

(OA63130) UNIX File Backup of INUSE Files Publication Updates

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1 z/OS DFSMSHsm Storage Administration

SC23-6871

1.1 z/OS DFSMSHsm Storage Administration Guide

1.1.1 Chapter 6. Availability management of SMS-managed storage

Under “Command availability management” the section “Using the data set or UNIX file backup by command capabilities” is updated to include a bullet point about tailoring how backup copies of in-use UNIX files are made. This bullet point will point to a new section “Backing up UNIX files in use at the time of backup” which will be a section under “Using the data set or UNIX file backup by command capabilities.”

1.1.1.1 Command availability management

Using the data set or UNIX file backup by command capabilities

The data set back up by command function provides the following capabilities:

- Up to 64 data sets or UNIX files per host can be backed up at one time.
- Data sets or UNIX files can be backed up directly to DASD or to tape.
- If concurrent copy is specified, users are notified when the data set or UNIX file backup is either logically or physically complete. Concurrent copy supports non-SMS data sets or UNIX files contained in a non-SMS managed zFS, or if specified on the command, concurrent copy overrides the management class for an SMS data set or UNIX files contained in a non-SMS managed zFS.
- Users can unmount continuously mounted backup tapes. • Users can tailor the times when DFSMSHsm unmounts a tape.
- Users can specify the number of days to retain a specific backup copy of a data set or UNIX file. See “Specifying the number of days to retain a backup copy of a data set” on page 179.
- Users can create a data set backup copy and store it under a different, specified data set name. See “Data set backup using NEWNAME” on page 450.
- Users can create a UNIX file backup copy as if it was originally backed up from a subset of the current path.
- Users can request removal of the UNIX file after a successful backup

- [Users can tailor how backup copies of in-use UNIX files are made using the INUSE keyword or -I option. See “Backing up UNIX files in use at time of backup”](#)

Backing up UNIX files in use at time of backup

The INUSE keyword and -I option allow users to tailor how backup copies of in-use UNIX files are made. When the INUSE keyword or -I option is used, UNIX files that are in use at the time of backup will have the backup retried until exclusive serialization can be obtained or the max number of retries has been made. If after the max number of retries has been made and exclusive serialization still cannot be obtained the request will either fail or a backup will be taken anyway (a fuzzy backup), depending on what was specified on the command. The INUSE keyword and -I option have subkeywords and suboptions that specify the number of retries, the amount of time to delay in between retries, and whether serialization is required (backup request will fail if exclusive serialization cannot be obtained) or preferred (a fuzzy backup will be taken if exclusive serialization cannot be obtained). The user will be notified if a fuzzy backup of the UNIX file was made.

1.2 Part 2. DFSMSHsm Storage Administration Reference

1.2.1 Chapter 32. BACKDS command: Backing up a specific data set

1.2.1.1 Syntax of the BACKDS command for a UNIX file

The syntax diagram will be updated with the optional INUSE keyword.

```
INUSE (RETRY (nn) , DELAY (min) , SERIALIZATION (PREFERRED | REQUIRED) )
```

1.2.1.2 Optional parameters for the BACKDS command

A new section is added to detail the INUSE keyword.

INUSE: Tailoring backup processing of UNIX files in use at the time of backup

The INUSE keyword is an optional parameter that specifies how UNIX files that are in use at the time of backup should be processed.

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

The INUSE keyword has subkeywords RETRY, DELAY, and SERIALIZATION that enable the user to specify the maximum number of retries, the time to delay in between retries, and whether exclusive serialization is required or preferred.

INUSE(RETRY(*nn*),DELAY(*min*),SERIALIZATION(REQUIRED|PREFERRED))

- RETRY(*nn*) - DFSMSHsm will retry a maximum of *nn* times to back up a UNIX file after the first attempt fails because the UNIX file is in use. For *nn*, specify a value 0 to 99. The default value is 0.
- DELAY(*min*) - DFSMSHsm delays for *min* minutes before retrying a backup attempt which failed because the UNIX file in use. DFSMSHsm will delay *min* minutes in between each retry. For *min*, specify a value from 0 to 999. The default value is 15.
- SERIALIZATION(PREFERRED|REQUIRED) – Specifies whether exclusive serialization of the UNIX file is required after the max number of retries of the backup have been made. The default value for SERIALIZATION is REQUIRED.

PREFERRED – If the UNIX file is still in use after the max number of retries for the backup have been made, the UNIX file will be backed up anyway. A message indicating a fuzzy backup was made will be issued. If the UNIX file is not in use at that time, a normal backup will be made. If RETRY(0) is in effect and exclusive serialization could not be obtained on the first attempt then a fuzzy backup will be made.

REQUIRED – If the UNIX file is still in use after the max number of retries for the backup is made, the backup request will fail.

The subkeywords are optional and any that are omitted will have the default value for that subkeyword used.

zFS File Snapshot is not supported for in use UNIX files. If SERIALIZATION(PREFERRED) and CC(PREF) or CC(REQ) are specified on the command and the UNIX file is in use at the time of backup, the backup request will still fail.

1.2.2 Chapter 73. Java hbackup command for Incremental UNIX file backup

1.2.2.1 Syntax of the Java hbackup command

The syntax diagram will be updated to include the -I option:

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

1.2.2.2 Optional parameters of the Java hbackup command

This section will be updated to include the new I -I option:

- I UNIX files that are in use at the time of backup will have their backup retried up to a specified maximum number of times, delaying a specified number of minutes in between each retry. On retry, an attempt to obtain exclusive serialization to the UNIX file will be made. If on retry exclusive serialization is obtained then a normal backup of the UNIX file will be made. If exclusive serialization cannot be obtained, then additional retries of the

backup will be made until the maximum number of retries has been made. If after the maximum number of retries exclusive serialization cannot be obtained, the backup request will either fail or a backup of the file will be taken anyway, depending on if the command specified serialization was required or preferred.

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

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

- | | | | | | |
|----------------------------|---|-------------------|---|------------------|--|
| <code>retry</code> | Specifies the maximum number of retries. DFSMShsm will retry a maximum of <i>nn</i> times to back up a UNIX file after the first attempt fails because the UNIX file is in use. For <i>nn</i> , specify a value 0 to 99. The default value is 0. | | | | |
| <code>delay</code> | Specifies the number of minutes to delay in between retries. DFSMShsm delays for <i>min</i> minutes before retrying a backup attempt which failed because the UNIX file is in use. For <i>min</i> , specify a value from 0 to 999. The default value is 15. | | | | |
| <code>serialization</code> | Specifies whether exclusive serialization of the UNIX file is required or preferred to make the backup. The default is serialization is required. The following are the possible values for the serialization suboption:
<table><tr><td><code>PREF</code></td><td>Serialization is preferred. If the UNIX file is still in use after the max number of retries for the backup have been made, the UNIX file will be backed up anyway. A message indicating a fuzzy backup was made will be issued. If the UNIX file is not in use at that time, a normal backup will be made. If <code>retry=0</code> is in effect and exclusive serialization could not be obtained on the first attempt then a fuzzy backup will be made.</td></tr><tr><td><code>REQ</code></td><td>Serialization is required. If the UNIX file is still in use after the max number of retries for the backup have been made, the backup request will fail.</td></tr></table> | <code>PREF</code> | Serialization is preferred. If the UNIX file is still in use after the max number of retries for the backup have been made, the UNIX file will be backed up anyway. A message indicating a fuzzy backup was made will be issued. If the UNIX file is not in use at that time, a normal backup will be made. If <code>retry=0</code> is in effect and exclusive serialization could not be obtained on the first attempt then a fuzzy backup will be made. | <code>REQ</code> | Serialization is required. If the UNIX file is still in use after the max number of retries for the backup have been made, the backup request will fail. |
| <code>PREF</code> | Serialization is preferred. If the UNIX file is still in use after the max number of retries for the backup have been made, the UNIX file will be backed up anyway. A message indicating a fuzzy backup was made will be issued. If the UNIX file is not in use at that time, a normal backup will be made. If <code>retry=0</code> is in effect and exclusive serialization could not be obtained on the first attempt then a fuzzy backup will be made. | | | | |
| <code>REQ</code> | Serialization is required. If the UNIX file is still in use after the max number of retries for the backup have been made, the backup request will fail. | | | | |

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

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

2 z/OS DFSMSHsm Managing Your Own Data

SC23-6870

2.1 Chapter 14. HBACKDS: Backing up data sets

2.1.1 Using UNIX shell commands (hbackup)

2.1.1.1 Format of the hbackup command

The syntax diagram will be updated to include the -I option:

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

2.1.1.2 Options

This section will be updated to include the new -I option:

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

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

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

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

- delay Specifies the number of minutes to delay in between retries. DFSMShsm delays for *min* minutes before retrying a backup attempt which failed because the UNIX file is in use. For *min*, specify a value from 0 to 999. The default value is 15.
- serialization Specifies whether exclusive serialization of the UNIX file is required or preferred to make the backup. The default is serialization is required. The following are the possible values for the serialization suboption:
- | | |
|------|---|
| PREF | Serialization is preferred. If the UNIX file is still in use after the max number of retries for the backup have been made, the UNIX file will be backed up anyway. A message indicating a fuzzy backup was made will be issued. If the UNIX file is not in use at that time, a normal backup will be made. If <i>retry=0</i> is in effect and exclusive serialization could not be obtained on the first attempt then a fuzzy backup will be made. |
| REQ | Serialization is required. If the UNIX file is still in use after the max number of retries for the backup have been made, the backup request will fail. |

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

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

2.2 Chapter 21. HLIST: Listing information from the BCDS and MCDS

2.2.1 Sample lists from the HLIST command

2.2.1.1 Listing UNIX file entries from the backup control data set

A new field INUSE is added to the displayed output of the DFSMShsm LIST, HLIST, and UNIX hlist commands. INUSE=YES indicates the backup was created while the file was in use; INUSE=NO indicates a normal backup of the file was created. The INUSE field is only present in the detailed format of the LIST/HLIST output, i.e. when the TERM keyword is specified on the LIST/HLIST command. The INUSE field is not present in the output when the ODS keyword is specified on the LIST/HLIST command. The INUSE field is displayed by default or when using the -d option on the UNIX hlist command. The INUSE field is not displayed when using the -t option on the UNIX hlist command.

Table 9. Headings of output for all UNIX files when you request information from the backup control data set (continued)		
Printer Output Heading	Terminal Label	Description
BACKUP VOLUME	BACKVOL	This field contains the volume serial number of the volume on which the backup version resides. The volume can be a backup volume or a migration level 1 volume.
BACKUP DATE	BACKDATE	This field contains the date that the backup version was created.
BACKUP TIME	BACKTIME	This field contains the time that the backup version was created.
GEN NMBR	GEN	This field contains the relative generation number of the backup version. The most recent backup version is number 0, the next most recent backup version is number 1, and so forth.
VER NMBR	VER	This field contains the version number of the backup version. This number is unique to the backup version during its entire life span. The numbering begins at 1 for the first backup version of a UNIX file
UNS/ RET	UNS/RET	This field indicates special conditions or exceptions. UNS indicates that the UNIX file was unserialized when backed up. RET indicates that the version listed is a retired version. U/R indicates an unserialized, retired version. NO indicates a version that is neither unserialized nor retired
RET DAYS	RETDAYS	This field contains the RETAIN_DAYS parameter that is specified at the time of backup. The value represents the minimum number of days that DFSMSHsm maintains the backup copy. ***** indicates that RETAIN_DAYS is not specified.
	EXTENDED ACL	This field contains YES or NO, depending if an extended file access control list existed for the UNIX file.
TYPE	TYPE	This field contains FILE or DIR to indicate that a particular backup is for a UNIX file, or an empty UNIX directory.
	INUSE	This field contains YES or NO, depending on whether the UNIX file was backed up while in use. YES indicates the UNIX file was backed up while in

		use. NO indicates the UNIX file was backed up with exclusive serialization (a normal backup was created).
--	--	---

Figure 34. Sample terminal list for the file

```

FILE=/test/prod/passenger-manifests/12-31-2018/AA6185/business-class/12ab84nt95a
xa/VIP-list.csv
BACKUP FREQ =*** , MAX ACTIVE BACKUP VERSIONS =***
FROMFS=zFS.UDIR

BDSN=DFHSM.BACK.TDXYV04.$NT95AXA.VIP-LIST.A9011 BACKVOL=MIG102
BACKDATE=2019/01/11 BACKTIME=04:10:18 GEN=000 VER=003 UNS/RET= NO
EXTENDED ACL= NO RETDAYS=***** TYPE=FILE INUSE=NO

BDSN=DFHSM.BACK.TAWIV04.$NT95AXA.VIP-LIST.A9011 BACKVOL=MIG102
BACKDATE=2019/01/11 BACKTIME=04:02:19 GEN=001 VER=002 UNS/RET= NO
EXTENDED ACL= NO RETDAYS=***** TYPE=FILE INUSE=YES

BDSN=DFHSM.BACK.TWODT03.$NT95AXA.VIP-LIST.A9011 BACKVOL=MIG102
BACKDATE=2019/01/11 BACKTIME=03:58:46 GEN=002 VER=001 UNS/RET= NO
EXTENDED ACL= NO RETDAYS=***** TYPE=FILE. INUSE=NO

TOTAL BACKUP VERSIONS = 0000000003
ARC0140I LIST COMPLETED, 13 LINE(S) OF DATA OUTPUT

```

3 z/OS MVS System Messages Vol 2 (ARC-ASA)

SA38-0669

3.1 ARC1454I – New message

ARC1454I BACKUP CREATED WHILE FILE WAS IN USE: *filepath*

Explanation

A UNIX file backup request was made with the -I option or the INUSE keyword and serialization preferred specified. After the maximum number of retries specified on the command, the UNIX file specified by *filepath* was still found to be in use. Because

serialization preferred was specified on the command, a backup of the UNIX file was created while it was in use.

System Action

DFSMSHsm processing continues.

Programmer Response

None.

Source

DFSMSHsm

3.2 ARC1455I – New Message

ARC1455I FILE *filepath* IS IN USE. BACKUP WILL BE RETRIED AFTER *mmmm* MINUTES. *rrrr* RETRIES REMAIN.

Explanation

A UNIX file backup request was made with the -I option or the INUSE keyword and the file *filepath* was found to be in use. Backup of the file will be retried after *mmmm* minutes. The number *rrrr* indicates how many retries remain.

System Action

DFSMSHsm processing continues

Programmer Response

None.

Source

DFSMSHsm

3.3 ARC1456I – New Message

ARC1456I VFS CALLABLE SERVICE *service* FAILED WITH RETURN CODE *rc* and REASON CODE *rsn* WHILE PROCESSING *filepath*

Explanation

A UNIX file backup request was made with the -I option or the INUSE keyword. An error occurred while using VFS callable services to determine if the file *filepath* was in use. The failing VFS callable service is *service*. The VFS return code is *rc* and the VFS reason code is *rsn*.

System Action

The BACKUP command processing of the indicated UNIX file ends. DFSMSHsm processing continues

Programmer Response

Contact IBM Support.

Source

DFSMSHsm

3.4 ARC1457I – New Message

ARC1457I RECOVERING *filepath* FROM A BACKUP THAT WAS CREATED WHILE THE FILE WAS IN USE.

Explanation

The UNIX file specified by *filepath* is being recovered from a backup that was created while the UNIX file was in use. The UNIX file backup must have been created using the INUSE keyword or -I option.

System Action

DFSMSHsm processing continues.

Programmer Response

None.

Source

DFSMSHsm

3.5 ARC1334I – New Reason Codes

The message ARC1334I BACKUP VERSION NOT CREATED is updated with new reason codes.

Explanation

Reascode

Meaning

43

An error occurred while processing a UNIX file with -I option or the INUSE keyword. The file was found to be in use at the time of backup and was attempting to be retried when the error occurred.

44

While processing a UNIX file with the -I option or the INUSE keyword and serialization required specified, the maximum number of retries had been attempted but exclusive serialization of the UNIX file still could not be obtained.

45

An error occurred while processing a UNIX file with the -I option or the INUSE keyword. DFSMSHsm was checking if the file was in use when the error occurred.

Programmer Response

Reascode

Meaning

43

Contact IBM Support.

44

If the UNIX file is continuously in use, consider reissuing the command with the -I option or INUSE keyword and serialization preferred specified. When serialization preferred is specified, a backup of the UNIX file will be created even if the UNIX file is in use. If serialization required is the only acceptable option, either increase the number of retries or delay time specified on the -I option or INUSE keyword, or ensure the UNIX file is closed before issuing the backup request.

45

Examine message ARC1456I (if it was issued) and contact IBM Support.

3.6 ARC1605I – update to programmer response

If *reason-code* is 4, an issue occurred with parsing the specified command and keywords. Examine the documentation for the command issued to ensure the correct syntax was used for the keywords.

If *reason-code* is 8, 16, 28, 36, 37, 38, 40, 42, 44, 50 or 51, correct the problem and retry the command. If *reason-code* is 12, 20, or 24, DFSMSHsm encountered a logical error. Notify the storage administrator or the system programmer.

If *reason-code* is 58, correct the EXCLUDE list specified by EXCLUDE (-e) option or the exclude file path specified by EXCLUDEDEF (-E) option and reissue the request.

4 z/OS DFSMSHsm Data Areas

GC14-7504

4.1 Chapter 32. MCC—Backup Control Data Set Backup Version Record

Table 84. MCC—BCDS Backup Version Record

Offsets Actual / FIXCDS	Type	Length	Name	Description
370(172) 306(132)	FIXED	1	MCC_PDSEV	PDSE Version number. N/A when value is zero
371(173) 307(133)	BITSTRING	1	MCCFLGS4	More flags
	1... ..		MCCF_ZFS	When set to 1, the VSAM LINEAR data set is for ZFS usage.
	.1.. ..		MCCF_ENCR	When set to 1, the encryption information as described by MCC_ENCRYPTA is present in this MCC record.
	..1.		MCCF_BSON	When set to 1, VSAM KSDS data set is a BSON VSAMDB data set.

	...1		MCCF_JSON	When set to 1, VSAM KSDS data set is a JSON VSAMDB data set.
	.... 1...		MCCF_UNIX_DIR	Unix empty directory.
	.... .1..		MCCFEMPTY	ON – Data set was empty at the time of backup
	.... ..1.		MCCF_UNIX_FUZZY	When set to 1, the backup was created while the UNIX file was in use.

4.2 Chapter 50. MWE—Extension for Data Set Backup Enhancements (MWE—Extension for Data Set Backup Enhancements) (MWE—Management Work Element

Table 135. MWE—Extension for Data Set Backup Enhancements (continued)

Offset Decimal (Hex)	Type	Length	Name	Description
320 (140)	FIXED	2	MEWDSBU_RETAIN_DAYS	RETAIN_DAYS for dataset backup
322 (142)	FIXED	2	MWEDSBU_WCDIR#	Wildcard request base directory length
324 (144)	FIXED	2	MWEDSBU_INU_RETRY_CNT	Number of INUSE Retries
326 (146)	FIXED	2	MWEDSBU_INU_DELAY	Minutes to delay retry
328 (148)	ADDRESS	4	MWEDSBU_INU_BRDQCB@	Retry-delay queue control block
332 (14C)	FIXED	4	MWEDSBU_INU_TIMESTAMP	Time MWE was added to retry-delay queue
336 (150)	CHARACTER	44	MWEDSBU_NEWNAME	DATA SET NAME SPECIFIED AS NEWNAME PARAMETER
336 (150)	ADDRESS	4	MWEDSBU_NN_UFPOFF	MWE_NN_UFP_STRUCT offset from the MWE beginning

340 (154)	BITSTRING	2	MWEDSBU_UNIX_FLAGS	UNIX file specific flags
	1... ..		MWEDSBU_UX_BDSMF	ARCBDSMF checking done
	.1... ..		MWEDSBU_UX_BACKDEL	Backup with DELETE
	..1... ..		MWEDSBU_UX_REPLICANT	This MWE is a replicated copy of the related Primary MWE. MWE is replicated
	...1... ..		MWEDSBU_UX_DIR_TO_CLOSE	Directory Open
	.... 1...		MWEDSBU_UX_HARDLINK	File is a hardlink
	.... .1..		MWEDSBU_UX_1ST_HLNK	First hardlink found
	.... ..1.		MWEDSBU_UX_INU_REQ	INUSE request
	.... ...1		MWEDSBU_UX_INU_RETRY	Retry backup for INUSE request
	1... ..		MWEDSBU_UX_INU_SER_REQ	Serialization required for INUSE request
	.1.. ..		MWEDSBU_UX_INU_FUZZY	Take fuzzy backup for INUSE request
	xxxx xxxx		*	Reserved