

IBM Education Assistance for z/OS V2R1

Item: Fast Replication Enhancements

Element/Component: DFSMShsm, DFSMSdss, ISMF and SMS



Agenda

- Trademarks
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Trademarks

- See url <http://www.ibm.com/legal/copytrade.shtml> for a list of trademarks.



Presentation Objectives

- This presentation will cover the changes introduced by the DFSMS Fast Replication Enhancements item.



Overview

- These line items address critical requirements against:
 - DFSMSdss physical data set COPY and RESTORE commands
 - Physical DS RENAME and REPLACE
 - Physical DS alternate SMS volume
 - DFSMSHsm fast replication and physical data set recovery functionality
 - FlashCopy consistency group
 - Fast replication data set recovery to different volumes
 - Fast replication data set recovery with rename
 - RECOVER VSAM data set from dump with rename



Overview – DFSMSdss Physical DS Rename and Replace

▪ Problem Statement / Need Addressed

- DFSMSdss does not allow renaming of VSAM data sets during physical DS COPY and RESTORE
 - Only supported for nonVSAM today
 - 7 marketing requirements
 - MR1011075120, MR030912475, MR0309124752, MR1011013327, MR1114053052, MR0819115958, MR0907116329
 - Gives users access to production data set and restored data set without having to restore entire volume
 - Ability to unload data from the backup version

▪ Solution

- RENAMEUnconditional will be supported for VSAM
 - RENAME will continue to remain unsupported for VSAM RESTORE
 - Recataloging after DFSMSdss processing remains necessary
 - VSAM Alternate Indexes will continue to remain unsupported
 - REPLACEUnconditional will also be supported for physical DS RESTORE
 - Physical DS COPY supports REPLACEU today



Overview – DFSMSdss Physical DS Alternate SMS Volume

▪ Problem Statement / Need Addressed

- DFSMSdss physical DS COPY and RESTORE only supports one output volume
 - Volume selection is not an option
 - If target does not have the space, the operation fails
 - Scenarios:
 - COPY FULL from SRC to TGT, COPY DS from TGT to SRC
 - DUMP FULL from TGT to tape, RESTORE DS from tape to SRC
 - Space might no longer be available on SRC if data set size changed
 - Preallocated target might have had to be scratched/reallocated

▪ Solution

- Adding a new user interaction module (UIM) exit
 - Physical DS Alternate SMS Volume (EIOPTION 30)
 - Added to ADREID0 mapping
 - Allows program to pass a list of volumes that DFSMSdss can use to attempt to allocate data set on during physical DS copy and restore, when necessary
 - Only called if original target volume could not be used



Overview – DFSMSHsm FlashCopy Consistency Group

▪ Problem Statement / Need Addressed

- When application data resides on multiple volumes, data-consistent copy might need to be created across multiple volumes for FRBACKUP.
- DFSMSdss has supported this for a few years but DFSMSHsm has not.

▪ Solution

- DFSMSHsm FlashCopy Consistency Group option will “freeze” the source volumes causing subsequent writes to be held. After FlashCopy has completed, the held I/O will resume.
- Note: The consistency group must be formed and completed within a (default 2-minute) time window, therefore it is intended for backing up small LOG copy pools.

▪ Benefit / Value

- Data-consistent copy can be created across multiple volumes.
- Example: DB2 customers can use this option on the LOG copy pool for a consistent, non-fuzzy backup of the logs and BSDS.



Overview – DFSMSHsm FR Data Set Recovery to Different Volumes

- **Problem Statement / Need Addressed**

- Prior to z/OS V2R1, fast replication data set recovery must recover data sets to the original volumes where they resided at the time of backup. The recovery might fail for reasons such as insufficient space.

- **Solution**

- Remove the FR recovery restriction that data sets must recover back to the original volumes

- **Benefit / Value**

- Customers will be able to recover data sets to different volumes than the original volumes.



Overview – DFSMSHsm Physical Data Set Recovery with Rename

▪ **Problem Statement / Need Addressed**

- Fast replication data set recovery currently does not allow data sets to be recovered to a new name
- RECOVER command currently does not allow VSAM data sets to be renamed when restoring from dump

▪ **Solution**

- Enhance FRBACKUP command to allow data set to be recovered to a new name
- Enhance RECOVER command to remove the restriction that VSAM data set must be recovered to the original name when restoring from dump

▪ **Benefit / Value**

- Renaming a data set during recovery would allow users to recover a data set to another name for analysis without replacing the production data.



Usage & Invocation – FlashCopy Consistency Group

- Specify whether the FlashCopy consistency group option is required to be used when the copy pool is backed up to disk
 - New SMS copy pool settings
 - FlashCopy Consistency Group (Y or N)
 - Y** - yes, perform consistency group FlashCopy
 - N** (default) - no, do not perform consistency group FlashCopy



Usage & Invocation – FlashCopy Consistency Group (*cont.*)

- When a copy pool is defined with “FlashCopy Consistency Group = Yes”,
 - The consistency group backup for the copy pool will execute under *one* FRBACKUP task regardless of the current setting for
SETSYS MAXCOPYPOOLTASKS(FRBACKUP(xx) DSS(yyy))
 - DFSMSHsm FRBACKUP function will invoke DFSMSdss:
 - Specifying *FCFREEZE* on the COPY commands. “Freeze” places the source volume in an extended long busy state. All subsequent writes to the source volume will be held. Associated dependent writes to any volumes also cannot complete.
 - Specifying *CGCREATED ACCVOL FCCGVERIFY* command (in DFSMSdss) to thaw the source volumes after all volumes have been copied. The previously held I/O will resume. *FCCGVERIFY* validates the consistency of the copy.
- New RC90 for the existing message ARC1806E FAST REPLICATION BACKUP HAS FAILED FOR COPY POOL *cpname*, RC=*return_code*
 - **RC90** – A data-consistent copy pool backup version could not be created successfully. The FlashCopy consistency group timer might have expired or reset before FRBACKUP finished processing all the volumes.



Usage & Invocation – FlashCopy Consistency Group (*cont.*)

- **LIST COPYPOOL**(*cpname*) command can be used to display and determine whether the copy pool backup version was created using the FlashCopy consistency group option.
 - New information: FCCG=Y / N
 - Sample output:

COPYPOOL=CP6

ALLOWPPRCP FRB=PN FRR=PN

VERSION	VTOCENQ	DATE	TIME	FASTREPLICATIONSTATE	DUMPSTATE
001	Y	2012/08/06	11:03:50	RECOVERABLE	NONE

TOKEN(C)=C ' '

TOKEN(H)=X ' '

TOTAL NUM OF VOLUMES=00009, INCREMENTAL=N, CATINFO=Y, FCFRR=N, RECOVERYINCOMPLETE=N, **FCCG=Y**

SGNAME	SOURCE - TARGET	SOURCE - TARGET	SOURCE - TARGET	SOURCE - TARGET
SGRP1	SRC01B - TGT01B	SRC02B - TGT02B		
SGRP2	SRC03B - TGT05B	SRC04B - TGT06B	SRC05B - TGT07B	
SGRP6	SRC31B - TGT31B	SRC32B - TGT32B	SRC33B - TGT33B	SRC34B - TGT34B



Usage & Invocation – FlashCopy Consistency Group (*cont.*)

- **ARCXTRCT DATA = COPYPOOL** output will indicate whether the copy pool backup version was created using the FlashCopy Consistency Group option, based on the backup control data set (BCDS) information.
 - The CPENT table will be updated with a new CPFFCCG (bit X'40') flag at offset X'09'. When the bit is set to 1, it indicates the copy pool backup version was created with the FlashCopy CG option.
 - ARCXTRCT user macro is described in the *z/OS DFSMSHsm Managing Your Own Data*



Usage & Invocation – DFSMSdss FlashCopy Consistency Group

- DFSMSdss will accept multiple volume serial numbers on the **FCCGVERIFY** keyword of the CGCREATED command. The keyword will accept up to 255 volume serial numbers.



Usage & Invocation – FR DS Recovery to Different Volumes

- DFSMSHsm currently captures catalog information at the time of the fast replication backup in order to recover deleted and moved data sets back to the original volumes.
- DFSMSHsm will be enhanced to allow data sets to be recovered to alternate volumes.
 - No changes to the fast replication commands
 - DFSMSHsm will first attempt to recover the data set to the original volumes. If the initial allocation attempt failed, DFSMSHsm will perform SMS volume selection within the primary storage group and retry data set recovery.
 - No coexistence APAR is required on down-level systems for this function.



Usage & Invocation – FR DS Recovery with Rename

- DFSMSHsm will enhance the FRRECOV DSNNAME command to allow the recovered data sets to be renamed.
 - New optional parameter: NEWNAME(*newdsname*)
 - For *newdsname*, substitute a single, fully qualified data set name for the recovered data set
 - If a data set exists with the same name as the new data set name you are specifying, you must specify the existing REPLACE parameter to replace the existing data set
 - When the optional NEWNAME(*newdsname*) parameter is specified, DSNNAME(*dsname*) must also specify a single, fully qualified data set name
 - No coexistence APAR is required for this support



Usage & Invocation – RECOVER VSAM Data Set with Rename

- DFSMSHsm previously did not support renaming of a VSAM data set during recovery from dump. DFSMSHsm will be enhanced to remove this restriction.
 - DFSMSHsm will enhance the 'RECOVER dsname FROMDUMP' function.
 - Existing optional parameter: NEWNAME(*newdsname*)
 - The existing keyword can be used to specify a new VSAM data set name when recovering FROMDUMP.
 - No coexistence APAR is required for this support
- DFSMSdss RENAMEUnconditional will be supported for VSAM
 - VSAM Alternate Indexes will continue to remain unsupported
 - REPLACEUnconditional will also be supported for physical DS RESTORE
 - Physical DS COPY already supports REPLACEU today



Interactions & Dependencies

- Software Dependencies
 - None
- Hardware Dependencies
 - Existing function: FlashCopy Consistency Group
 - IBM System Storage DS8000 series
- Exploiters:
 - Fast replication data set recovery to different volumes: DB2 10 RECOVER utility



Migration & Coexistence Considerations

- DFSMSHsm toleration/coexistence APAR **OA40252** must be applied to lower-level systems which share resources (DFSMSHsm CDS) with the V2R1 systems
 - Provides coexistence for FRBACKUP function
 - Disallow lower-level hosts from backing up copy pools with FlashCopy Consistency Group=Yes
 - ARC1806E FAST REPLICATION BACKUP FAILED FOR COPY POOL *cpname*, RC=89

- DFSMSDss - None.



Presentation Summary

- DFSMSdss enhancements:
 - Allows CGCREATED FCCGVERIFY command keyword to accept multiple volume serial numbers
 - Enhances physical data set RENAMEU and REPLACEU support
 - Adds UIM exit (EIOPTION 30) to select alternate volumes for allocation during physical data set copy and restore
- DFSMSHsm enhancements:
 - Provides DFSMSHsm FlashCopy Consistency Group support
 - Allows FR data set recovery to different volumes
 - Allows FR recovered data sets to be renamed
 - Allows VSAM data sets to be renamed when RECOVER from dump



Appendix

▪ Publications

- SC23-6870, *z/OS V2R1 DFSMSHsm Managing Your Own Data* (previously SC35-0420)
- SC23-6871, *z/OS V2R1 DFSMSHsm Storage Administration* (previously SC35-0421)
- SC23-6868, *z/OS V2R1 DFSMSdss Storage Administration* (previously SC35-0423)
- SA38-0668, *z/OS V2R1 MVS System Messages Vol 1 (ABA-AOM)* (previously SA22-7631)
- SA38-0669, *z/OS V2R1 MVS System Messages Vol 2 (ARC-ASA)* (previously SA22-7632)

