

# An Introduction to z/OS DASD Backup and Archiving

Session 17061



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# Storage Management Objectives

- Data Availability

- Data available even if logically/physically damaged
- Dataset **Backup** and **Recover/Restore**

- Space Availability

- Sufficient free space for new/extended datasets
- Dataset **Migrate/Archive** and **Recall**

# Backup vs. Archive/Migration

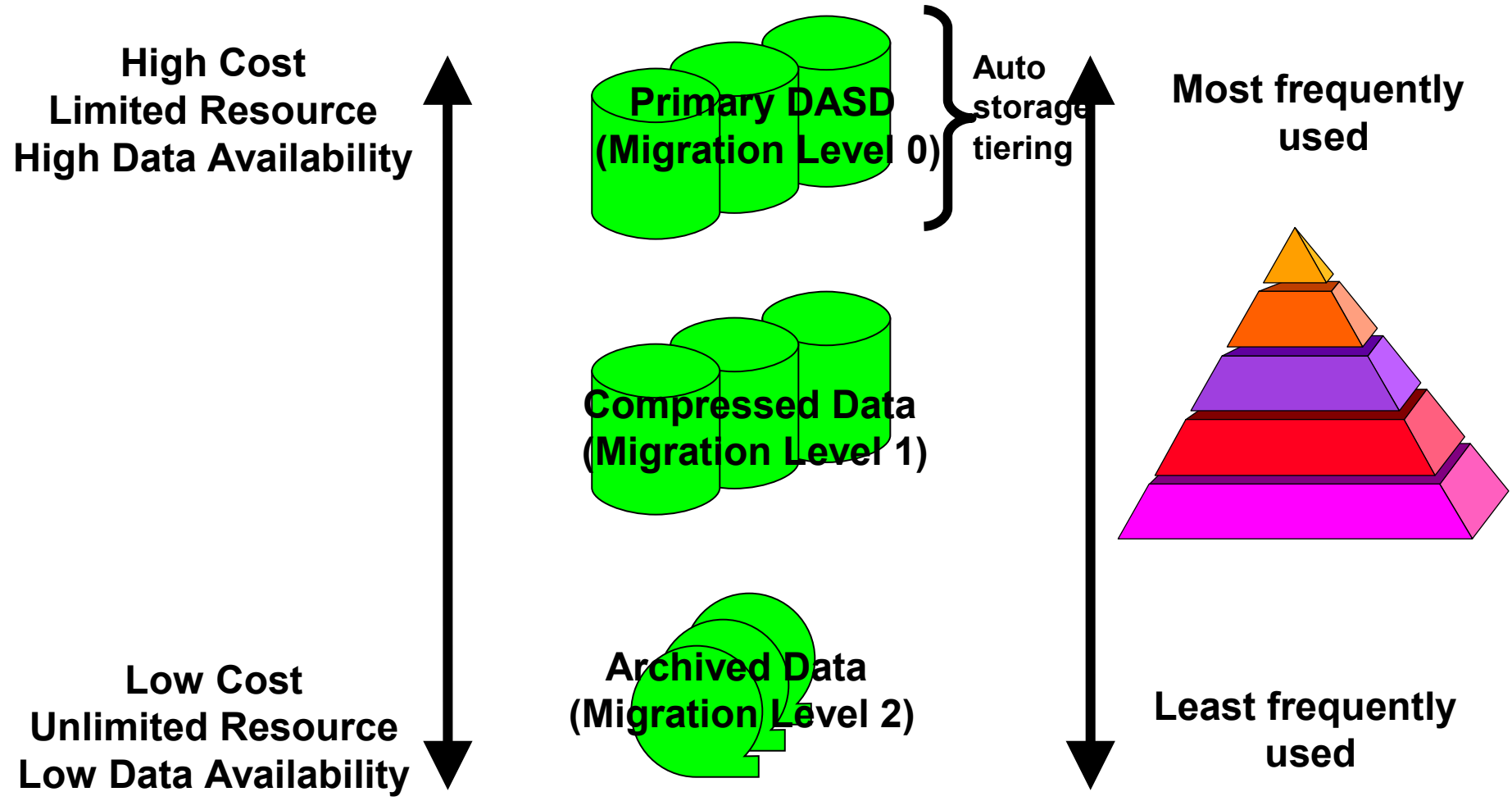
- Backup

- Short term (usually)
- Multiple copies
- Vault offsite

- Archive

- Long term (years)
- 1 or 2 copies
- Recycle needed

# Storage Hierarchy



# Dataset Life Cycle

Dataset Creation

Open/Extend/Close

**Backup / Restore**

Migrate / Recall

Expiration and Deletion

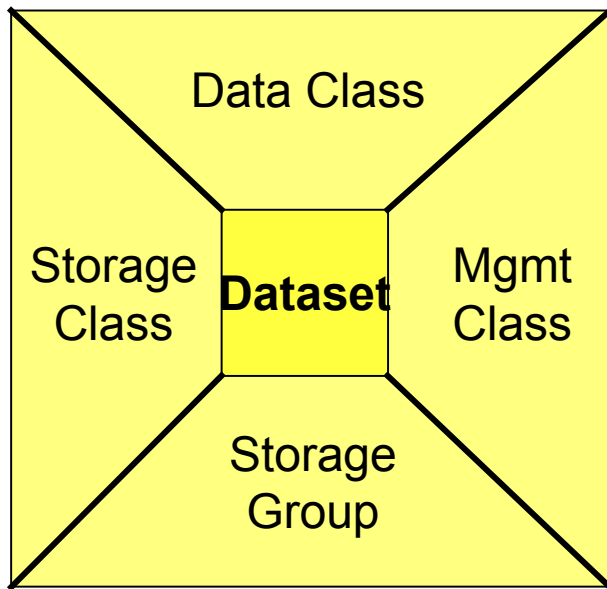
# Backup and Restore Management

- When do backups run?
  - Daily? Weekly? >1 per day?
- What data is backed up?
  - Updated data? All data? Selected data?
- How long is the backup retained?
- How can the backup be found?
- How is the backup restored?
  - Overlay existing dataset? New volume?, Rename?

# DFSMS Manages Storage

## SMS Constructs

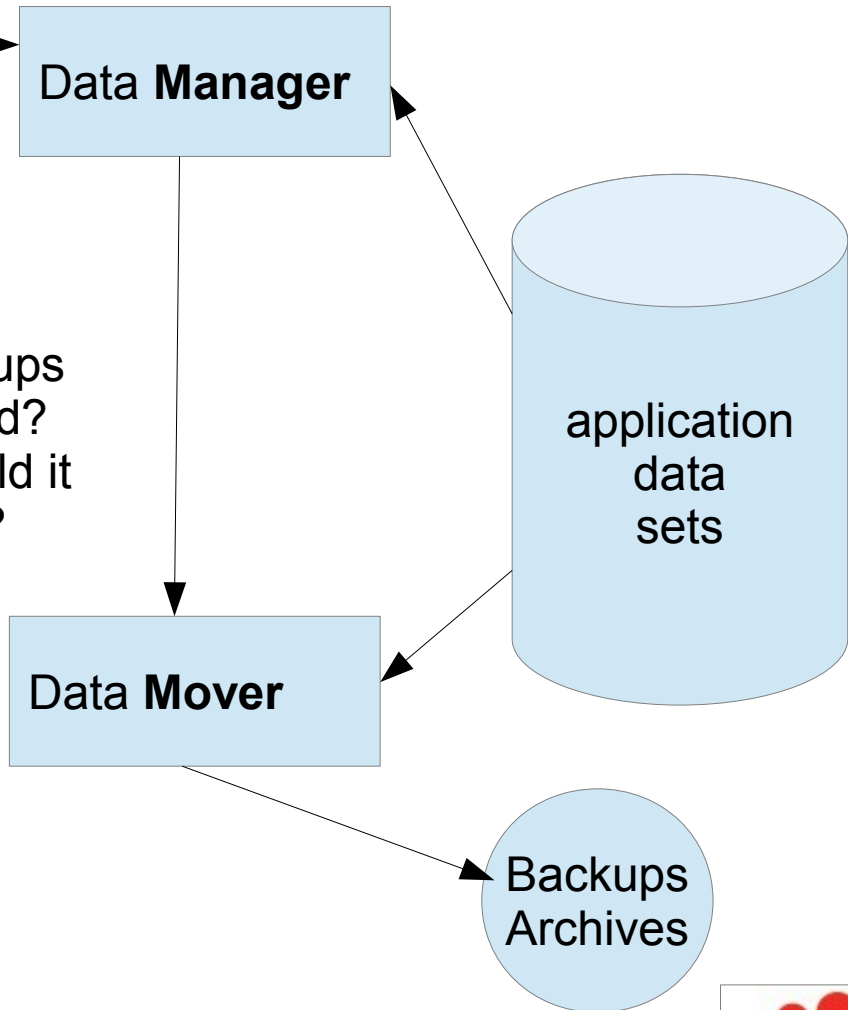
### Dataset Characteristics



What services?  
PAV?, striped?

What backups are needed?  
When should it migrate?

What volume should be chosen?



# Important SMS Constructs

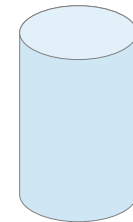
- Management Class

- Expiration Attributes
- Migration Attributes
- Partial Release
- GDG generations
- Backup Attributes
- Transition Criteria
- ABARS Attributes

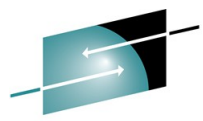


- Storage Group

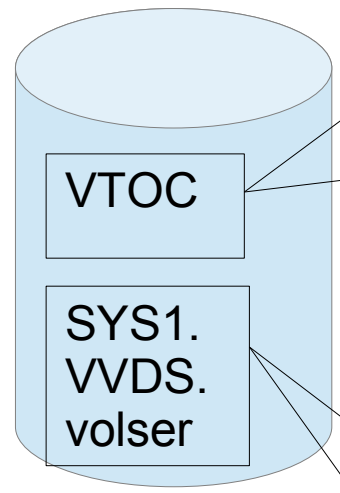
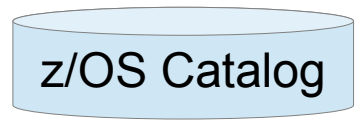
- Auto mig/bkup/dump
- dump class/system
- Alloc/migr threshold
- VOLSERs







# Fields used by DASD Managers



## Format-1 DSCB

- DSN
- dataset-changed (DS1IND02)
- last-referenced date
- backup info

## VVR or NVR

- DSN / cluster name / components
- Dataclas, Storclas, Mgmtclas name

# Major DASD Management Vendors

## IBM

### Data Manager

- DFSMSHsm

### Data Mover

- DFSMSdss

## IDP

### Data Manager

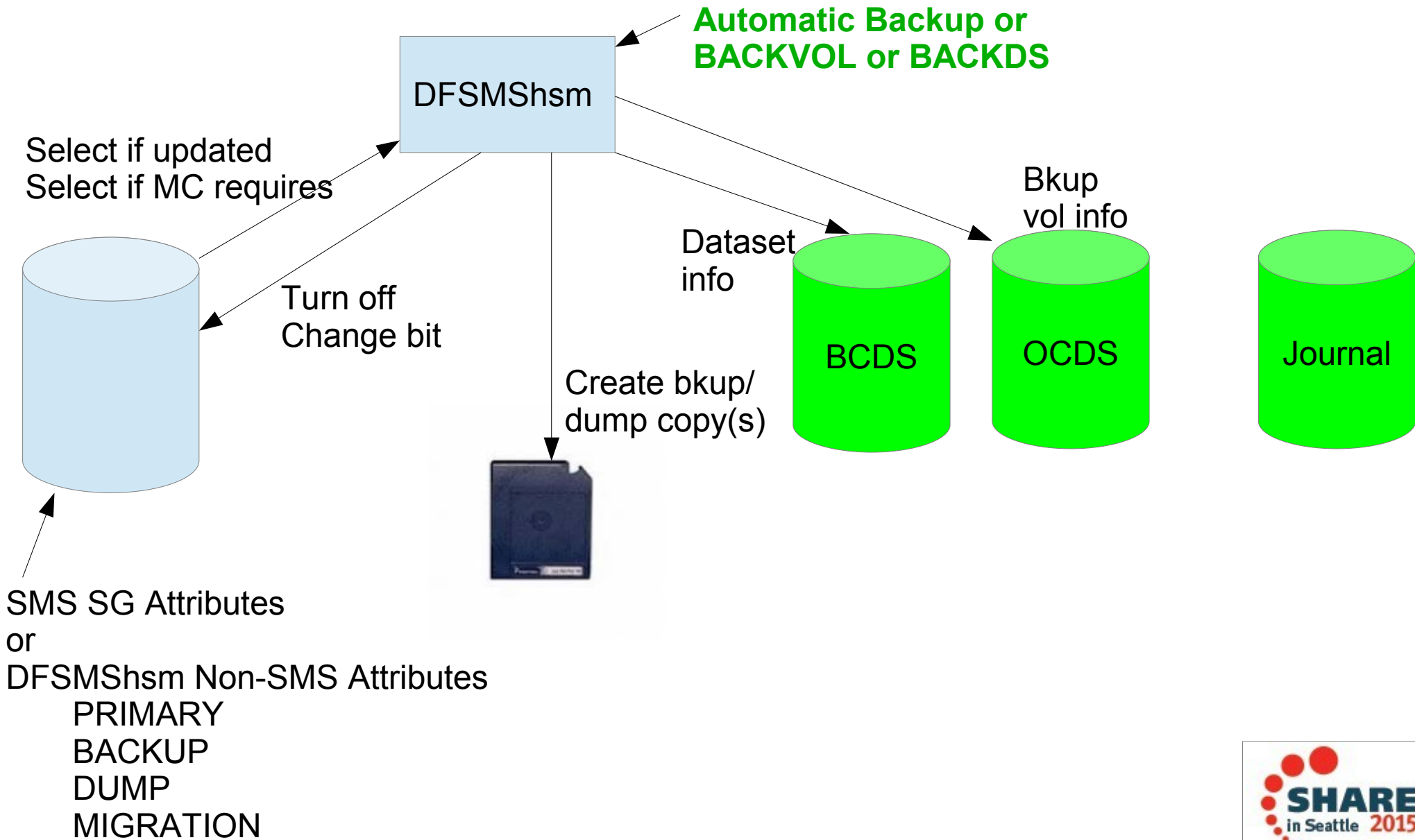
- FDRABR

### Data Mover

- FDR/FDRDSF

CA – CA-DISK

# DFSMSHsm Backup Process



# DFSMShsm Backup Process

- Types of Backup
  - Automatic Incremental Backup
  - Automatic Dump
  - Command Backup / Command Dump
  - Other
    - Inline Backup
    - ABARS Backup
    - Fast Replication Backup

# DFSMShsm Backup

- Automatic Incremental Backup

```
DEFINE BACKUP (YYYYYYN CYCLESTARTDATE (yyyy/mm/dd))  
SETSYS AUTOBACKUPSTART (starttime latest quiesce)  
SETSYS BACKUP (DASD | TAPE)  
SETSYS DUPLEX (BACKUP (Y | N))  
SETSYS MAXBACKUPTASKS (n)
```

- Automatic Dump

```
DEFINE DUMPCYCLE (NNNNNNY CYCLESTARTDATE (yyyy/mm/dd))  
SETSYS AUTODUMPSTART (starttime latest quiesce)  
SETSYS MAXDUMPTASKS (n)  
DEFINE DUMPCLASS (name ...RETPD UNIT FREQ et al)
```

# DFSMShsm Backup

- Command Backup

**(H)BACKDS dsn TARGET NEWNAME RETAIN DAYS et al**

- Command Dump

**BACKVOL VOLUMES (volser) DUMP (DUMPCCLASS (class)) RETPD (days)**

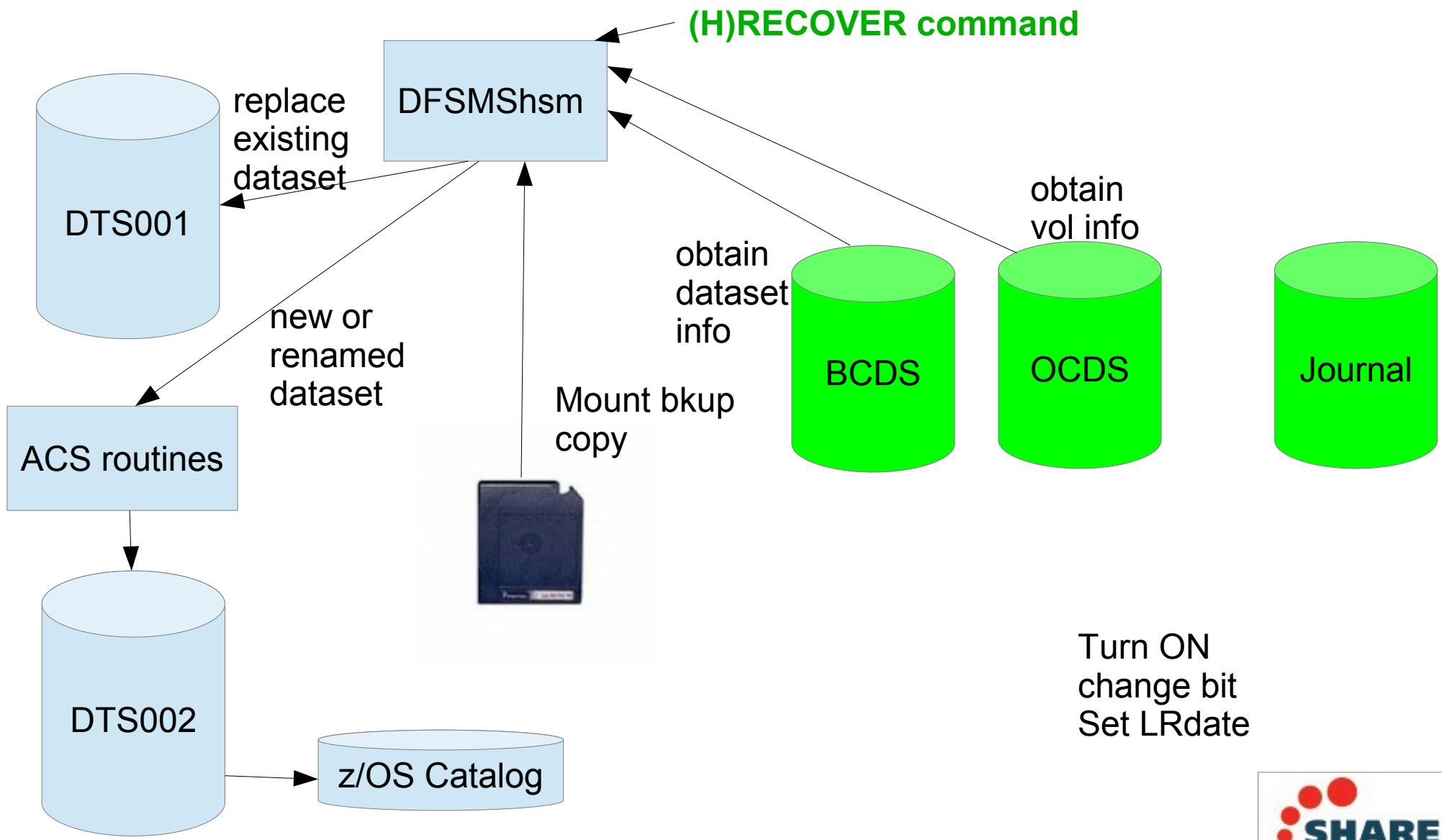
**BACKVOL STORAGEGROUP (*sgname*) DUMP (DUMPCCLASS (class)) STACK (nn)**

# DFSMShsm - Locating the Backup

- Obtain Info from BCDS, MCDS, OCDS
  - TSO HLIST command
  - DFSMSHsm LIST command
  - ISMF HLIST

```
LIST DSNAME (dsn) MCDS/BCDS/BOTH -  
LIST (ODS (dsn) /SYSOUT/TERMINAL)
```

# Recover (Restore) from Backup





# DFSMShsm Recovery Process

## Types of Recovery

- Dataset recovery from incremental

```
(H)RECOVER dsn TOVOLUME(volser) UNIT(unit) REPLACE ...
```

- Full volume restore from incremental

```
RECOVER * TOVOLUME(original_volser) UNIT(unittype) -  
FROMDUMP (DUMPVOLUME(tape_volser) APPLYINCREMENTAL)
```

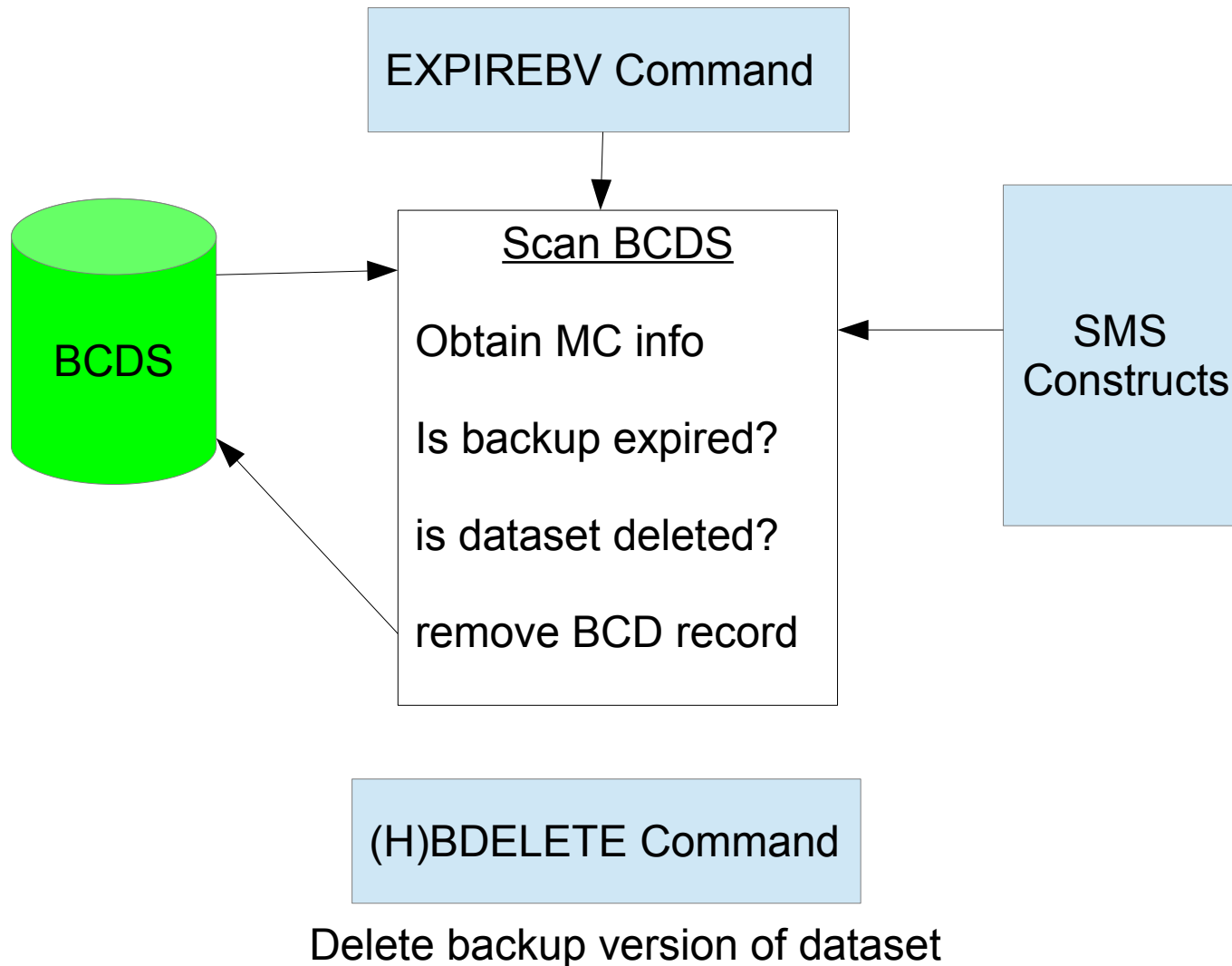
- Full volume restore from dump copy

```
RECOVER * TOVOLUME(volser) UNIT(unittype)
```

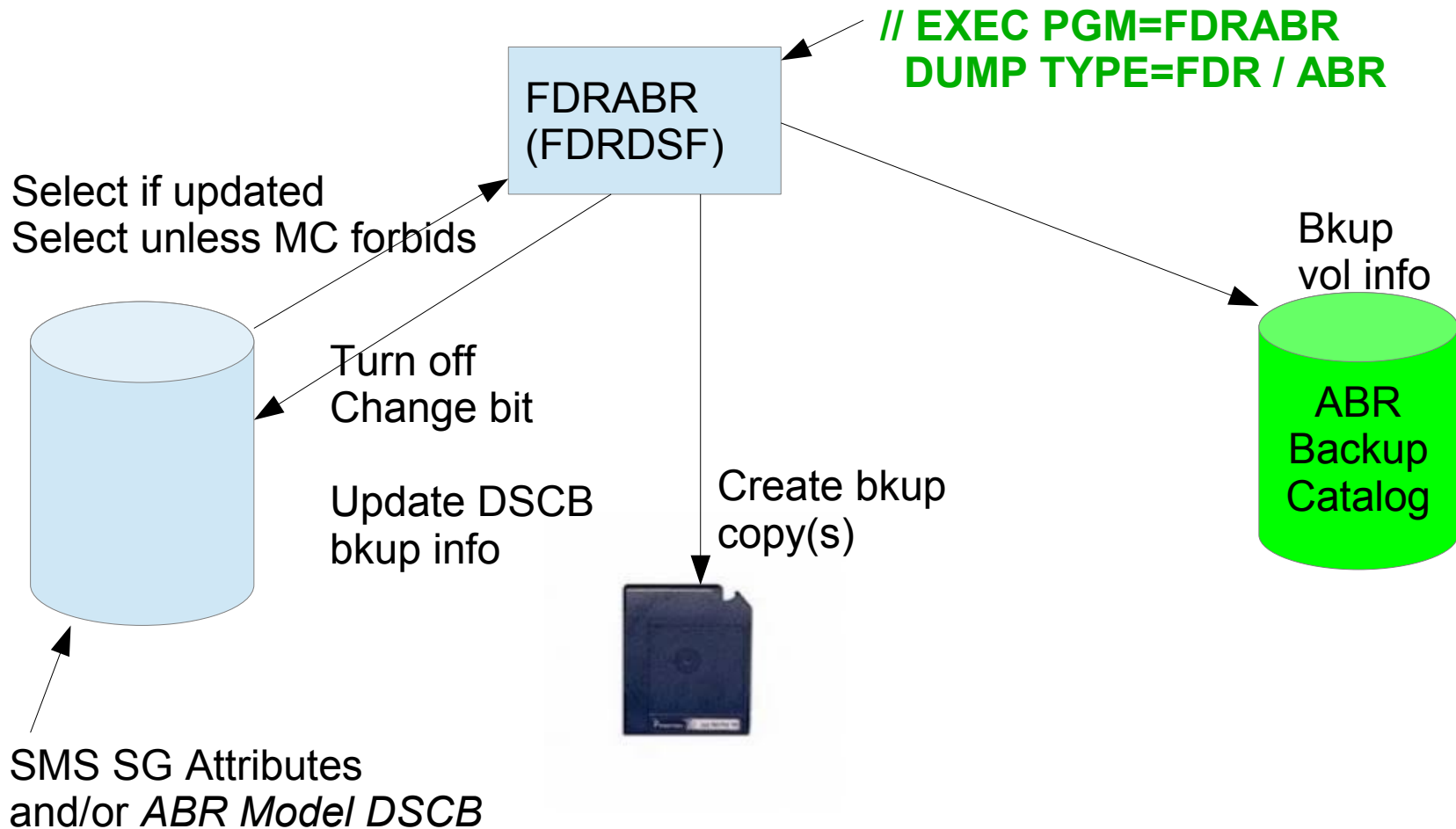
- Other

- ABARS, Fast Replication Recovery

# DFSMShsm Backup Expiration



# FDRABR Backup Process



# FDRABR Backup Process

## Types of Backup

- Incremental

```
DUMP TYPE=ABR  
MOUNT VOL=, STORGRP=
```

- Full-Volume

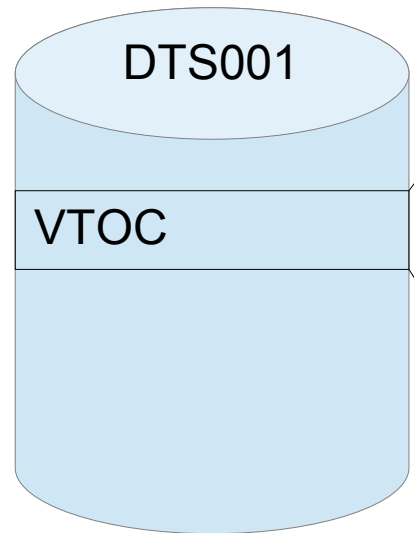
```
DUMP TYPE=FDR  
MOUNT VOL=, STORGRP=
```

- Other

- Dataset (TYPE=DSF, TYPE=AUTO)
- Application (TYPE=APPL)

# FDRABR Backup Architecture

Backup DSN=FDRABR.VDTS001.C1003404

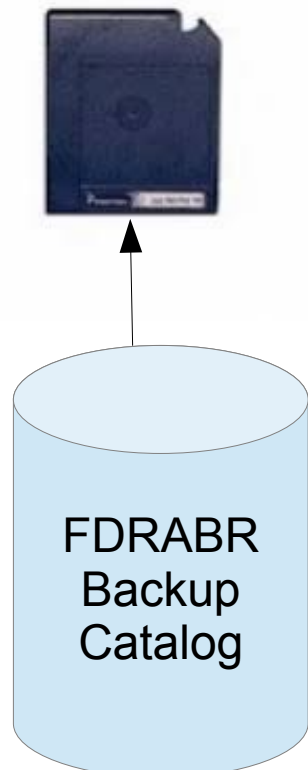


DSN=MY.DATA.SET

Dataset Backup Info:  
-cycle table, flags, et al

DSN=FDRABR.VTSO001

Volume Backup Info:  
-GEN, CYCLE, et al

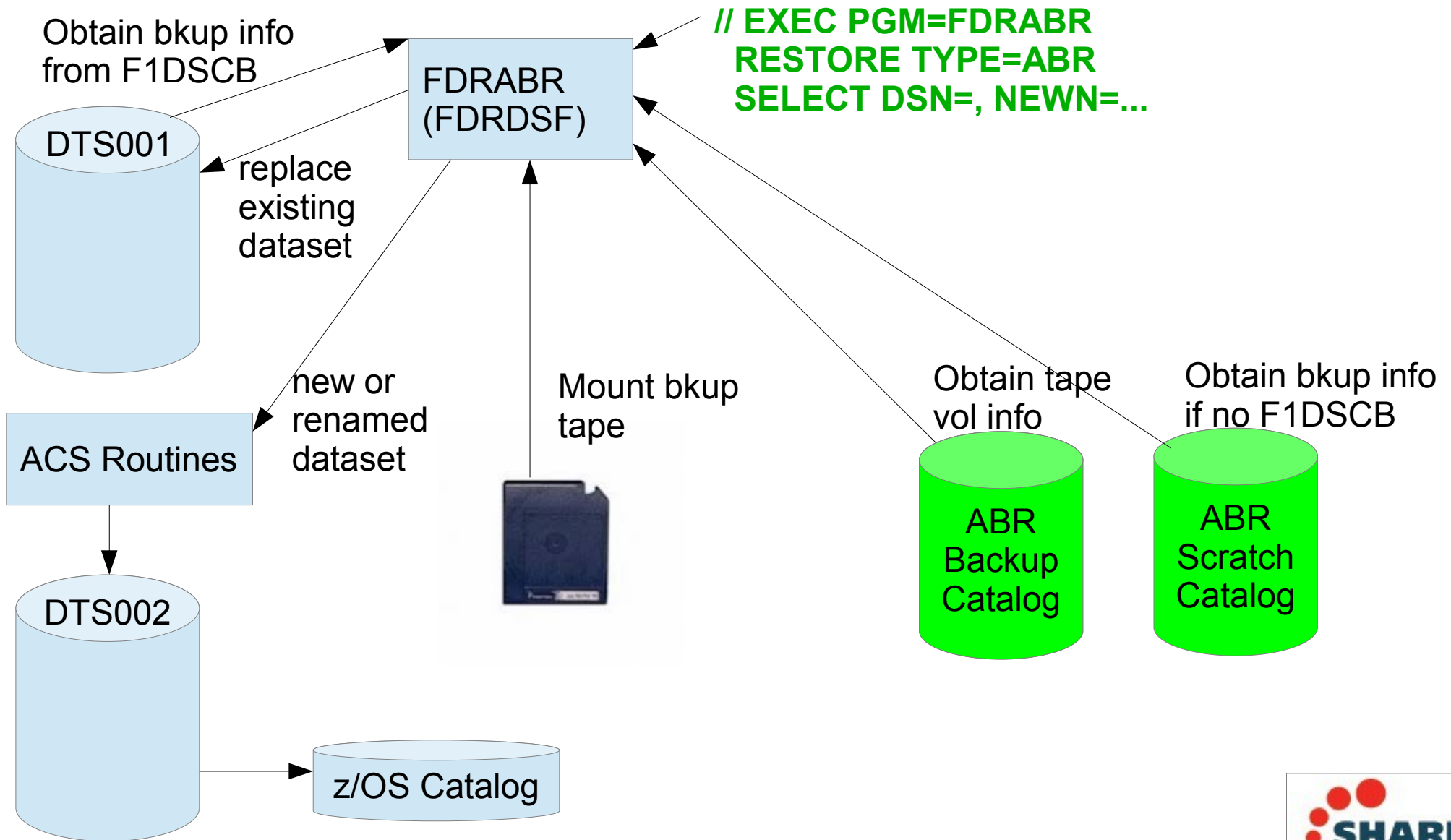


Tape Volume Info:  
Bkup DSN, fseq, expiration

# FDRABR – Locating the Backup

- Backup Information stored in:
  - Dataset F1DSCB (dataset exists)
  - ABR Scratch Catalog (dataset deleted)
  - ABR Backup Catalog (tape volume info)
- PGM=FDRABRP, PRINT BACKUP function
- PGM=FDREPORT
- ISPF panels

# FDRABR Recovery Process



# FDRABR Backup Expiration

- All datasets on backup file expire together
- Tape expiration via:
  - EXPDT/RETPD in JCL (date or catalog control)
  - ABR model if no JCL value
    - Same day as full vol for incremental
  - Explicit expiration processing not required



# Dataset Life Cycle

Dataset Creation

Open/Extend/Close

Backup / Restore

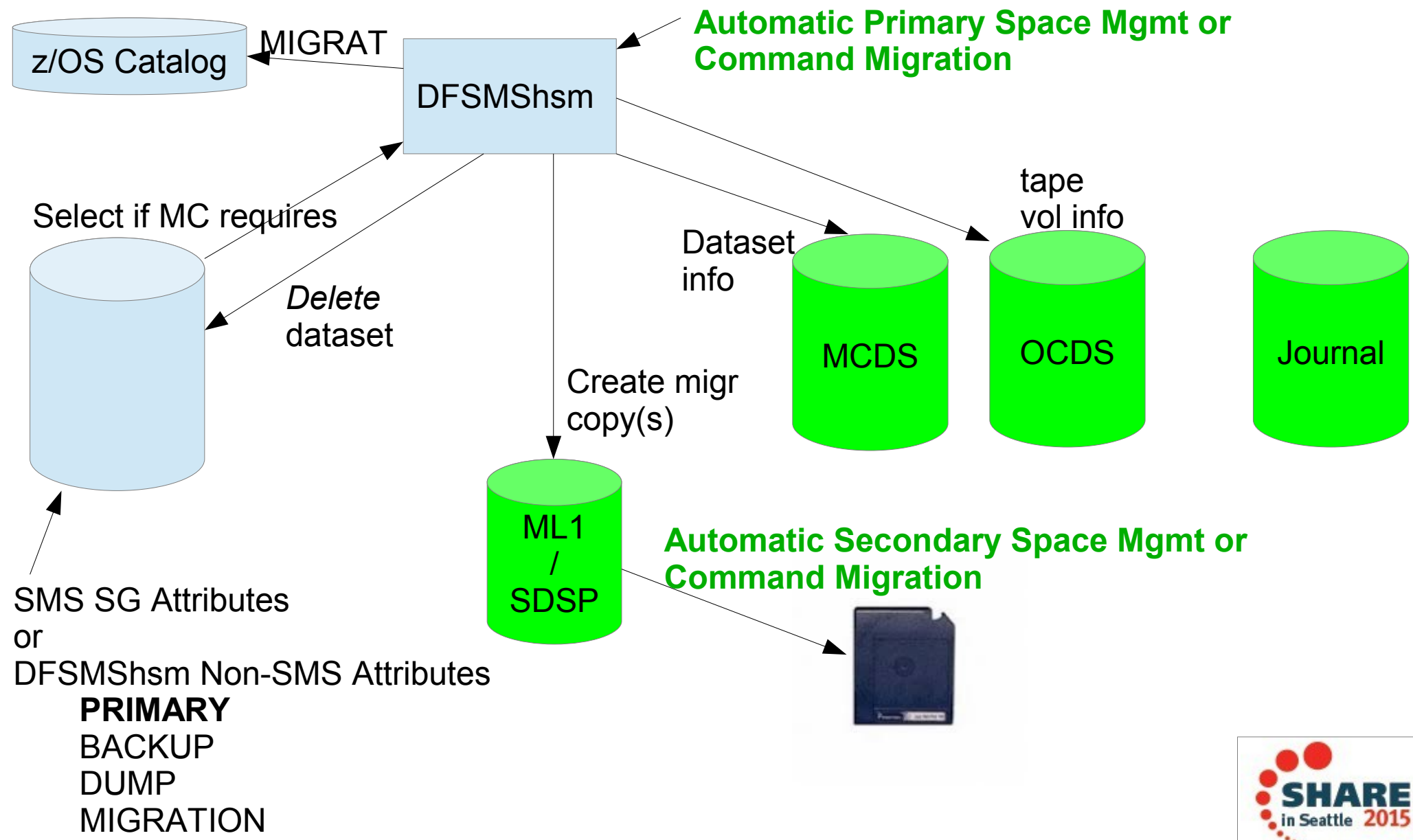
**Migrate / Recall**

Expiration and Deletion

# Migration and Recall Management

- How often to migrate?
- What data should be migrated?
  - Which volumes? How old? What criteria?
- How long is the migrated copy retained?
- How is the data recalled?
  - Explicit recall? Recall by reference?

# DFSMShsm Migration Process



# DFSMShsm Space Management

## Space Management Functions

- Migrate, extent reduction, release, expire
- Automatic Primary Space Management
- Automatic Secondary Space Management
- Command Space Management
- Other
  - Interval migration
  - On-demand migration
  - Fast Subsequent Migration

# DFSMShsm Space Management

## Space Management Windows and Settings

```
DEFINE PRIMARYSPMGMTCYCLE (YYYYYYY CYCLESTARTDATE (YYYY/MM/DD))  
SETSYS PRIMARYSPACEMANAGEMENTSTART (hhmm hhmm)  
SETSYS MAXMIGRATIONTASKS (nn)  
SETSYS MAXEXTENTS (nn)
```

```
SETSYS SECONDARYSPACEMANAGEMENTCYCLE (YYYYYYY)  
CYCLESTARTDATE (yyyy/mm/dd) )  
SETSYS SECONDARYSPMGMTSTART (hhmm)  
SETSYS MAXSSMTASKS (CLEANUP(2) TAPEMOVEMENT(1))  
SETSYS SMALLDATASETPACKING (KB(110))
```

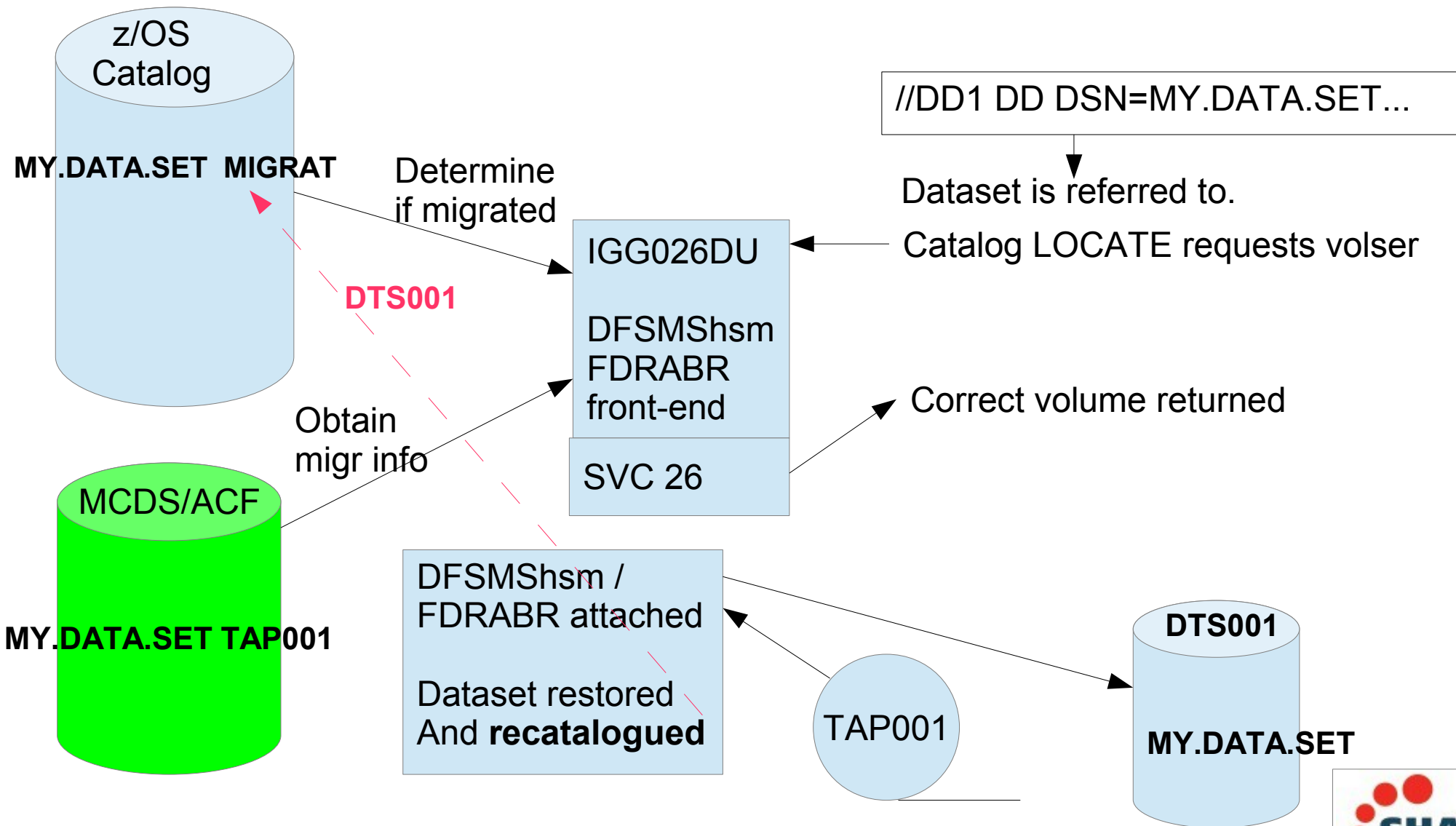
## Space Management Commands

```
HMIGRATE dsn ML2  
MIGRATE DSN/VOLUME  
DELETE dsn
```

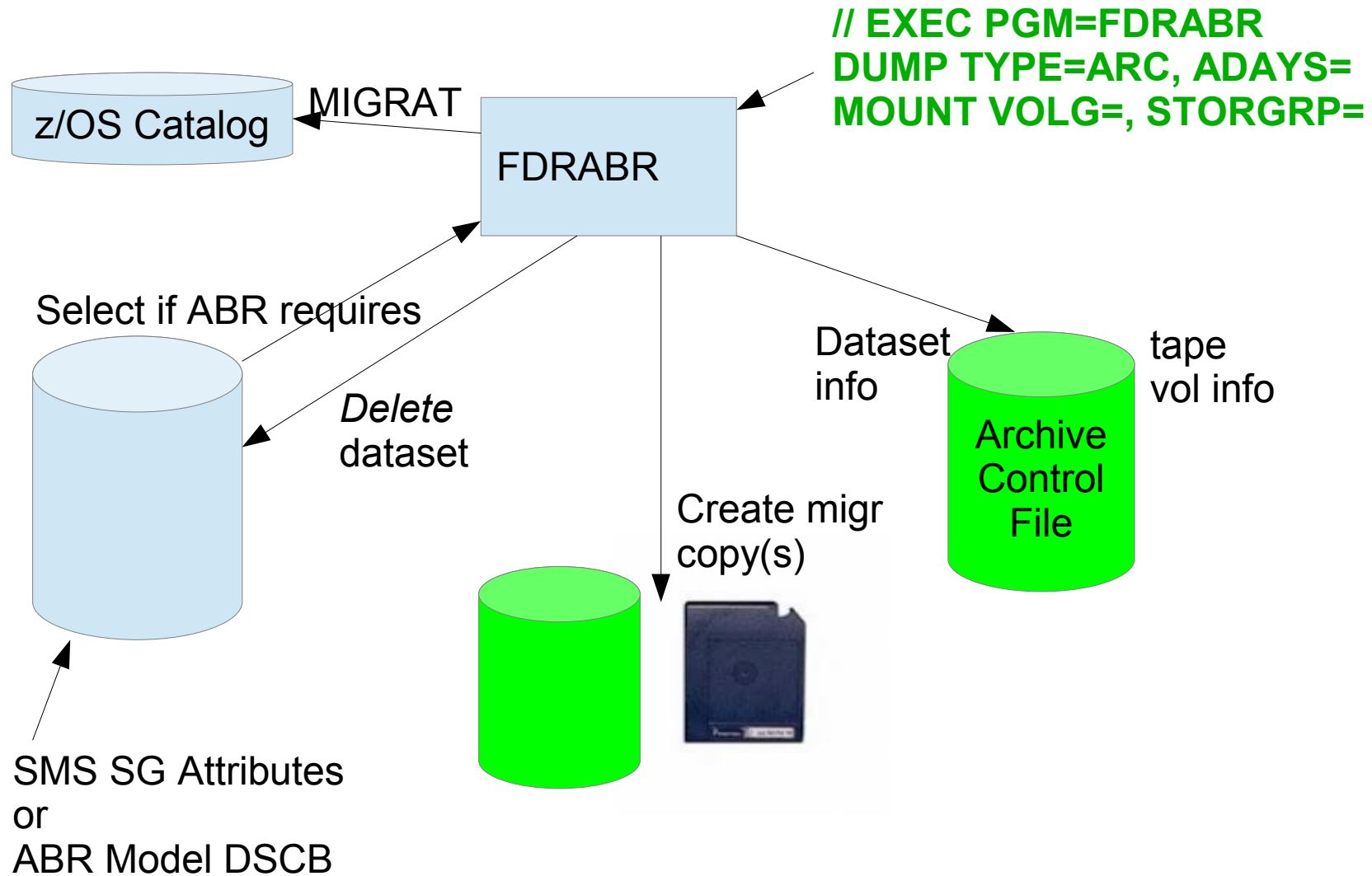
# Locating the Migration Copy

- DFSSMShsm
  - H(LIST) dsn MCDS
  
- FDRABR
  - PGM=FDRABRP, PRINT ARCHIVE
  - ISPF panels
  - FDREPORT

# Automatic Recall DFSMShsm and FDRABR



# FDRABR Archive Process





# FDRABR Selection Criteria

- SMS Selection Criteria
  - Management Class Migration Attributes
  - Management Class Expiration Attributes optional
- FDRABR Selection Criteria
  - ADAYS, IFNOTCAT, EXPIRED, MAXGDG, DSN

# FDRABR Selection Criteria

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# FDRABR Space Management

- Migration
  - DUMP TYPE=ARC
- Deletion
  - DUMP TYPE=SCR

# FDRABR Archive Expiration

- All datasets on archive file expire together (usually)
- Tape expiration via:
  - EXPDT/RETPD in JCL (date or catalog control)
  - RETPD in SYSIN
  - FDROPT default
- Archive Control File expiration
  - Usually = tape expiration
  - Unless SMSEXPIRE=YES

# DFSMShsm vs. FDRABR

DEFINE / SETSYS - - - FDROPT / SYSIN  
BCDS - - - - - ABR Catlg/DSCB/Model  
MCDS - - - - - Archive Control File  
OCDS - - - - - ABR Catalog  
Functions, Commands - PGM=, SYSIN  
(H)LIST - - - - - FDREPORT/FDRABRP

# More Topics...

- Management of non-SMS data
- Disk-to-Disk Data Movement
- Volume Defragmentation
- Flashcopy and FDRINSTANT
- CDS Backup, ACF Maintenance, Recycle
- Application Backup and ABARS
- Report Writing
- Serialization, Security, Standalone restore and much more...

# Further Reading and Documentation

- IBM z/OS DFSMSHsm Primer
  - <http://www.redbooks.ibm.com/redbooks/SG245272>
- DFSMSHsm Storage Administration Reference
  - [http://publibz.boulder.ibm.com/cgi-bin/bookmgr\\_OS390/BOOKS/DGT2S6A0/CCONTS?SHELF=DGT2BKB0&DN=SC35-0421-12&DT=20110618155526](http://publibz.boulder.ibm.com/cgi-bin/bookmgr_OS390/BOOKS/DGT2S6A0/CCONTS?SHELF=DGT2BKB0&DN=SC35-0421-12&DT=20110618155526)
- FDR System User's Guide, C & F Guides
  - <ftp://ftp.fdrinnovation.com/Public/MANUALS/>

# Questions?

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