sets

This chapter 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 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 HMIGRATE line operator in the line operator column next to USER20.ISMF.JCL as described in Figure 38.

```
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          OPERATOR          DATA SET NAME          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.SPFPLOG1.LIST   2623   1311   50    ???
                USER20.TEMP.DATASET    4684   93     98    ???
                -----      BOTTOM OF DATA      -----

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

Figure 38. Data Set List Panel with HMIGRATE Selected

The HMIGRATE Entry panel appears.

3. Complete the HMIGRATE Entry panel as described in Figure 39 on page 114. (Specify Y in the *wait for completion* field if you want to wait for HMIGRATE to complete before returning to ISMF.)

HMIGRATE

```

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  . . 1          (1 or 2)

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 39. HMIGRATE Entry Panel

4. Press ENTER to perform the migration and redisplay the list (see Figure 40).

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

Enter Line Operators below:                               Entries 1-1 of 1
                                                           Data Columns 3-6 of 39

LINE OPERATOR          DATA SET NAME          ALLOC SPACE  % NOT USED  COMPRESSED
---(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.SPFL0G1.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 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 following information applies to both SMS-managed and non-SMS-managed data sets.

Task: Migrate one or more data sets to migration volumes.

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.

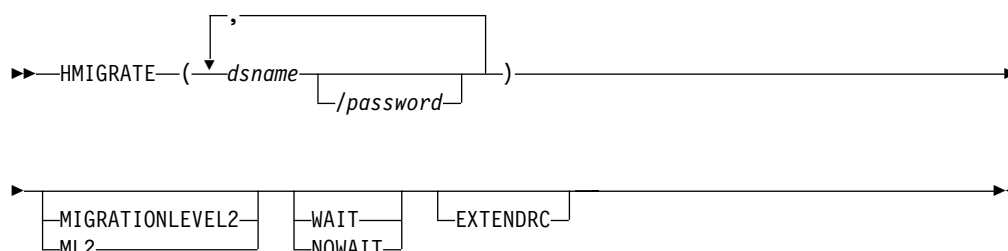
Command migration of SMS-managed data sets is available for eligible data sets only. Data set eligibility is determined by an SMS management class attribute.

RACF Authority: If you want 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:



Notes:

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

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

HMIGRATE

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 38 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, DFSMSShsm authorization checking fails the migration of those data sets that are protected by a different password.
- DFSMSShsm does not process individual partitioned data set members. If you specify a partitioned data set name with a member name, DFSMSShsm 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 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.

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.

WAIT | 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.

EXTENDRC: Requesting an Extended Set of Return and Reason Codes

Explanation: **EXTENDRC** is an optional parameter that specifies 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 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 171.

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 a Password-Protected Data Set to Migrate to a Level 1 Volume

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 to a migration level 1 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 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

HMIGRATE

level 0 volumes directly to migration level 2 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' 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 19. HQUERY—Listing Pending Requests

To list pending requests, use the HQUERY command in TSO. The following discussion applies to both SMS-managed data sets and non-SMS-managed data sets.

Using TSO Commands

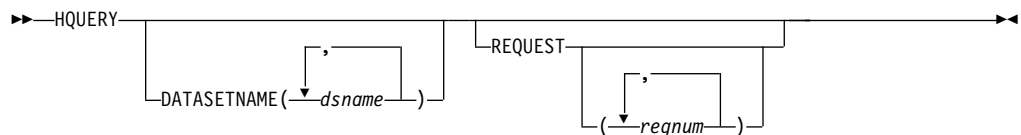
Task: Display pending DFSMSHsm requests associated with your user identification.

You can display specific requests by request number or you can display all the requests for a specific data set name. You can display all requests associated with your user identification by specifying no parameters on the HQUERY command. For an example of the messages displayed in response to an HQUERY command, see “Messages from the HQUERY Command” on page 121.

Abbreviation: The minimum abbreviation for the HQUERY command is HQ.

Syntax

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



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 list the requests associated with the specified data set name(s).

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 either DATASETNAME or REQUEST, the list contains all requests 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.

HQUERY

REQUEST: Specifying a List of Requests by Request Number

Explanation: **REQUEST** is an optional parameter you use to list the requests for the specified request number or numbers. 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.

If you do not specify a *reqnum*, you list all of your outstanding requests.

Abbreviations: The TSO abbreviation convention applies for **REQUEST**. There are no additional abbreviations.

Defaults: If you do not specify either **REQUEST** or **DATASETNAME**, the list contains all requests 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 DFSMSShsm log. Table 9 presents the messages associated with the HQUERY command.

Table 9. Messages Associated with the HQUERY Command

Parameter Name	Message Identification	Message Text
Datasetname Request	ARC0161I	{MIGRATING BACKING UP RECOVERING RECYCLING AUDITING DUMPING RESTORING} VOLUME <i>volser</i> FOR USER { <i>userid</i> **AUTO**}, REQUEST { <i>request</i> NONE}
	ARC0162I	{MIGRATING BACKING UP RECALLING RECOVERING DELETING RESTORING} DATA SET <i>dsname</i> FOR USER <i>userid</i> , REQUEST <i>request</i>
	ARC0165I	USER NOT AUTHORIZED TO QUERY REQUEST FOR OTHER USERIDS OR REQNUM MISSING
	ARC0166I	NO DFSMSShsm REQUEST FOUND FOR QUERY
	ARC0167I	<i>type</i> MWE FOR {VOLUME DATA SET COMMAND AGGREGATE GROUP CONTROL FILE DATA SET} <i>name</i> FOR USER <i>userid</i> , REQUEST <i>reqnum</i> , WAITING TO BE PROCESSED, <i>nmwe</i> MWE(S) AHEAD OF THIS ONE

HQUERY

Chapter 20. HRECALL—Recalling Data Sets

This chapter 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 41.

```
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.SPFPLOG1.LIST   2623   1311   50     ???
              USER20.TEMP.DATASET   4684     93     98     ???
-----  -----  -----  BOTTOM OF DATA  -----

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

Figure 41. Data Set List Panel with HRECALL Selected

The HRECALL Entry panel appears.

3. Complete the HRECALL Entry panel as described in Figure 42 on page 124. (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.)

HRECALL

```

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 42. HRECALL Entry Panel

4. Press ENTER to perform the recall and redisplay the list (see Figure 43).

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

Enter Line Operators below:
Entries 1-1 of 1
Data Columns 3-6 of 39

LINE          OPERATOR          DATA SET NAME          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.SPFL0G1.LIST    2623   1311   50   ???
                USER20.TEMP.DATASET    4684   93     98   ???
-----      -----      BOTTOM OF DATA      -----

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

Scroll ==> HALF

```

Figure 43. Data Set List Panel After Function Completes

For more information on using DFSMSHsm/ISMF line operators, refer to *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.

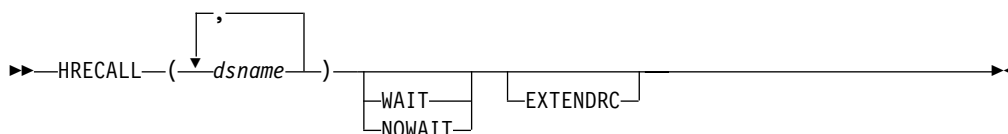
It is not considered an error when you are recalling a data set that is not cataloged to the volume MIGRAT. If this occurs, the informational message ARC1102I will be issued and a zero will be returned in register 15.

RACF Authority: If you want to recall a RACF-protected data set, you must have RACF EXECUTE authority to the data set.

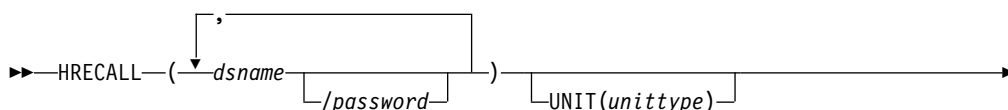
Abbreviation: The minimum abbreviation for the HRECALL command is HRECA.

Syntax

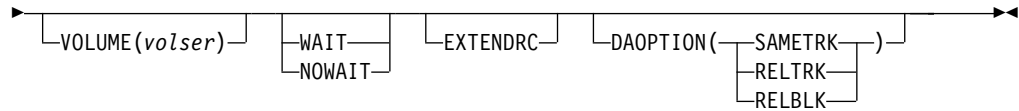
The following diagram presents the syntax of the HRECALL command for **SMS-managed** data sets:



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



HRECALL



Note: Parentheses around data set names are required only when multiple dsnames 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 38 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.
- 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 171.

Abbreviations: The TSO abbreviation convention applies for EXTENDRC.

HRECALL

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 | 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
```

HRECALL

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 Vol

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 21. HRECOVER—Recovering Data Sets

This chapter describes how to recover a backup version or a dump copy of a data set using ISMF or TSO. This command applies to both SMS-managed and non-SMS-managed data sets.

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 44.

```

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          OPERATOR          DATA SET NAME          ALLOC   ALLOC   % NOT   COMPRESSED
                                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 ==>
F1=Help   F2=Split  F3=End    F4=Return F7=Up     F8=Down   F9=Swap
F10=Left  F11=Right F12=Cursor

```

Figure 44. Data Set List Panel with HRECOVER Selected

The HRECOVER entry panel appears.

3. Complete the HRECOVER entry panel as described in Figure 45 on page 132. 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.

HRECOVER

```
Panel Utilities Scroll Help
-----
HRECOVER ENTRY PANEL Page 1 of 6

Specify Y to recover a Backup Version for
Data Set: USER20.SAMPLE.DATASET

Version Date Gennum Recover(Y/N) | Version Date Gennum Recover(Y/N)
-----|-----
100 94100 000 N | 099 94099 001 N
098 94098 002 N | 097 94097 003 N
096 94096 004 N | 095 94095 005 N
094 94094 006 N | 093 94093 007 N
092 94092 008 N | 091 94091 009 N
090 94090 010 N | 089 94089 011 N
088 94088 012 N | 087 94087 013 N
086 94086 014 N | 085 94085 015 N
084 94084 016 N | 083 94083 017 N
082 94082 018 N | 081 94081 019 N

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

Figure 45. HRECOVER Entry Panel (Part 1 of 6)

```
Panel Utilities Scroll Help
-----
HRECOVER ENTRY PANEL Page 2 of 6

Specify Y to recover a Backup Version for
Data Set: USER20.SAMPLE.DATASET

Version Date Gennum Recover(Y/N) | Version Date Gennum Recover(Y/N)
-----|-----
080 94080 020 N | 079 94079 021 N
078 94078 022 N | 077 94077 023 N
076 94076 024 N | 075 94075 025 N
074 94074 026 N | 073 94073 027 N
072 94072 028 N | 071 94071 029 N
070 94070 030 N | 069 94069 031 N
068 94068 032 N | 067 94067 033 N
066 94066 034 N | 065 94065 035 N
064 94064 036 N | 063 94063 037 N
062 94062 038 N | 061 94061 039 N

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

Figure 45. HRECOVER Entry Panel (Part 2 of 6)

```

Panel Utilities Scroll Help
-----
HRECOVER ENTRY PANEL                               Page 3 of 6

Specify Y to recover a Backup Version for
Data Set: USER20.SAMPLE.DATASET

Version Date Gennum Recover(Y/N) | Version Date Gennum Recover(Y/N)
-----|-----
060  94060 040      N           | 059  94059 041      N
058  94058 042      N           | 057  94057 043      N
056  94056 044      N           | 055  94055 045      N
054  94054 046      N           | 053  94053 047      N
052  94052 048      N           | 051  94051 049      N
050  94050 050      N           | 049  94049 051      N
048  94048 052      N           | 047  94047 053      N
046  94046 054      N           | 045  94045 055      N
044  94044 056      N           | 043  94043 057      N
042  94042 058      N           | 041  94041 059      N

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

Figure 45. HRECOVER Entry Panel (Part 3 of 6)

```

Panel Utilities Scroll Help
-----
HRECOVER ENTRY PANEL                               Page 4 of 6

Specify Y to recover a Backup Version for
Data Set: USER20.SAMPLE.DATASET

Version Date Gennum Recover(Y/N) | Version Date Gennum Recover(Y/N)
-----|-----
040  94040 060      N           | 039  94039 061      N
038  94038 062      N           | 037  94037 063      N
036  94036 064      N           | 035  94035 065      N
034  94034 066      N           | 033  94033 067      N
032  94032 068      N           | 031  94031 069      N
030  94030 070      N           | 029  94029 071      N
028  94028 072      N           | 027  94027 073      N
026  94026 074      N           | 025  94025 075      N
024  94024 076      N           | 023  94023 077      N
022  94022 078      N           | 021  94021 079      N

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

Figure 45. HRECOVER Entry Panel (Part 4 of 6)

HRECOVER

```

Panel  Utilities  Scroll  Help
-----
                                HRECOVER ENTRY PANEL                                Page 5 of 6

Specify Y to recover a Backup Version for
Data Set: USER20.SAMPLE.DATASET

Version  Date   Gennum  Recover(Y/N) | Version  Date   Gennum  Recover(Y/N)
-----
020     94020  080     N              | 019     94019  081     N
018     94018  082     N              | 017     94017  083     N
016     94016  084     N              | 015     94015  085     N
014     94014  086     N              | 013     94013  087     N
012     94012  088     N              | 011     94011  089     N
010     94010  090     N              | 009     94009  091     N
008     94008  092     N              | 007     94007  093     N
006     94006  094     N              | 005     94005  095     N
004     94004  096     N              | 003     94003  097     N
002     94002  098     N              | 001     94001  099     N

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

```

Figure 45. HRECOVER Entry Panel (Part 5 of 6)

```

Panel  Utilities  Help
-----
                                HRECOVER ENTRY PANEL                                Page 6 of 6

Optionally specify one or more for
Data Set: USER20.SAMPLE.DATASET

For the Backup Data Set, Specify:
Data Set Password . . . . . (if password protected)
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)

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

```

Figure 45. HRECOVER Entry Panel (Part 6 of 6)

4. Press ENTER to perform the recover and redisplay the list (see Figure 46 on page 135).

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

```

Figure 46. Data Set List Panel After Function Completes

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

Using TSO

The commands for recovering an SMS-managed or a non-SMS-managed data set are different.

When recovering SMS-managed data sets, the SMS allocation services used in your computing center directs the return of your data set. When recovering non-SMS data sets or uncataloged data sets, you can direct the return of your data sets to a specific volume.

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.

HRECOVER

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 DFSMSShsm invoking DFSMSdss to do a restore of the data set. You can read about the decisions that DFSMSShsm makes to select the DFSMSdss copy in z/OS *DFSMSShsm Storage Administration Guide*. 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 DFSMSShsm options set by your installation's system programmer and on the optional parameters that you specify on the HRECOVER command.

RACF Authority:

- If you want 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.
- If you want to recover a RACF-protected data set and you issue the HRECOVER command 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:

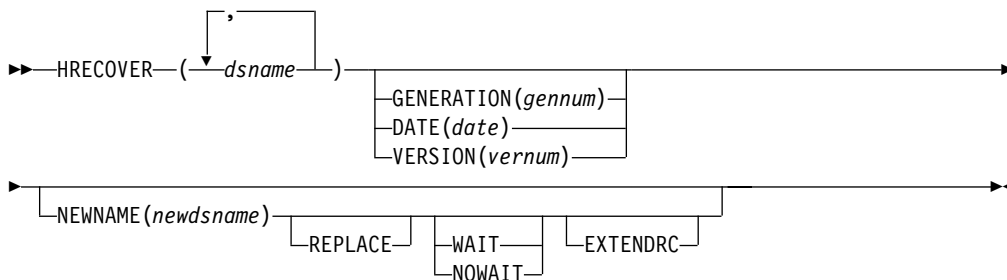
- A RACF profile must exist for the original data set if the original data set was RACF-indicated at the time of backup or recovery.
- A RACF profile must exist for the newname data set if the newname data set exists and is RACF indicated.

Note: In either case, it does not matter if the original data set exists as long as the profile exists.

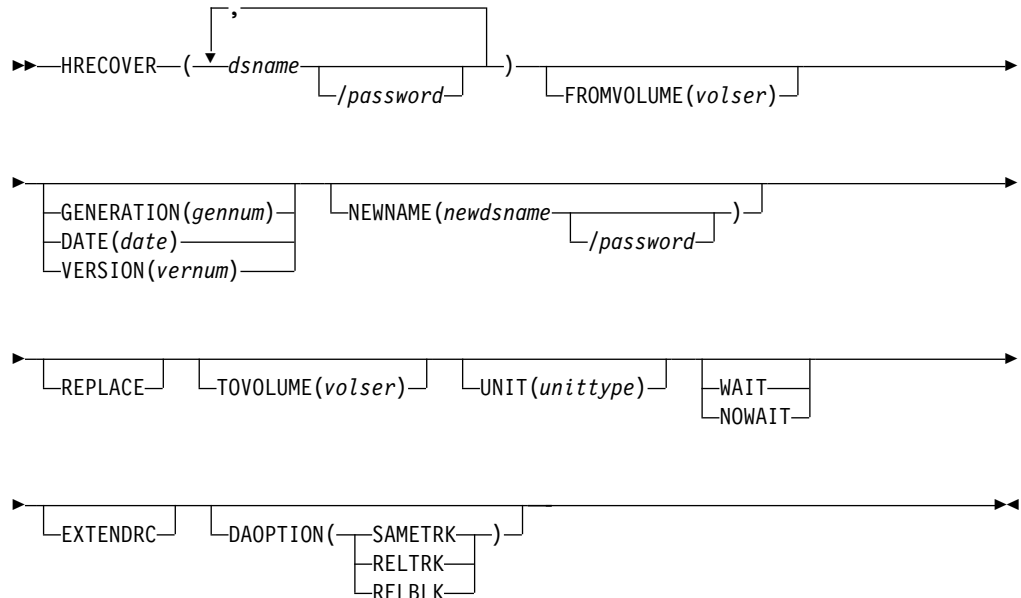
Abbreviation: The minimum abbreviation for the HRECOVER command is HRECOV.

Syntax

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



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



Note: Parentheses around data set names are required only when multiple dsnames 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 38.

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 DFSMSshsm backed up the data set.

HRECOVER

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.

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.

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 171.

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.

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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.

GENERATION | DATE | VERSION: Specifying the Particular Data Set Backup Version to Recover

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

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 that you want to recover.

GENERATION specifies that you want to recover a particular backup version of a specific data set. For *gennum*, substitute the relative generation number of the backup version of the data set 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.

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.

VERSION(*vernum*) specifies that you want to recover a particular unique version of a specific data set. 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.

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. 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.

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**(*newsname*) 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 *newsname*, 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 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.

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- 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 Version Is to Replace Any Existing Data Set 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 with the same data set 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 user's data set, the track overflow feature must be on in both the software and hardware.

WAIT | NOWAIT: Specifying Whether to Wait for the Data Set to Be Recovered

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

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

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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 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.

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)
```

HRECOVER

Part 3. DFSMSHsm Application Programming Interface

Chapter 22. Using DFSMSHsm User Macros

This section 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

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:

- | | |
|--------------------------|--|
| 0 | Function is successful |
| 100 | DFSMSHsm is not running |
| 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 <i>blank</i> |
| 404 | The date specified with ARCHRCOV has format <i>yyddd</i> , but the system date is later than 1999. |
| 806 | Link error |
| Any other nonzero | Function fails |

See “Individual Macros and Their Messages” on page 175.

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 10 presents the unit types and their UCBs that are supported by the user macros in this section.

Table 10. Supported Unit Types and Their UCBs

Unit Type	UCB
3380	X'3010200E'
3390	X'3010200F'
9345	X'00002004'

ASYNCHRONOUS Processing with DFSMSHsm

DFSMSHsm initially provides only two types of submittal requests from users or user programs: the no-wait request and the wait request.

No-wait sends a request to DFSMSHsm and returns 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 or not.

The ASYNC=YES option of the ARCHRCAL and ARCHBACK user macros 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 the ASYNC=YES option will run successfully in your requesting user program, you, as a program submitter, must perform the following tasks:

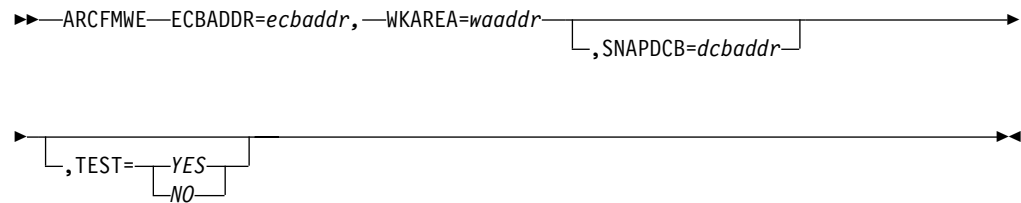
- Ensure that the requesting user program is an authorized program because protected CSA storage is used to communicate the request.
- Specify the ASYNC=YES option and the WAIT=YES option when you code the requested user macro.
- Save the ECB address that is returned in Register 1 and do not free this area until the ECB is posted. When the request is queued in CSA, control is returned to the requestor. Register 1 contains the address of an ECB that will be posted when the request is finished.
- 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

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

SNAPDCB specifies the address of an open DCB that can be used for SNAP processing. If this parameter is specified, the management work element area that is used for the request is written to the specified DCB upon return from DFSMSHsm service processing. This feature is intended for problem determination. For *dcbaddr*, substitute the address of an open DCB.

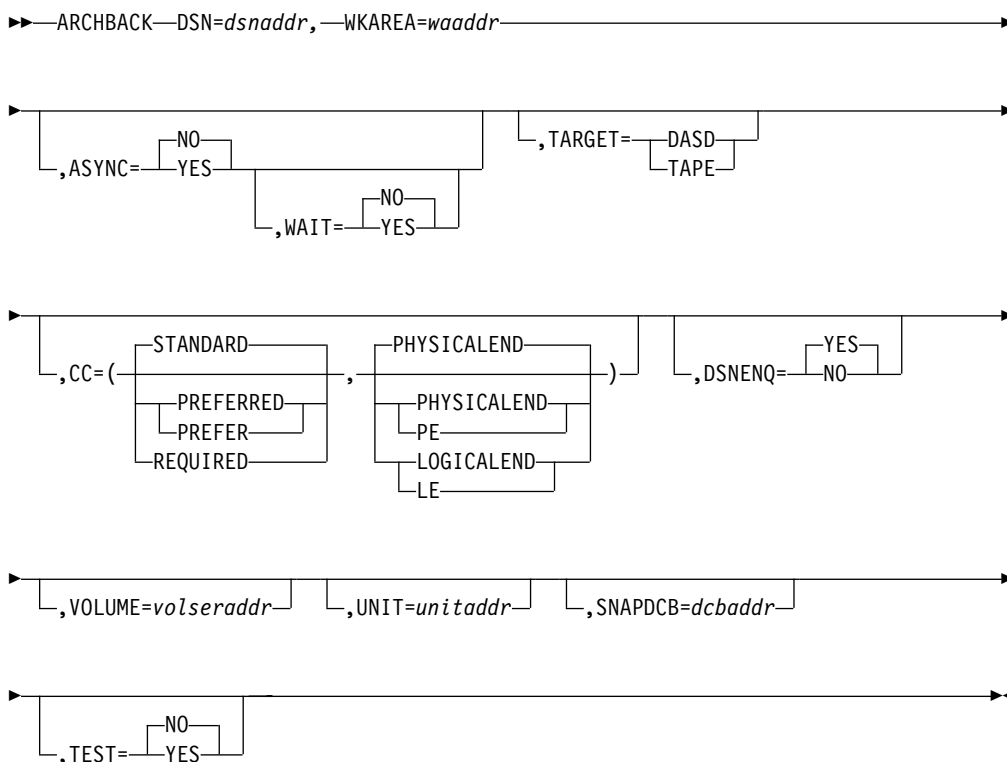
TEST specifies whether to refrain from sending a request for service to DFSMSHsm. If YES is specified the service request is not sent. If NO is specified, a service request is sent to DFSMSHsm. In both cases the parameters are checked for correctness. A 4xx return code will result for invalid parameters. The default is NO.

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.

Syntax

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



This invocation macro must be invoked in a **24-bit** addressing mode, and all memory areas passed to DFSMSHsm through the macro must be below the **16MB** line.

Required Parameters

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 and becomes available to you as soon as the macro returns to your program.

Optional Parameters

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 ASYN option. If ASYN=YES is specified, the WAIT parameter must also be specified as YES to allow the ECB to be posted back to the user when DFSMSShm 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 from the common storage area (CSA), and an event control block (ECB) address is returned in register 1 when control is returned to the requestor. 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. 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 ARCHBACK macro. The last reported, nonzero return code is placed 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 DFSMSShm has processed this request. If you specify YES without ASYN=YES, the application does not receive control back until DFSMSShm 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, DFSMSShm 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, 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, concurrent copy is a requirement, and the command fails if 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.

Notes:

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.

ARCHBACK

3. If you issue ARCHBACK on a down-level system, a warning message relates that you are not receiving all the functions that you expect. DFSMSShm processes the backup request, but ignores all new keywords. A down-level system means any release prior to Version 2 Release 10.

DSNENQ specifies whether the data set is serialized by DFSMSShm 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-DFSMSShm-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 10 on page 150. 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 processing. If this parameter is specified, the management work element area that is used for the request is written to the specified DCB upon return from DFSMSShm service processing. This feature is intended for problem determination. For *dcbaddr*, substitute the address of an open DCB.

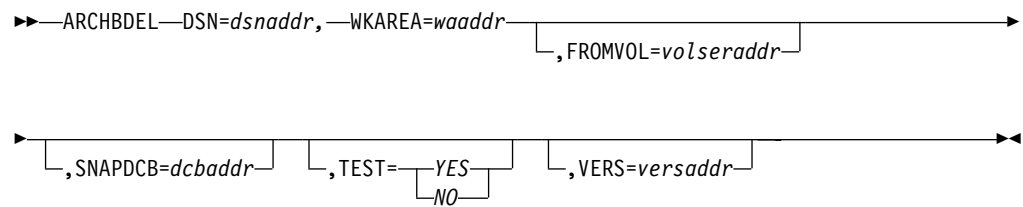
TEST specifies whether to refrain from sending a request for service to DFSMSShm. If YES is specified, the service request is not sent. If NO is specified, a service request is sent to DFSMSShm. In both cases the parameters specified to the macro are checked for correctness. A 4xx return code results for invalid parameters. The default is NO.

ARCHBDEL—Deleting Backed Up Version of Data Sets

The ARCHBDEL macro allows you to delete a backup version of a data set. This macro can handle only one data set at a time. Consequently, the macro must be invoked for each data set processed.

Syntax

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



This invocation macro must be invoked in a **24-bit** addressing mode, and all memory areas passed to DFSMSHsm through the macro must be below the **16MB** line.

Required Parameters

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 is available to you as soon as the macro returns control to your program.

Optional Parameters

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 processing. If this parameter is specified, the management work element area that is used for the request is written to the specified DCB upon return from DFSMSHsm service processing. This feature is intended for problem determination. For *dcbaddr*, substitute 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 4xx return code results for invalid parameters. The default is NO.

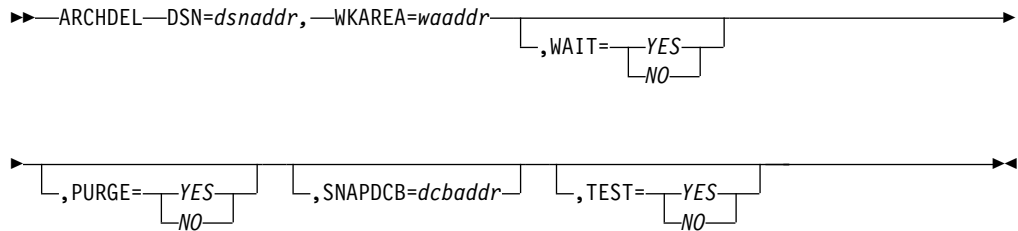
VERS specifies a list of versions to delete. Specify the address of a structure that contains a 2-byte number of entries on the list, followed by entries (2-bytes each) containing the version number (001–999) that you want to delete. You can use the ARCXTRCT macro to extract data for version numbers that currently exist. For more information on this macro, please see “ARCXTRCT—Extracting Data from DFSMSHsm” on page 164. If you do not specify this parameter, all backup versions for this data set are deleted.

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.

Syntax

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



This invocation macro must be invoked in a **24-bit** addressing mode, and all memory areas passed to DFSMSHsm through the macro must be below the **16MB** line.

Required Parameters

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

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 processing. If this parameter is specified, the management work element area that is used for the request is written to the specified DCB upon return from DFSMSHsm service processing. This feature is intended for problem determination. For *dcbaddr*, substitute the address of an open DCB.

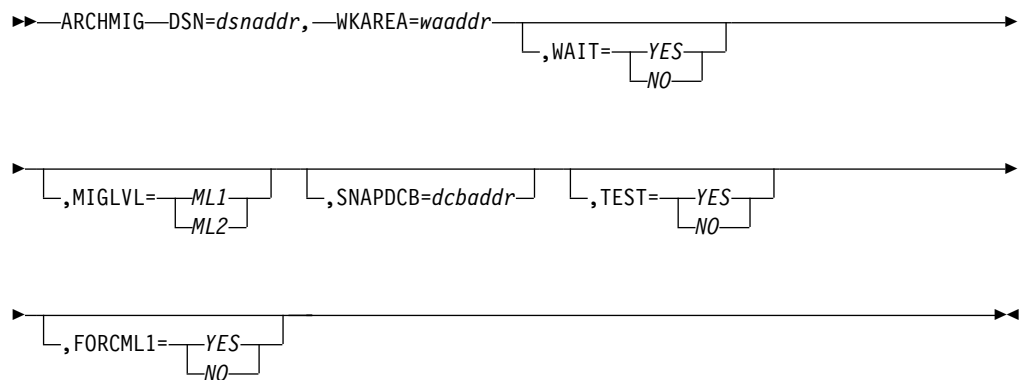
TEST specifies whether to refrain from sending a request for service to DFSMSHsm. If YES is specified, the service request is not sent. If NO is specified, a service request is sent to DFSMSHsm. In both cases the parameters of the macro are checked for correctness. A 4xx return code results for invalid parameters. The default is NO.

ARCHMIG—Migrating Data Sets

The ARCHMIG macro allows you to migrate a data set. This macro can handle only one data set at a time. Consequently, the macro must be invoked for each data set processed.

Syntax

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



This invocation macro must be invoked in a **24-bit** addressing mode, and all memory areas passed to DFSMSHsm through the macro must be below the **16MB** line.

Required Parameters

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

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.

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MIGLVL specifies the migration level, ML1 or ML2, to which you wish to migrate the data set. The default is ML1. 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 processing. If this parameter is specified, the management work element area that is used for the request is written to the specified DCB upon return from DFSMSHsm service processing. This feature is intended for problem determination. For *dcbaddr*, substitute 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 4xx return code results for invalid parameters. The default is NO.

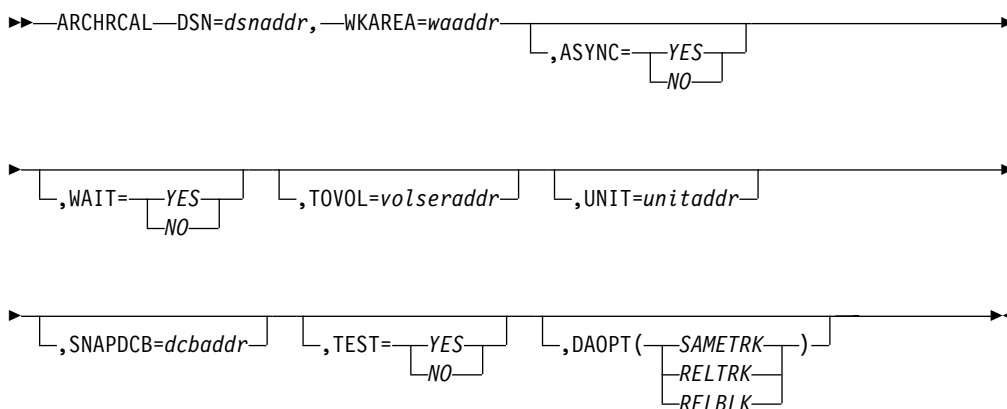
FORCML1 specifies whether or not you want to override the management class parameter of ML1DAYS(0) and force this data set to migrate to ML1. If YES is specified, the data set will be migrated to ML1 without compaction. If NO is specified, the management class criteria will be used to determine if the data set should migrate to ML1 or ML2. The default is NO.

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.

Syntax

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



This invocation macro must be invoked in a **24-bit** addressing mode, and all memory areas passed to DFSMSHsm through the macro must be below the **16MB** line.

Required Parameters

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

ASYNCR specifies whether the special asynchronous recall processing is requested. The requesting application must be authorized by the authorized program facility (APF) to request the ASYNCR option. If ASYNCR=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 from the common storage area (CSA), and an event control block (ECB) address is returned in register 1 when control is returned to the requestor. 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. 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

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

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for a 3390 device. For a table presenting the supported unit type and UCBs, see Table 10 on page 150. 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 processing. If this parameter is specified, the management work element area that is used for the request is written to the specified DCB upon return from DFSMSHsm service processing. This feature is intended for problem determination. For *dcbaddr*, substitute 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 4xx return code results for invalid parameters. The default is NO.

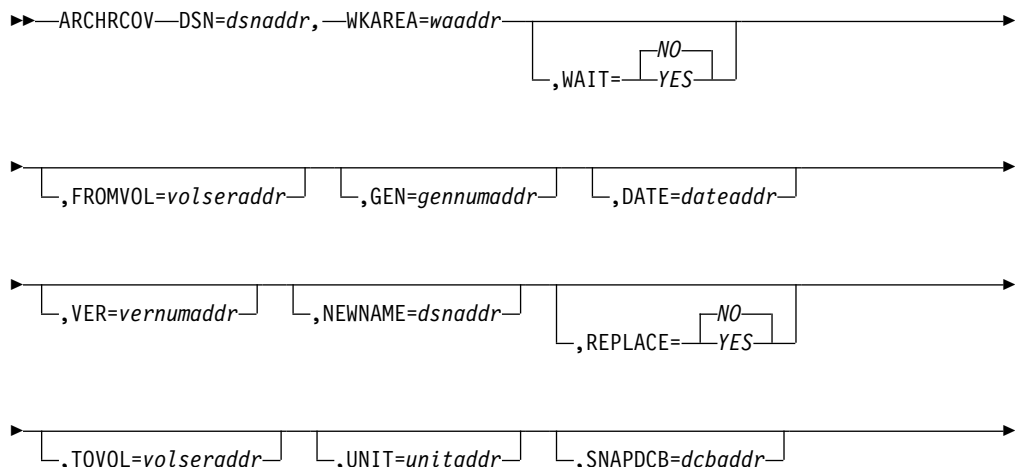
DAOPT specifies the type of data set accessing required after the recall of a direct access data set. This, in turn, implies the allowable target volume DASD types. The recalled data set must be non-SMS-managed. For details on DAOPT see “DAOPTION: Selecting Target Volume Track Length” on page 126.

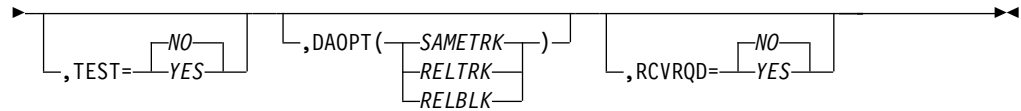
ARCHRCOV—Recovering a Data Set

The ARCHRCOV macro allows you to recover a backup version or a dump copy of a data set. This macro can handle only one data set at a time. Consequently, the macro must be invoked for each data set processed.

Syntax

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





This invocation macro must be invoked in a **24-bit** addressing mode, and all memory areas passed to DFSMSHsm through the macro must be below the **16MB** line.

Required Parameters

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

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.

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 164 to extract data for the generation numbers that currently exist. This parameter applies to both SMS-managed and non-SMS-managed data sets.

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 *yyyddd*.
- If the system date is before 1 January 2000, that field may contain either (a) 7 digits in the format *yyyddd*, 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 19yy) 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

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ARCXTRCT macro in “ARCXTRCT—Extracting Data from DFSMSHsm” on page 164 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.

VER specifies the address of a field containing the unique version number of the particular 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.

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.

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.

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 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 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 10 on page 150. This parameter only applies to non-SMS-managed data sets.

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 processing. If this parameter is specified, the management work element area that is used for the request is written to the specified DCB upon return from DFSMSHsm service processing. This feature is intended for problem determination. For *dcbaddr*, substitute 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 4xx return code results for invalid parameters. The default is NO.

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 138.

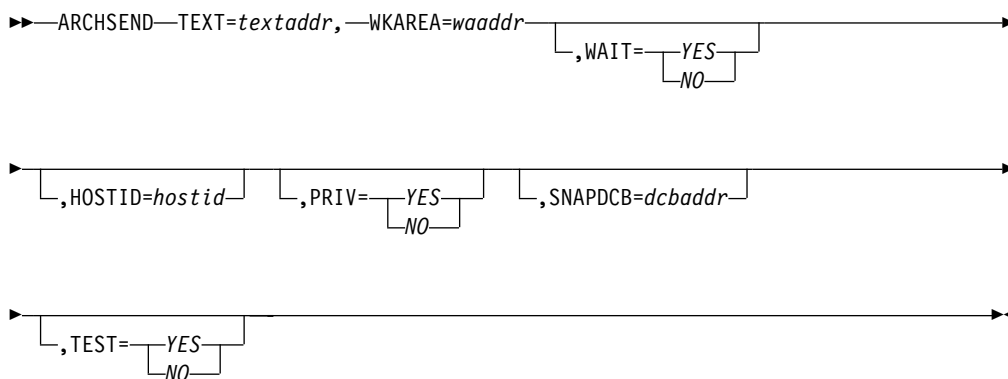
RCVRQD specifies whether to set the recovery required indicator on in the target data set. This parameter should only be used by forward recovery applications. The default is NO. This parameter applies to both SMS-managed and non-SMS-managed data sets.

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.

Syntax

The following diagram presents the syntax of the ARCHSEND macro:



This invocation macro must be invoked in a **24-bit** addressing mode, and all memory areas passed to DFSMSHsm through the macro must be below the **16MB** line.

Required Parameters

TEXT specifies the address of a field containing the command text that is to be passed to DFSMSHsm by the HSEND CMD 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

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, refer to “Startup Procedure Keywords” in *z/OS DFSMSHsm Implementation and Customization Guide*.

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SNAPDCB specifies the address of an open DCB that can be used for SNAP processing. If this parameter is specified, the management work element area that is used for the request is written to the specified DCB upon return from DFSMSHsm service processing. This feature is intended for problem determination. For *dcbaddr*, substitute 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 4xx return code will result for invalid parameters. The default is NO.

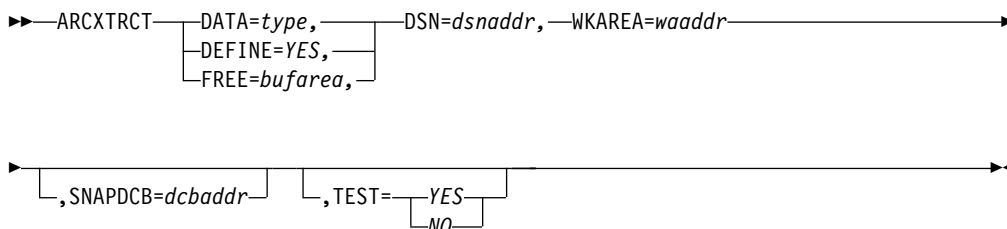
PRIV specifies a reserved keyword for the internal interface from the CATALOG function to DFSMSHsm. If YES is specified, the interface is used. If NO is specified, the interface is not used. The default is NO.

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.

Syntax

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



This invocation macro must be invoked in a **24-bit** addressing mode, and all memory areas passed to DFSMSHsm through the macro must be below the **16MB** line.

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:

1. Extract the data into an extract buffer.

DATA determines the type of data to be extracted.

The following value *type* is permissible:

BUVERS - Extract data about the backup versions for an individual data set. The extract buffer will be a header followed by one or more entries describing each valid backup version. There can be up to 100 versions returned for a single data set. Since 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.

Table 11 shows the layout of the extract header.

Table 11. Extract Header Layout

Offset	Type	Bytes	Name	Description
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 12 shows the layout of each backup version entry.

Table 12. Entry for DATA=BUVERS backup version

Offset	Type	Bytes	Name	Description
0 (0)	Character	108	BUVEENT	ENTRY FOR BACKUP VERSION
0 (0)	Fixed	4	BUVEVER	VERSION NUMBER 001-999
4 (4)	Fixed	4	BUVEGEN	GENERATION NUMBER 0-99
8 (8)	Character	4	BUVEDATE	DATE WHEN BACKUP MADE YYYYDDDF
12 (C)	Character	4	BUVETIME	TIME WHEN BACKUP MADE HHMMSSSTH
16 (10)	Character	16	BUVEOWNR	RESOURCE OWNER
24 (18)	Character	8	BUVEDATA	RESOURCE DATA
40 (28)	Bitstring	4	BUVEFLAG	STATUS FLAGS
	1... ..		BUVEFBWO	BACKUP-WHILE-OPEN CANDIDATE
	.1.. ..		BUVENONQ	NO ENQ ATTEMPTED, SINCE HSM DIRECTED NOT TO
	..1.		BUVEFCAT	CATALOGED WHEN BACKUP MADE
	...1		BUVEFRRR	RLS RECOVERY REQUIRED INDICATOR
 1...		BUVENQN1	ENQ ATTEMPTED, BUT FAILED
1..		BUVENQN2	ENQ ATTEMPT, BACKUP RETRIED, ENQ FAILED AGAIN
xx		*	RESERVED
44 (2C)	Character	8	BUVERLSL	RLS RECOVERY TIMESTAMP LOCAL
52 (34)	Character	8	BUVERLSG	RLS RECOVERY TIMESTAMP GMT
60 (3C)	Character	48	*	RESERVED

The 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.

DSN 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-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.

2. Define 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 11 and Table 12 show the layouts of the data buffer that is returned.

3. Free the extract buffer.

FREE 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

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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 11 on page 165).

Optional Parameters

SNAPDCB specifies the address of an open DCB that can be used for SNAP processing. If this parameter is specified, the management work element area that is used for the request is written to the specified DCB upon return from DFSMSHsm service processing. This feature is intended for problem determination. For *dcbaddr*, substitute that 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 4xx return code results for invalid parameters. The default is NO.

Part 4. Appendixes

Appendix A. DFSMSHsm/ISMF Line Operator Reference Summary

Table 13 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 13. 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

The following return codes (*retcode*) belong to the default set:

Retcode	Meaning
0	No errors are detected. (see note)
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.

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.

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: $HSMRC = (\text{contents of Reg 15} / 65536)$

For reason code: $HSMREAS = (\text{contents of Reg 15} - (HSMRC \times 65536))$

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:

Register 15:

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 on page 174 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.

The following return codes, which belong to the extended set, 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. The values for *retcode* are:

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.
nn	A DFSMSHsm functional failure occurred (the WAIT option was specified) and the MWE return code of the functional failure coincides with ARC xxnn messages as follows: <ul style="list-style-type: none">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 by using LookAt or see *MVS System Messages*. For a description of LookAt, see “Using LookAt to look up message explanations” on page x.

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
    END
ELSE -
    /*IF DATA SET IS NOT MIGRATED OR RECOVERY NOT SUCCESSFUL
    /*ISSUE MESSAGE */
    DO
        WRITE RECOVERY NOT SUCCESSFUL
        EXIT
    END
EXIT

```

Return Codes from User Macros

Programming Interface Information

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.

The following return codes are placed in Register 15 upon completion of the invocation:

Retcode	Meaning
0	Function is successful
100	DFSMSHsm is not running
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 <i>yyddd</i> , but the system date is later than 1999
806	Link error
Any other nonzero	Function fails

End of Programming Interface Information

Individual Macros and Their Messages

Programming Interface Information

The following 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.

Macro	Message
ARCFMWE	None.
ARCHBACK	See ARC13xx for return codes (must use WAIT to get a <i>retcode</i>)*.
ARCHBDEL	See messages ARC0182 and ARC0183.
ARCHDEL	See message ARC11xx for return codes (must use WAIT to get a <i>retcode</i>)*.
ARCHMIG	See message ARC12xx for return codes (must use WAIT to get a <i>retcode</i>)*.
ARCHRCAL	See message ARC11xx for return codes (must use WAIT to get a <i>retcode</i>)*.
ARCHRCOV	See message ARC11xx for return codes (must use WAIT to get a <i>retcode</i>)*.
ARCHSEND	Dependent on the text sent. For instance, if the text indicated MIGRATE, then refer to message ARC12xx (must use WAIT to get a <i>retcode</i>)*.
ARCXTRCT	See message ARC0184I.

*WAIT *must* be coded in the macro in order to get an “any other nonzero” return code.

└ **End of Programming Interface Information** _____

Appendix C. Accessibility

Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, to use software products successfully. The major accessibility features in z/OS enable users to:

- Use assistive technologies such as screen-readers and screen magnifier software
- Operate specific or equivalent features using only the keyboard
- Customize display attributes such as color, contrast, and font size

Using assistive technologies

Assistive technology products, such as screen-readers, function with the user interfaces found in z/OS. Consult the assistive technology documentation for specific information when using it to access z/OS interfaces.

Keyboard navigation of the user interface

Users can access z/OS user interfaces using TSO/E or ISPF. Refer to *z/OS TSO/E Primer*, *z/OS TSO/E User's Guide*, and *z/OS ISPF User's Guide Volume I* for information about accessing TSO/E and ISPF interfaces. These guides describe how to use TSO/E and ISPF, including the use of keyboard shortcuts or function keys (PF keys). Each guide includes the default settings for the PF keys and explains how to modify their functions.

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This book primarily documents information that is NOT intended to be used as Programming Interface of DFSMSHsm.

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Glossary

This glossary defines technical terms and abbreviations used in DFSMSHsm documentation. If you do not find the term you are looking for, refer to the index of the appropriate DFSMSHsm manual or view *IBM Glossary of Computing Terms*, located at <http://www.ibm.com/ibm/terminology>

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Numerics

3480. An IBM 3480 Magnetic Tape Subsystem device that is capable of recording data only in the 3480 format.

3480X. A 3480 XF device or an IBM 3490 Magnetic Tape Subsystem device that is capable of recording data in either the 3480 format or the 3480 XF (IDRC) format. DFSMSHsm can, at the user's option, select either IDRC or non-IDRC recording.

3490. An IBM 3490 Magnetic Tape Subsystem device that records data in the 3480-2 XF format. DFSMSHsm always requests IDRC recording.

3490E. See 3490.

3590. An IBM TotalStorage Enterprise Tape Drive 3590 that operates as a 3590-B1x. See 3590-B1x and 3590-E1x.

3590B1x. An IBM TotalStorage Enterprise Tape Drive 3590 Model B1x that uses the 3590 High Performance Cartridge, writes in 128 track format, and can emulate the 3490 Magnetic Tape Subsystem.

3590E1x. An IBM TotalStorage Enterprise Tape Drive 3590 Model E1xx that uses the 3590 High Performance Cartridge, can read 128 or 256 track format tapes, and writes in 256 track format. This drive emulates either the IBM 3490 magnetic tape drive or the IBM TotalStorage Enterprise Tape Drive 3590 Model B1x.

A

ABARS. Aggregate backup and recovery support.

ABEND. Abnormal end.

ABR. Aggregate backup and recovery record.

ACB. Access control block.

accompany data set. In aggregate backup and recovery processing, a data set that is physically transported from the backup site to the recovery site instead of being copied to the aggregate data tape. It is cataloged during recovery.

ACCOMPANY keyword. The keyword used in the selection data set to create an accompany list.

accompany list. An optional list in the selection data set that identifies the accompany data sets.

ACEE. Access control environment element.

ACS. Automatic class selection.

active data. Data that is frequently accessed by users and that resides on level 0 volumes.

activity log. In DFSMSHsm, a SYSOUT or DASD-type data set used to record activity and errors that occurred during DFSMSHsm processing.

AG. Aggregate group.

aggregate backup. The process of copying the data sets and control information of a user-defined group of data sets so that they may be recovered later as an entity by an aggregate recovery process.

aggregate data sets. In aggregate backup and recovery processing, data sets that have been defined in an aggregate group as being related.

aggregate group. A Storage Management Subsystem class that defines control information and identifies the data sets to be backed up by a specific aggregate backup.

aggregate recovery. The process of recovering a user-defined group of data sets that were backed up by aggregate backup.

AIX. Alternate index.

allocate data set. In aggregate backup and recovery processing, a data set name that is listed in the selection data set. The space for this data set is allocated and the data set is cataloged at the recovery location, but the actual data is not restored.

ALLOCATE keyword. The keyword used in the selection data set to create an allocate list.

allocate list. An optional list in the selection data set that identifies the allocate data sets.

alternate index. In systems with VSAM, a collection of index entries related to a given base cluster and organized by an alternate key, that is, a key other than the prime key of the associated base cluster data records. Its function is to provide an alternate directory for locating records in the data component of a base cluster. See also *path*.

alternate index cluster. In VSAM, the data and index components of an alternate index.

alternate tape volume reference. In DFSMSHsm, additional fields in the TTOC record that record information about the alternate tape volume. These fields provide DFSMSHsm with the necessary information to refer to the alternate tape volume.

alternate tape volumes. In DFSMSHsm, copies of original tape volumes created during tape copy processing. The volumes can either be stored on-site or off-site for use later in the event of a disaster. During the tape replace processing, these volumes can replace the original volumes that may be lost.

APAR. Authorized program analysis report.

APF. Authorized program facility.

ASID. Address space identifier.

ATL. Automated tape library.

audit. A DFSMSHsm process that detects discrepancies between data set information in the VTOCs, the computing system catalog, the MCDS, BCDS, and OCDS.

AUTH. The DFSMSHsm command used to identify an authorized user who can issue DFSMSHsm system programmer and storage administrator commands.

authorized user. In DFSMSHsm, the person or persons who are authorized through the DFSMSHsm AUTH command to issue DFSMSHsm system programmer, storage administrator, and operator commands.

automated tape library. A device consisting of robotic components, cartridge storage frames, tape subsystems, and controlling hardware and software, together with the set of volumes which reside in the library and may be mounted on the library tape drives.

automatic backup. In DFSMSHsm, the process of automatically copying eligible data sets from DFSMSHsm-managed volumes or migration volumes to backup volumes during a specified backup cycle.

automatic cartridge loader feature. A feature of the 3480 Magnetic Tape Subsystem providing the operator with the capability of preloading multiple tapes to be used as migration, backup, or dump tapes.

automatic class selection (ACS). A mechanism for assigning SMS classes and storage groups.

automatic dump. In DFSMSHsm, the process of using DFSMSdss to automatically do a full volume dump of all allocated space on DFSMSHsm-managed volumes to designated tape dump volumes.

automatic interval migration. In DFSMSHsm, automatic migration that occurs periodically when a threshold level of occupancy is reached or exceeded on a DFSMSHsm-managed volume during a specified time interval. Data sets are moved from the volume, largest eligible data set first, until the low threshold of occupancy is reached.

automatic primary space management. In DFSMSHsm, the process of automatically deleting expired data sets, deleting temporary data sets, releasing unused overallocated space, and migrating data sets from DFSMSHsm-managed volumes.

automatic secondary space management. In DFSMSHsm, the process of automatically deleting expired migrated data sets from the migration volumes, deleting expired records from the migration control data set, and migrating eligible data sets from level 1 volumes to level 2 volumes.

automatic space management. In DFSMSHsm, includes automatic volume space management, automatic secondary space management, and automatic recall.

automatic volume space management. In DFSMSHsm, includes automatic primary space management and automatic interval migration.

availability management. In DFSMSHsm, the process of ensuring that a current version (backup copy) of the installation's data sets resides on tape or DASD.

B

backup. In DFSMSHsm, the process of copying a data set residing on a level 0 volume, a level 1 volume, or a

volume not managed by DFSMSHsm to a backup volume. See *automatic backup, incremental backup*.

backup control data set (BCDS). A VSAM, key-sequenced data set that contains information about backup versions of data sets, backup volumes, dump volumes, and volumes under control of the backup and dump functions of DFSMSHsm.

backup copy. In DFSMSHsm, a copy of a data set that is kept for reference in case the original data set is destroyed.

backup cycle. In DFSMSHsm, a period of days for which a pattern is used to specify the days in the cycle on which automatic backup is scheduled to take place.

backup frequency. In DFSMSHsm, the number of days that must elapse since the last backup version of a data set was made until a changed data set is again eligible for backup.

backup profile. In DFSMSHsm, a RACF discrete data set profile associated with the backup version of a cataloged data set that is protected by a RACF discrete data set profile.

backup version. Synonym for backup copy.

backup volume. A volume managed by DFSMSHsm to which backup versions of data sets are written.

backup volume cleanup process. A DFSMSHsm process that scratches data set backup versions that are no longer needed on DASD.

backup VTOC copy data set. In DFSMSHsm, a copy of the VTOC of a volume that was backed up by DFSMSHsm. This VTOC data set contains only part of the data set VTOC entry for each data set from the original data set. This data set is written on a migration level 1 volume.

base cluster. In systems with VSAM, a key-sequenced or entry-sequenced file over which one or more alternate indexes are built. See also *cluster*.

base data component. In VSAM, a component of the base cluster containing data of a data set.

base sysplex. A base (or basic) sysplex is the set of one or more MVS systems that is given a cross-system coupling facility (XCF) name and in which the authorized programs can then use XCF coupling services. A base system does not include a coupling facility. See also *parallel sysplex* and *sysplex*.

BCDS. Backup control data set.

BCR. Backup control record.

BDAM. Basic direct access method.

BSAM. Basic sequential access method.

BVR. Backup cycle volume record.

C

catalog. (1) A directory of files and libraries, with reference to their locations. A catalog may contain other information such as the types of devices in which the files are stored, passwords, blocking factors. (A) (ISO) (2) To enter information about a file or a library into a catalog. (A) (ISO) (3) The collection of all data set indexes that are used by the control program to locate a volume containing a specific data set. (4) To include the volume identification of a data set in the catalog. (5) See *VSAM master catalog, VSAM user catalog*.

CDD. Common data set descriptor record.

CDS. Control data set.

CDT. Class descriptor table.

CF. Coupling facility.

changed data set. In DFSMSHsm, a data set that has been opened for other than read-only access.

CLIST. Command list.

cluster. In systems with VSAM, a named structure consisting of a group of related components, for example, a data component with its index component. See also *base cluster*.

command list. A command procedure containing executable sequences of TSO commands, subcommands, and command procedure statements.

command procedure. In TSO, a data set or a member of a partitioned data set containing TSO commands to be performed sequentially by the EXEC command. See also *command list*.

common data set descriptor record. The record that precedes a user's data set on a DFSMSHsm-owned volume and that is used to return the data set to the user's format.

common filter services. A subcomponent of DFP common services. Common filter services compares data items with filter keys and indicates which data items match the keys and how many matches have been found.

common recall queue (CRQ). A single recall queue shared by multiple DFSMSHsm hosts that enables the recall workload to be balanced across each of those hosts.

common service area (CSA). In OS/VS2, a part of the common area that contains data areas addressable by all address spaces, but protected during its use by the key of the requester.

compaction. In DFSMSHsm, a method of compressing and encoding data that is migrated or backed up.

comprehensive command authority. In DFSMSHsm, allowing a user to issue the ABACKUP command for all aggregate groups.

compress. In DFSMSHsm, to release unused space in a partitioned data set during the migrate/recall and backup/recovery processes.

computing system catalog. In DFSMSHsm, the master catalog and any associated user catalogs used as sources during the audit process.

concurrent copy. A function to increase the accessibility of data by enabling you to make a consistent backup or copy of data concurrent with the usual application program processing.

connected set. A group of tapes volumes that are related to each other because one or more data sets span the physical tape volumes. Or, a single tape volume with a data set or data sets that do not span to any other volumes.

contiguous space. An unbroken consecutive series of storage locations.

control data set. In DFSMSHsm, one of three data sets (BCDS, MCDS, and OCDS) that contain records used in DFSMSHsm processing.

control file. In aggregate backup and recovery processing, one of three aggregate files generated by the aggregate backup process. It contains the catalog, allocation, volume, and related information necessary to perform aggregate recovery.

converter/interpreter processing. The job segment that converts and interprets JCL for MVS.

coupling facility. A special logical partition that provides high-speed caching, list processing, and locking functions in a sysplex.

cross-system coupling facility (XCF). A component of MVS that provides functions to support cooperation between authorized programs running within a sysplex.

CRQ. Common recall queue.

CRQplex. One or more DFSMSHsm hosts that are connected to the same CRQ. There may be multiple CRQplexes within a single HSMplex.

CSA. Common service area.

CSECT. Control section.

CTC. Channel-to-channel.

current backup version. In DFSMSHsm, a backup copy of the data set that was created on a date after the data set was last updated.

CVT. Communications vector table.

cycle start date. In DFSMSHsm, the date a backup cycle, dump cycle, or migration cleanup cycle is started.

D

DADSM. Direct Access Device Space Management.

DAE. Dump analysis elimination.

daily backup volume. In DFSMSHsm, a volume associated with a given day in the backup cycle and assigned to contain backup versions created on that cycle day.

DAIR. Dynamic allocation interface return code.

DASD. Direct access storage device.

DASD calculation services (DCS). A subcomponent of DFP common services. DCS retrieves and calculates data set information for both VSAM and non-VSAM data sets based on the user's input request.

data class. A list of allocation attributes that the system uses for the creation of data sets.

data control block (DCB). A control block used by access method routines in storing and retrieving data.

data file. In aggregate backup and recovery processing, one of three aggregate files generated by the aggregate backup process. It contains the backup copies of the data sets to be recovered.

data migration. See *migration*.

data set change indicator. A bit in the Format 1 data set VTOC entry that indicates whether the data set has been opened for output.

data set deletion. In DFSMSHsm, the space management technique of deleting non-SMS-managed data sets that have not been used for a specified number of days and that do not have expiration date protection.

data set group. Data sets that have the same set of initial characters in their names.

data set organization. The type of arrangement of data in a data set. Examples are sequential organization or partitioned organization.

data set pool. One or more volumes managed by DFSMSHsm to which data sets that have migrated can be recalled, depending on the set of initial characters of the data set name.

data set retirement. In DFSMSHsm, the space management technique of deleting non-SMS-managed data sets that have not been referred to for a specified number of days, and that have a backup version. See also *delete-if-backed-up*.

date last referred to. In DFSMSHsm, the last date when a data set was opened.

DBA. Delete-by-age.

DBU. Delete-if-backed-up.

DCB. Data control block.

DCL. Dump class record.

DCR. Dump control record.

DCS. DASD calculation services.

debug mode. In DFSMSHsm, the method of operation that projects the changes that would occur in normal operation but in which no user data moves.

decompaction. In DFSMSHsm, the process of decoding and expanding data that was compacted during daily space management or backup.

delete-by-age (DBA). In DFSMSHsm, the space management technique of deleting non-SMS-managed data sets that have not been opened for a specified number of days.

delete-if-backed-up (DBU). In DFSMSHsm, the space management technique of deleting non-SMS-managed data sets that have not been opened for a specified number of days, and that have a current backup version. See also *data set retirement*.

demotion. The process of one host losing level functions to another. Both original and promoted hosts can go through the demotion process. See also *promotion*.

DFP. Data Facility Product.

DFP common services. A component of DFP that contains three subcomponents: common filter services (CFS), DASD calculation services (DCS), and device information services (DIS).

DFSMS. Data Facility Storage Management Subsystem.

DFSMSdss. A functional component of DFSMS/MVS used to copy, dump, move, and restore data sets and volumes.

DFSMSHsm. A functional component of DFSMS/MVS used to manage volumes and data sets.

DFSMSHsm-authorized user. In DFSMSHsm, the person or persons who are authorized through the

DFSMSHsm AUTH command to issue system programmer and storage administrator commands.

DFSMSHsm log. In DFSMSHsm, a pair of sequential data sets, X and Y, containing a chronological list of transactions and statistics occurring in DFSMSHsm.

DFSMSdfp. A functional component of DFSMS/MVS used to manage programs, devices, and data.

DFSMSHsm-managed volume. A volume managed by DFSMSHsm containing data sets that are directly accessible to the user.

DFSMSHsm-owned volumes. Storage volumes on which DFSMSHsm stores backup versions, dump copies, or migrated data sets.

DFSMSHsm secondary address space. A separate address space started and controlled by DFSMSHsm to perform aggregate backup or aggregate recovery processing.

DFSORT. An IBM licensed program that serves as a high-speed data processing utility. DFSORT provides an efficient and flexible way to handle sorting, merging, copying and reporting operations as well as versatile data manipulation at the record, field and bit level.

DGN. Dump generation record.

direct access storage device (DASD). A device in which the access time is effectively independent of the location of data.

directed recall. Moving a migrated data set from a level 1 or a level 2 volume to a level 0 volume and specifying the target volume and unit name where the data set can be allocated.

disaster. An unplanned occurrence that keeps a company or organization from conducting its normal business for some time period.

disaster backup. A means to protect a computing system complex against data loss in the event of a disaster.

disaster recovery. A means to replace lost data at another location with sufficient resources in order to resume operation.

discrete backup profile. A RACF profile created when DFSMSHsm backs up a cataloged, RACF-indicated data set.

discrete profile. A RACF profile that contains security information about a specific data set on a particular volume.

disposition processing. In OS/VS, a function performed by the initiator at the end of a job step to keep, delete, catalog, or uncatalog data sets, or to pass them to a subsequent job step, depending on the data

set status of the disposition specified in the DISP parameter of the DD statement.

Distributed System License Option (DSLO). A license option available to IBM customers with a basic license that permits them to copy certain IBM-licensed materials for the purpose of installing multiple systems.

DSLO. Distributed Systems License Option.

DSR. Daily statistics record.

dump. See *full volume dump*.

dump class. A DFSMSHsm-named set of characteristics that describe how volume dumps are managed.

dump copy. In DFSMSHsm, a copy of the volume image produced by the DFSMSdss full volume dump function.

dump cycle. In DFSMSHsm, a period of days for which a pattern is used to specify the days in the cycle on which automatic full volume dump is scheduled to take place.

dump generation. A successful full volume dump of a volume that may contain one to five identical dump copies.

dump VTOC copy data set. In DFSMSHsm, a copy of the VTOC of a volume dumped by DFSMSHsm. This VTOC data set contains only part of the data set VTOC entry for each data set from the original data set. This data set is written on a migration level 1 volume.

DVL. Dump volume record.

DVT. Device vector table.

E

EA. Extended addressability.

EBCDIC. Extended Binary Coded Decimal Interchange Code.

ECB. Event control block.

eligibility age. The number of days since a data set met its criteria to be migrated.

emergency mode. In DFSMSHsm, the method of operation that prevents data set movement and deletion in space management, backup, and recovery processes.

encode. (T) To convert data by the use of a code in such a manner that reconversion to the original form is possible.

erase-on-scratch. A RACF and DFP/XA function that overwrites the space occupied by a data set when the data set is scratched from a DASD device supported by MVS/XA.

ESDS. Entry-sequenced data set.

esoteric unit names. The names a user assigns to I/O devices that have the same device type. When the user specifies the assigned unit name to DFSMSHsm, DFSMSHsm associates the unit name to its device type.

ESTAE. Extended subtask ABEND exit.

ESTAI. Extended subtask ABEND intercept.

exclude data set. In aggregate backup and recovery processing, a data set in the selection data set exclude list. This data set is to be excluded from being processed by aggregate backup.

EXCLUDE keyword. The keyword used in the selection data set to create an exclude list.

exclude list. An optional list in the selection data set that identifies those data sets that are to be excluded from being processed by aggregate backup.

expiration. The removal of a user data set from either a user (non-DFSMSHsm-owned) volume, or from a DFSMSHsm-owned volume when the user data set has been migrated. If there is an explicit expiration date, it is found in the data set VTOC entry for a nonmigrated data set, or in the MCD record for a migrated data set. If there is no explicit expiration date, the management class attributes are checked to determine an implicit expiration date.

extended addressability. A type of extended format VSAM data set that allows greater than 4GB of data storage.

extended format compressed data set. A SAM or VSAM data set whose processing detects errors caused by an incomplete transfer of a physical block of data to a physical record in the data set. Each physical record is ended by a "hidden" suffix. SAM or VSAM processing determines, by examining these suffixes, if a data transfer to a physical record has ended prematurely.

extended remote copy (XRC). A hardware- and software-based remote copy service option that provides an asynchronous volume copy across storage subsystems for disaster recovery, device migration, and workload migration.

extent reduction. In DFSMSHsm, the releasing of unused space, reducing the number of extents, and compressing partitioned data sets.

extents. A continuous space on a direct access storage volume, occupied by or reserved for a particular data set, data space, or file.

F

facility class profile. In DFSMSHsm, the ability to check, through RACF profiles, the console operators' and users' authority to issue ABACKUP or ARECOVER commands.

fallback. Pertaining to returning to use of an earlier release of a program after a later release has been installed and used.

FBA. Fixed-block architecture.

FIFO. First in, first out.

fixed-block architecture. Data stored in blocks of fixed size; these blocks are addressed by block number relative to the beginning of the particular file.

FMID. Function modification identifier.

fragmentation index. The qualitative measure of the scattered free space on a volume.

FSR. Functional statistics record.

full volume dump. In DFSMSHsm, the process of using a DFSMSdss function that backs up the entire allocated space on a volume.

full volume restore. In DFSMSHsm, the process of using a DFSMSdss function that restores the entire volume image.

functional statistics record. A record that is created each time a DFSMSHsm function is processed. It contains a log of system activity and is written to the system management facilities (SMF) data set.

functional verification procedure. A procedure distributed with DFSMSHsm that tests to verify that all basic DFSMSHsm functions are working correctly.

G

GDG. Generation data group.

GDS. Generation data set.

general pool. In a DFSMSHsm environment with JES3, the collection of all DFSMSHsm primary volumes added to that processor that have a mount status of permanently-resident or reserved, that have the automatic recall attribute specified, and that have a mount attribute of storage or private.

generation data group. A collection of data sets with the same base name, such as PAYROLL, that are kept in chronological order. Each data set is called a generation data set.

generic profile. A RACF profile that contains security information about multiple data sets, users, or resources that may have similar characteristics and require a similar level of protection.

global scratch pool. A group of empty tapes that do not have unique serial numbers and are not known individually to DFSMSHsm. The tapes are not associated with a specific device. Contrast with *specific scratch pools*.

GRSplex. One or more MVS systems using global serialization to serialize access to shared resources.

GTF. Generalized trace facility.

H

hardware/software compression facility. A function for both SAM and VSAM extended format compressed data sets that has the ability to utilize either hardware data compression for best performance, or software data compression for DASD space considerations.

high threshold of occupancy. In DFSMSHsm, the upper limit of space to be occupied on a volume managed by DFSMSHsm. Contrast with *low threshold of occupancy*.

HMT. HSM Monitor/Tuner.

HSMplex. One or more DFSMSHsm hosts that share a set of control data sets. The hosts may be on single or multiple z/OS images.

I

ICETOOL. DFSORT's multipurpose data processing and reporting utility.

IDRC. Improved data recording capability.

improved data recording capability. An improved data recording mode that, depending on data set characteristics and machine model, may allow a significant increase in effective cartridge data capacity and performance.

inactive age. In DFSMSHsm, the number of days since the data set was last referred to.

inactive data. Copies of active or low-activity data that reside on DFSMSHsm-owned dump and incremental backup volumes. See also *low-activity data*.

include data set. In aggregate backup and recovery processing, a data set in the selection data set include list. This data set is processed by aggregate backup.

INCLUDE keyword. The keyword used in the selection data set to create an include list.

include list. A required list in the selection data set that identifies the include data sets that are to be processed by aggregate backup.

incremental backup. In DFSMSHsm, the process of copying a data set that has been opened for other than read-only access since the last backup version was created, and that has met the backup frequency criteria.

incremental recovery. Recovery of the latest backup copy of a data set or data sets made by incremental backup.

inline backup. The process of copying a specific data set to a migration level 1 volume from a batch environment. This process allows you to back up data sets in the middle of a job.

installation verification procedure (IVP). A procedure distributed with DFSMSHsm that tests to verify that the basic facilities of DFSMSHsm are functioning correctly.

installation exit. A means specified by an IBM software product by which a customer's system programmers may modify or extend the functions of the IBM software product. Such modifications or extensions consist of exit routines written to replace an existing module of an IBM software product, or to add one or more modules or subroutines to an IBM software product for the purpose of modifying the functions of the IBM software product.

instruction data set. In aggregate backup and recovery processing, a data set that contains instructions, commands, or any data the aggregate backup site defines as needed for aggregate recovery at the recovery site.

instruction file. In aggregate backup and recovery processing, one of three aggregate files generated by the aggregate backup process. It contains the instruction data set.

Interactive Storage Management Facility (ISMF). The interactive panels of DFSMSdfp that allow users and storage administrators access to the storage management functions of DFSMSdss and DFSMSHsm.

Interactive System Productivity Facility (ISPF). An IBM licensed program used to develop, test, and run application programs interactively. ISPF is the interactive access method for all storage management functions.

interval migration. In DFSMSHsm, automatic migration that occurs periodically when a threshold level of occupancy is reached or exceeded on a DFSMSHsm-managed volume during a specified time interval. Data sets are moved from the volume, largest eligible data set first, until the low threshold of occupancy is reached.

IPCS. Interactive problem control system.

ISMF. Interactive Storage Management Facility.

ISPF. Interactive System Productivity Facility.

ISPF/PDF. Interactive System Productivity Facility/Program Development Facility.

IVP. Installation verification procedure.

J

JCL. Job control language.

JES. Job entry subsystem.

JES2. Job entry subsystem 2.

JES3. Job entry subsystem 3.

JFCB. Job file control block.

journal data set. In DFSMSHsm, a sequential data set used by DFSMSHsm for recovery of the MCDS, BCDS, and OCDS. The journal contains a duplicate of each record in the control data sets that has changed since the MCDS, BCDS, and OCDS were last backed up.

K

KB. Kilobyte; 1024 bytes.

key-range data set. A key-sequenced data set that is defined with one or more KEYRANGE groups.

KSDS. Key-sequenced data set.

L

L2CR. Migration level-2 control record.

LE. Logical end.

level functions. (1) Functions that must be performed but need be performed by only one processing unit. Level functions include backing up the control data sets, backing up migrated data sets, deleting expired dump copies, moving backup versions from level 1 volumes to backup volumes, migration cleanup and level-1-to-level-2 migration. (2) See *primary-processing-unit functions*.

level 0 volume. A volume that contains data sets directly accessible by the user. The volume may be either DFSMSHsm-managed or non-DFSMSHsm-managed.

level 1 volume. A volume owned by DFSMSHsm containing data sets that migrated from a level 0 volume.

level 2 volume. A volume under control of DFSMSHsm containing data sets that migrated from a level 0 volume, from a level 1 volume, or from a volume not managed by DFSMSHsm.

like device. Pertaining to (DASD) devices with identical geometry: that is, the same number of bytes per track, the same number of tracks per cylinder, and the same number of cylinders per actuator.

linear data set. In VSAM, a named linear string of data, stored in such a way that it can be retrieved or updated in 4096-byte units.

logical end (LE). Signifies that a concurrent copy environment has been successfully initialized. After logical end, the data is again available for unrestricted application access. Actual movement of data begins after logical end. Contrast with *physical end*.

low-activity data. Data that is infrequently accessed by users and is eligible to be moved or has been moved to DFSMSHsm-owned migration volumes.

low threshold of occupancy. The lower limit of space to be occupied on a volume managed by DFSMSHsm. Contrast with *high threshold of occupancy*.

M

managed volume. See *DFSMSHsm-managed volume* and *primary volume*.

management class. A list of data set migration, backup, and retention attributes that DFSMSHsm uses to manage storage at the data set level.

management work element (MWE). A control block containing the necessary information to direct DFSMSHsm functions.

manual tape library. A set of tape drives defined as a logical unit by the installation together with the set of system-managed volumes which may be mounted on those drives.

master catalog. A key-sequenced data set or file with an index containing extensive data set and volume information that VSAM requires to locate data sets or files, to allocate and deallocate storage space, to verify the authorization of a program or operator to gain access to a data set or file, and to accumulate usage statistics for data sets or files.

MB. Megabyte; 1 048 576 bytes.

MC1. Migration level-1 free space record.

MCA. Migration control data set alias entry record.

MCB. BCDS data set record.

MCC. Backup version record.

MCD. MCDS data set record.

MCDS. Migration control data set.

MCL. Backup CDS backup changed migrated data set record.

MCM. Backup CDS move backup version record.

MCO. Migrated CDS VSAM associations record.

MCP. Eligible volume record.

MCR. Management control record.

MCT. Backup volume record.

MCU. Migration CDS user record.

MCV. Primary and migration volume record.

MCVT. Management communication vector table.

MHCR. Multiple-processing-unit control record.

migration. In DFSMSHsm, the process of moving a cataloged data set from a DFSMSHsm-managed volume to a migration level 1 or migration level 2 volume, from a migration level 1 volume to a migration level 2 volume, or from a volume not managed by DFSMSHsm to a migration level 1 or migration level 2 volume.

migration cleanup. In DFSMSHsm, a process of automatic secondary space management that deletes unnecessary records or migration copies.

migration control data set (MCDS). A VSAM, key-sequenced data set that contains statistics records, control records, user records, records for data sets that have migrated, and records for volumes under migration control of DFSMSHsm.

migration level 1 volume. Level 1 volume.

migration level 2 volume. Level 2 volume.

migration volume. A volume, under control of DFSMSHsm, that contains migrated data sets.

minimal discrete profile. A profile with no access list or model profile. The minimal discrete profile is used when recovering a RACF-indicated data set whose original profile or backup profile no longer exists.

minimum migration age. In DFSMSHsm, the number of days a data set must remain unopened before DFSMSHsm can select it to migrate from a volume.

MIPS. Million instructions per second.

ML1. Migration level 1. Synonym for level 1 volume.

ML2. Migration level 2. Synonym for level 2 volume.

model entity. A model data set name that defines a discrete data set profile for RACF protection.

MSS. Mass Storage System.

MTL. Manual tape library.

multicenter, key-range control data set. A control data set (MCDS or BCDS) that is represented by two or more key-sequenced data set (KSDS) clusters. Each cluster is a single key range. Contrast with *single-cluster, key range control data set*.

multiple-file format. In DFSMSHsm, a 3480 tape format, or the equivalent, that requires a unique standard label data set for each user data set written. When DFSMSHsm writes in multiple-file format, it writes one tape data set for every user data set to all 3480 migration and backup volumes.

multiple DFSMSHsm-host environment. Any environment in which two or more DFSMSHsm hosts share a common set of control data sets.

mutually exclusive parameters. A set of parameters of which only one can be used. If more than one parameter is specified, only the last parameter specified is used.

MVS/Enterprise Systems Architecture (MVS/ESA). An MVS operating system environment that supports accessing of virtual storage in multiple address spaces and data spaces.

MVS/ESA. MVS/Enterprise Systems Architecture.

MVS/Extended Architecture (MVS/XA). An MVS operating system environment that supports 31-bit real and virtual storage addressing, increasing the size of addressable real and virtual storage from 16 megabytes to 2 gigabytes.

MVS/SP™. An IBM licensed program used to control the MVS operating system and to establish a base for an MVS/XA or MVS/370 environment.

MVT. Mounted volume table.

MWE. Management work element.

N

non-DFSMSHsm-managed volume. A volume not defined to DFSMSHsm containing data sets that are directly accessible to users.

O

OCDS. Offline control data set.

O/C/EOV. Open/close/end-of-volume.

OCO. Object code only.

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offline control data set (OCDS). In DFSMSHsm, a VSAM, key-sequenced data set that contains information about tape backup volumes and tape migration level 2 volumes.

online. (1) Pertaining to the operation of a functional unit when under the direct control of a computer. (A) (ISO) (2) Pertaining to a user's ability to interact with a computer. (A) (3) Pertaining to a user's access to a computer via a terminal. (A) (4) Controlled by, or communicating with, a computer.

original tape volume. In DFSMSHsm, a 3480 or 3490 single-file tape volume, or the equivalent, used to store data during migration or backup processing, and from which a copy (called the alternate volume) is made for disaster recovery.

OS/VS2. A virtual storage operating system that is an extension of OS/MVT.

owned space. The storage space on a set of volumes to which DFSMSHsm allocates migrated data sets and backup versions, but to which user jobs should not allocate. Included in this set are migration level 1, migration level 2, and backup volumes.

owned volume. A volume on which DFSMSHsm writes dump, migration, or backup data sets.

P

parallel sysplex. A sysplex with one or more coupling facilities. See also *base sysplex* and *sysplex*.

partitioned data set (PDS). A data set in DASD that is divided into partitions, called members, each of which can contain a program, part of a program, or data.

partitioned data set extended (PDSE). A DFP library structure that is an enhanced replacement for a partitioned data set.

path. (1) (T) In a network, any route between any two nodes. (2) In a data base, a sequence of segment occurrences from the root segment to an individual segment. (3) In VSAM, a named, logical entity providing access to the records of a base cluster either directly or through an alternate index. (4) In an online IMS/VS system, the route a message takes from the time it is originated through processing; in a multisystem environment, the route can include more than one IMS/VS system.

PCDD. Pseudo common data set descriptor (CDD) record.

PDA. Problem Determination Aid.

PDF. Program Development Facility.

PDS. Partitioned data set.

PDSE. Partitioned data set extended.

PE. Physical end.

peer-to-peer remote copy (PPRC). A hardware-based remote copy option that provides a synchronous volume copy across storage subsystems for disaster recovery, device migration, and workload migration.

physical data set restore. In DFSMSHsm, the process of using a DFSMSdss function to restore one data set from a dump copy created by using the DFSMSHsm full volume dump function.

physical end (PE). Signifies that the concurrent copy process has finished copying the data to the output device. Contrast with *logical end*.

physical sequential. See *sequential data set*.

pool of volumes. See *data set pool*, *general pool*, and *volume pool*.

PPRC. Peer-to-peer remote copy.

primary processing unit. In a multiple processing-unit-environment, the processing unit assigned to do level functions for backup and dump. Level functions for backup are: backup of CDS, move backup versions, and backup of migrated data sets. Level functions for dump are: delete expired dump copies, and delete excess dump VTOC copy data sets.

primary-processing-unit functions. (1) The level functions (backing up migrated data sets, deleting expired dump copies, and moving backup versions from level 1 volumes backup volumes) that must be performed by the primary processing unit. (2) See *level functions*.

primary volume. A non-SMS volume managed by DFSMSHsm containing data sets that are directly accessible to the user.

problem determination aid trace. This data set is used to gather information about DFHSM processing.

promotion. The process of one host taking over level functions for another. See also *demotion*.

PSCB. Protected step control block.

PSP. Preventive service planning.

PSW. Program status word.

PTF. Program temporary fix.

Q

quiesce time. A time of day after which an automatic function does not start processing any more volumes.

R

RACF. Resource Access Control Facility.

recall. The process of moving a migrated data set from a level 1 or level 2 volume to a DFSMSHsm-managed volume or to a volume not managed by DFSMSHsm.

reconnection. In DFSMSHsm, the process by which an unchanged data set recalled from a migration Level 2 tape is space managed by reestablishing access to the migration copy from which it was recalled, rather than by moving the data set and creating a new migration copy.

record-level sharing (RLS). An extension to VSAM that provides direct shared access to a VSAM data set from multiple systems using cross-system locking.

recovery. In DFSMSHsm, the process of copying a backup version of a data set from a backup volume to a specified volume or to the volume from which the backup version was created.

recycle process. A DFSMSHsm process that, based on the percentage of valid data on a tape backup or migration level 2 volume, copies all valid data on the tape to a tape spill backup or migration level 2 volume.

reentrant. The attribute of a program or routine that allows the same copy of that program or routine to be used concurrently by two or more tasks.

Resource Access Control Facility (RACF). An IBM licensed program that provides access control by identifying and by verifying users to the system. RACF authorizes access to protected resources, logs unauthorized access attempts, and logs accesses to protected data sets.

restart data set. A data set created by DFSMSHsm if aggregate recovery fails. It contains a list of all the data sets successfully restored during the aggregate recovery and allows the user to restart the aggregate recovery after the cause of the failure has been resolved.

restore. In DFSMSHsm, the process of invoking DFSMSdss to perform the program's recover function. In general, it is to return to an original value or image, for example, to restore data in main storage from auxiliary storage.

restricted command authority. In DFSMSHsm, allowing a user having at least read authority to each data set within an aggregate group to process ABACKUP or ARECOVER.

retired version. In DFSMSHsm, a specially marked backup version that DFSMSHsm created before it deleted the non-SMS-managed original data set during data set retirement.

retirement. See *data set retirement*.

REXX. Restructured extended executor.

RLS. Record level sharing.

roll off. When a new backup, dump, or generation data set copy is created, the oldest copy becomes a candidate for deletion, to maintain a customer-specified limit.

RPL. Request parameter list. Part of VSAM control block.

RRDS. Relative record data set.

S

SAF. System authorization facility.

SAQ. Supplement for additional quantities.

SCP. System control programming.

SDSP. Small data set packing.

secondary address space. Synonym for DFSMSHsm secondary address space.

selection data set. In aggregate backup and recovery processing, a sequential data set or a member of a partitioned data set used to define the data sets that compose the input to the aggregate backup function. It contains any include, exclude, accompany, or allocate lists.

sequential data set. A data set whose records are organized on the basis of their successive physical positions, such as on magnetic tape.

similar device. A (DASD) device with the same number of bytes per track and tracks per cylinder.

single-cluster control data set. A control data set (MCDS or BCDS) that is represented by a single VSAM key-sequenced data set (KSDS) cluster. This can be a key-range or non-key-range cluster.

single-file format. In DFSMSHsm, a 3480 or 3490 format, or the equivalent, consisting of one standard-label data set that spans up to 255 tape volumes.

single DFSMSHsm-host environment. Any environment in which a single DFSMSHsm host has exclusive use of a set of control data sets.

small data set packing (SDSP). In DFSMSHsm, the process used to migrate data sets that contain equal to or less than a specified amount of actual data. The data sets are written as one or more records into a VSAM data set on a migration level 1 volume.

small-data-set-packing data set. In DFSMSHsm, a VSAM key-sequenced data set allocated on a migration level 1 volume and containing small data sets that have migrated.

SMF. System Management Facilities.

SMP. System Modification Program.

SMP/E. System Modification Program Extended.

SMS. Storage Management Subsystem.

SMS class. A list of attributes that SMS applies to data sets having similar allocation (data class), performance (storage class), or availability (management class) needs.

SMS-managed data set. A data set that has been assigned a storage class.

space manager. Synonym for storage administrator.

space management. In DFSMSHsm, the process of managing aged data sets on DFSMSHsm-managed and migration volumes. The three types of space management are: migration, deletion, and retirement.

spanning data sets. Data sets that span one or more tape volumes. The tape volumes that are spanned are part of a connected set. See also *connected set*.

specific scratch pool. A group of empty tapes with unique serial numbers that are known to DFSMSHsm as a result of being defined to DFSMSHsm with the ADDVOL command.

spill backup volume. A volume owned by DFSMSHsm to which all but the latest backup version of a data set are moved when more space is needed on a DASD daily backup volume or all valid versions are moved when a tape backup volume is recycled.

spill process. A DFSMSHsm process that moves all but the latest backup version of a data set from a DASD daily backup volume to a spill backup volume.

SSF. Software Support Facility.

SSI. Subsystem interface.

SSM. Secondary space management.

SSSA. Subsystem option block extension for SMS.

storage administrator. In DFSMSHsm, the person who is authorized through the DFSMSHsm AUTH command to issue DFSMSHsm system programmer and storage administrator commands, who can affect the authority of other DFSMSHsm users, and who controls the ways DFSMSHsm manages DASD space.

storage class. A named list of data set storage service attributes that identifies performance and availability requirements. SMS uses these attributes to control data placement.

storage group. (1) A named list of DASD volumes used for allocation of new SMS-managed data sets, or a dummy storage group, or a VIO storage group. (2) 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 hierarchy. An arrangement in which data may be stored in several types of storage devices that have different characteristics such as capacity and speed of access.

Storage Management Subsystem (SMS). An operating environment that helps automate and centralize the management of storage. To manage storage, SMS provides the storage administrator with control over data class, storage class, management class, storage group, and ACS routine definitions.

suballocated file. A VSAM file that occupies a portion of an already defined data space. The data space may contain other files. Contrast with *unique file*.

subsystem interface (SSI). The means by which system routines request services of the master subsystem, a job entry subsystem, or other subsystems defined to the subsystem interface.

SVC. Supervisor call instruction.

sysplex. A set of MVS or z/OS systems communicating and cooperating with each other through certain multisystem hardware components and software services to process customer workloads. This term is derived from *system complex*. See also *base sysplex* and *parallel sysplex*.

sysplex timer. An IBM unit that synchronizes the time-of-day (TOD) clocks in multiple processors or processor sides.

system-managed storage. An approach to storage management in which the system determines data placement and an automatic data manager handles data backup, movement, space, and security.

T

take back. Process performed by a demoted host to take back the level functions that have been taken over by a promoted host.

TCB. Task control block.

threshold of occupancy. A limit of occupied space on a volume managed by DFSMSHsm.

time sharing option (TSO). An option on the operating system for a System/370 that provides interactive time sharing from remote terminals.

TIOT. Task input/output table.

TMP. Terminal monitoring program.

TOD. Time of day.

trace. (1) A record of the execution of a computer program that exhibits the sequence in which the instructions were executed. (2) To record a series of events as they occur.

TSO. Time sharing option.

TSO/E. Time sharing option/extended.

TTOC. Tape table of contents record.

TVT. Tape volume table.

U

UCB. Unit control block.

UID. The DFSMSHsm authorized-user identification in 1 to 7 characters.

undirected recall. In DFSMSHsm, moving a migrated data set from a level 1 or level 2 volume to a level 0 volume without specifying the target volume or unit where the volume can be allocated. Undirected recall can be automatic or by command.

unique file. A VSAM file that occupies a data space of its own. The data space is defined at the same time as the file and cannot contain any other file. Contrast with *suballocated file*.

unlike device. A DASD device with a different number of bytes per track and tracks per cylinder, or both.

user catalog. An optional catalog used in the same way as the master catalog and pointed to by the master catalog. Use of user catalogs lessens the contention for the master catalog and facilitates volume portability.

user exit. A programming service provided by an IBM software product that may be requested during the execution of an application program that transfers control back to the application program upon the later occurrence of a user-specified event.

V

VAC. Volume activity count record.

virtual DASD. In DFSMSHsm, this refers to the 3850 Mass Storage System (MSS).

virtual storage access method (VSAM). An access method for indexed or sequential processing of fixed and variable-length records on direct access devices. The records in a VSAM data set or file can be organized in logical sequence by a key field (key sequence), in the physical sequence in which they are written on the data set or file (entry-sequence), or by relative-record number.

virtual storage constraint relief (VSCR). A function that increases the amount of storage available for the user's application program.

volume. (1) A certain portion of data, together with its data carrier, that can be handled conveniently as a unit. (ISO) (2) A data carrier that is mounted and demounted as a unit, for example, a reel of magnetic tape, a disk pack. (ISO) (3) That portion of a single unit of storage that is accessible to a single read/write mechanism, for example, a drum, a disk pack, or part of a disk storage module. (4) A storage medium that is mounted and demounted as a unit; for example, magnetic tape or diskette.

volume pool. In DFSMSHsm, a set of related primary volumes. When a data set is recalled, if the original volume that it was on is in a defined volume pool, the data set can be recalled to one of the volumes in the pool.

volume serial number. An identification number in a volume label that is assigned when a volume is prepared for use in the system.

volume table of contents (VTOC). (1) A table on a direct access volume that describes each data set on the volume. (2) An area on a disk or diskette that describes the location, size, and other characteristics of each file and library on the disk or diskette.

VSA. VSAM data set allocation control block.

VSAM. Virtual storage access method.

VSAM sphere. A sphere containing the following eight components: base cluster, base data object, base index object, base path, alternate index, alternate index data object, alternate index index object, and alternate index path.

VSCR. Virtual storage constraint relief.

VSR. Volume statistics record.

VTOC. Volume table of contents.

VTOC copy data set. A data set that contains a copy of the VTOC entry for each data set that DFSMSHsm backs up or dumps.

VTs. Virtual tape server.

VVDS. VSAM volume data set.

W

WPCDD. ABACKUP/ARECOVER pseudo CDD parameter list.

WWFSR. ABACKUP/ARECOVER backup and recovery record.

X

XCF. Cross-system coupling facility.

XRC. Extended remote copy.

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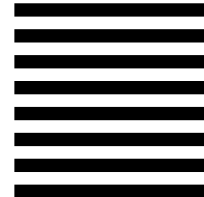
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