An Introduction to z/OS DASD Backup and Archiving

Session 15901

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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

High Cost
Limited Resource
High Data Availability

Primary DASD
(Migration Level 0)

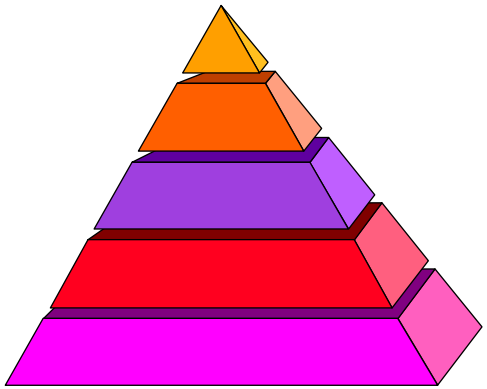
Auto storage tiering

Compressed Data
(Migration Level 1)

Archived Data
(Migration Level 2)

Low Cost
Unlimited Resource
Low Data Availability

Most frequently used



Least frequently used

Dataset Life Cycle

Dataset Creation

Open/Extend/Close

Backup / Restore

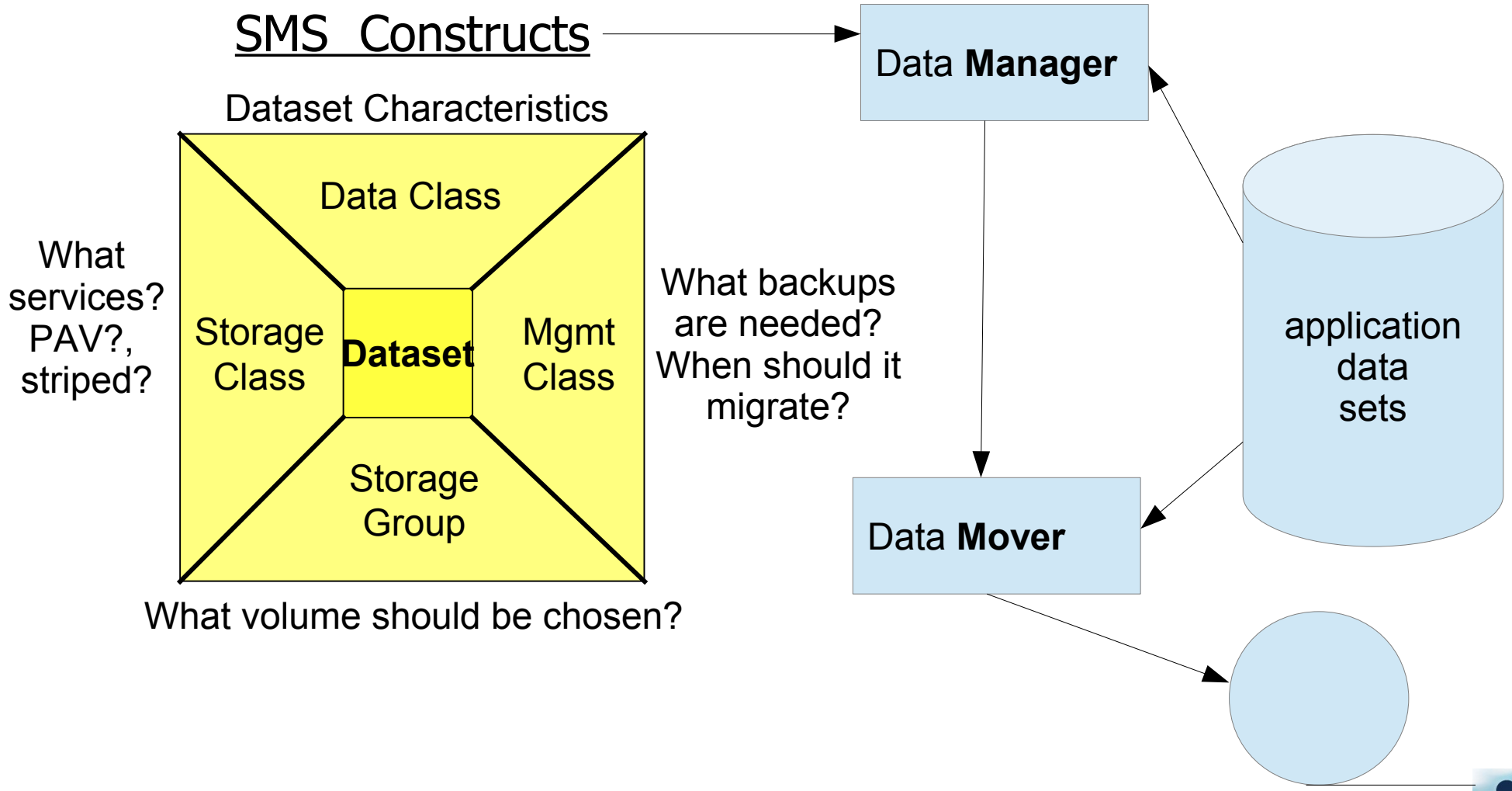
Migrate / Recall

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?

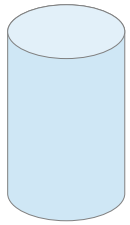
DFSMS Manages Storage



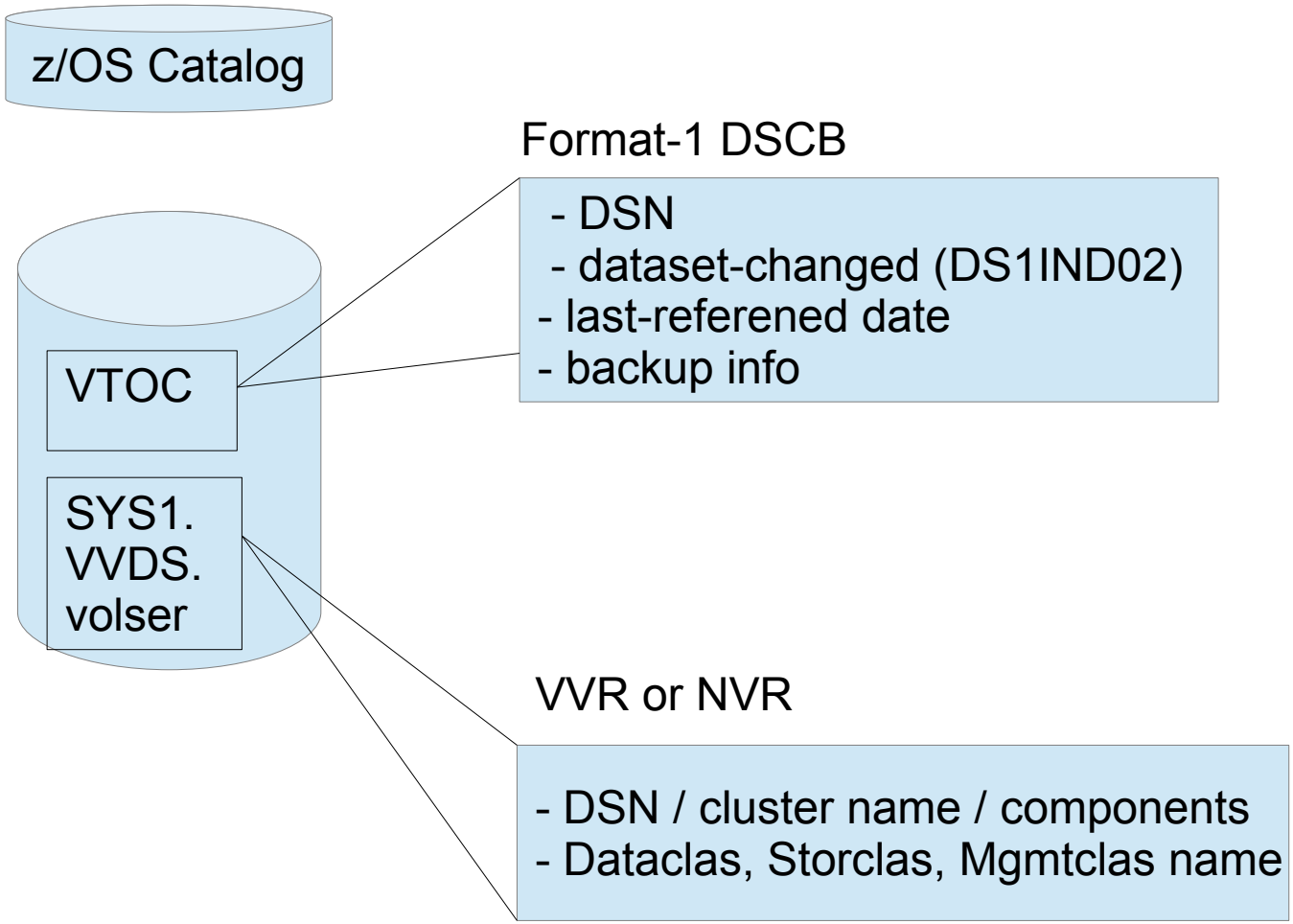
Important SMS Constructs

- 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



Major DASD Management Vendors

IBM

Data Manager

- DFSMShsm

Data Mover

- DFSMSdss

IDP

Data Manager

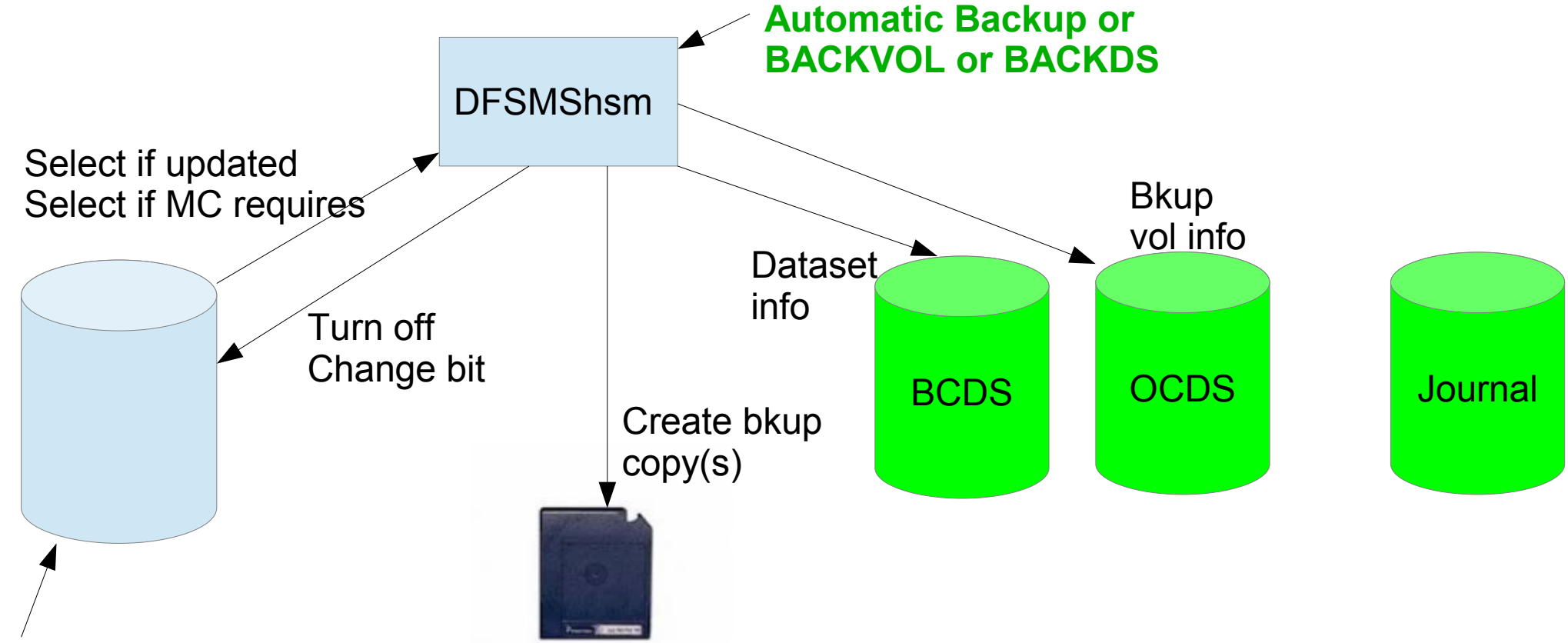
- FDRABR

Data Mover

- FDR/FDRDSF

CA – CA-DISK

DFSMShsm Backup Process



SMS SG Attributes
or
DFSMShsm Non-SMS Attributes

- PRIMARY
- BACKUP
- DUMP
- MIGRATION

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 RETAINDAYS et al
```

- Command Dump

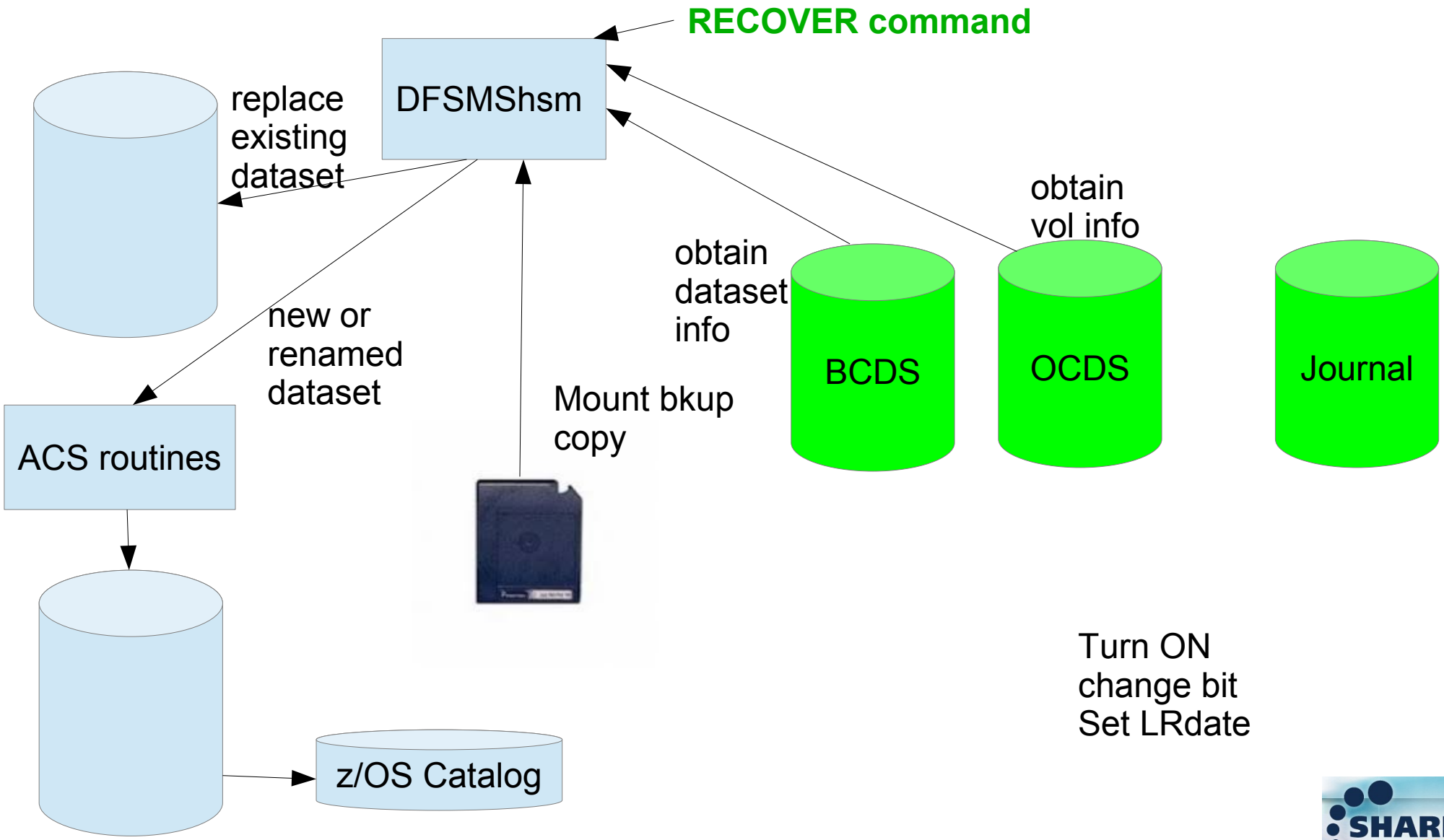
```
BACKVOL VOLUMES(volser) DUMP(DUMPCLASS(class)) RETPD(days)
BACKVOL STORAGEGROUP(sgname) DUMP(DUMPCLASS(class) STACK(nn))
```

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

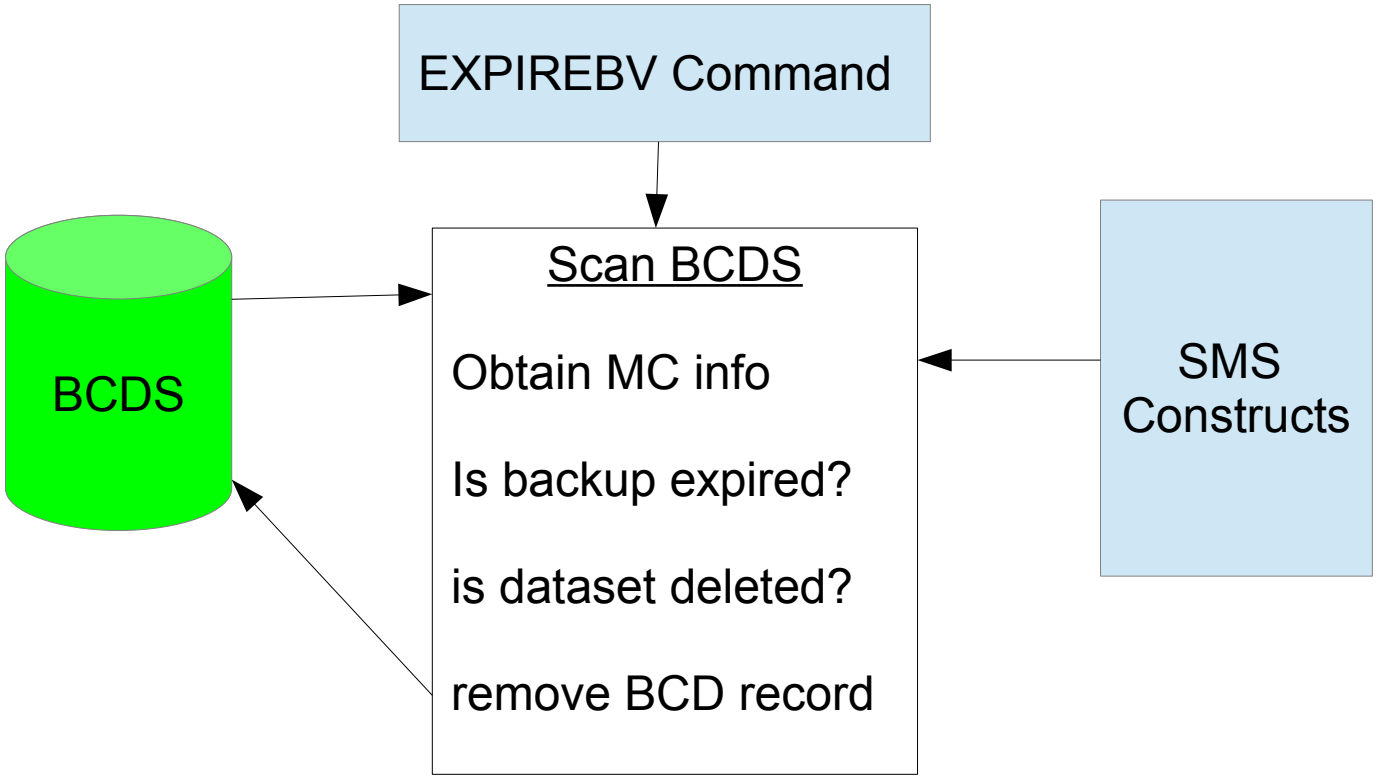
```
RECOVER * TOVOLUME(original_volser) UNIT(unittype) -
FROMDUMP(DUMPVOLUME(tape_volser) APPLYINCREMENTAL)
```

- Full volume restore from dump copy

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

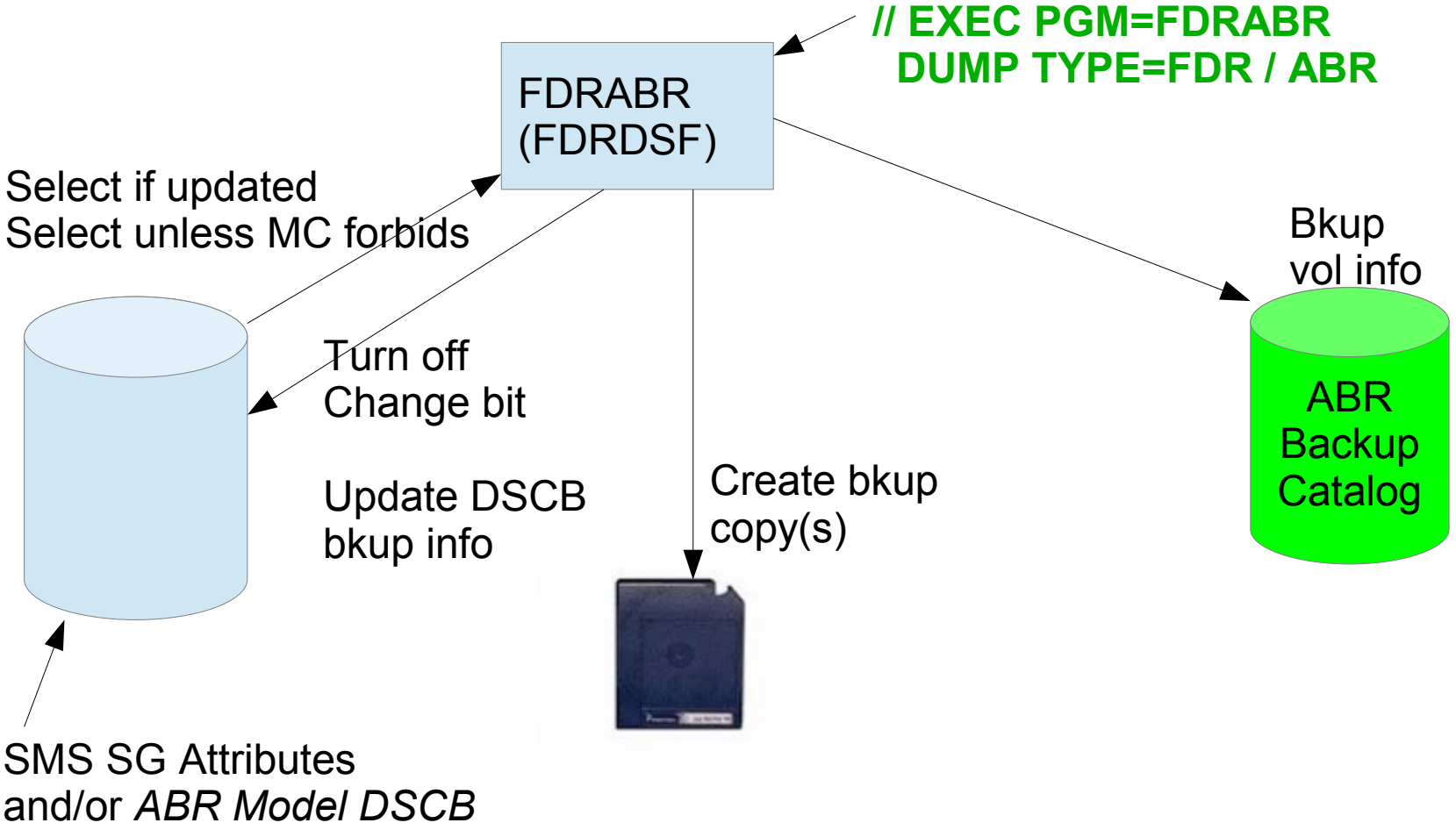
- Other
  - ABARS, Fast Replication Recovery

DFSMShsm Backup Expiration

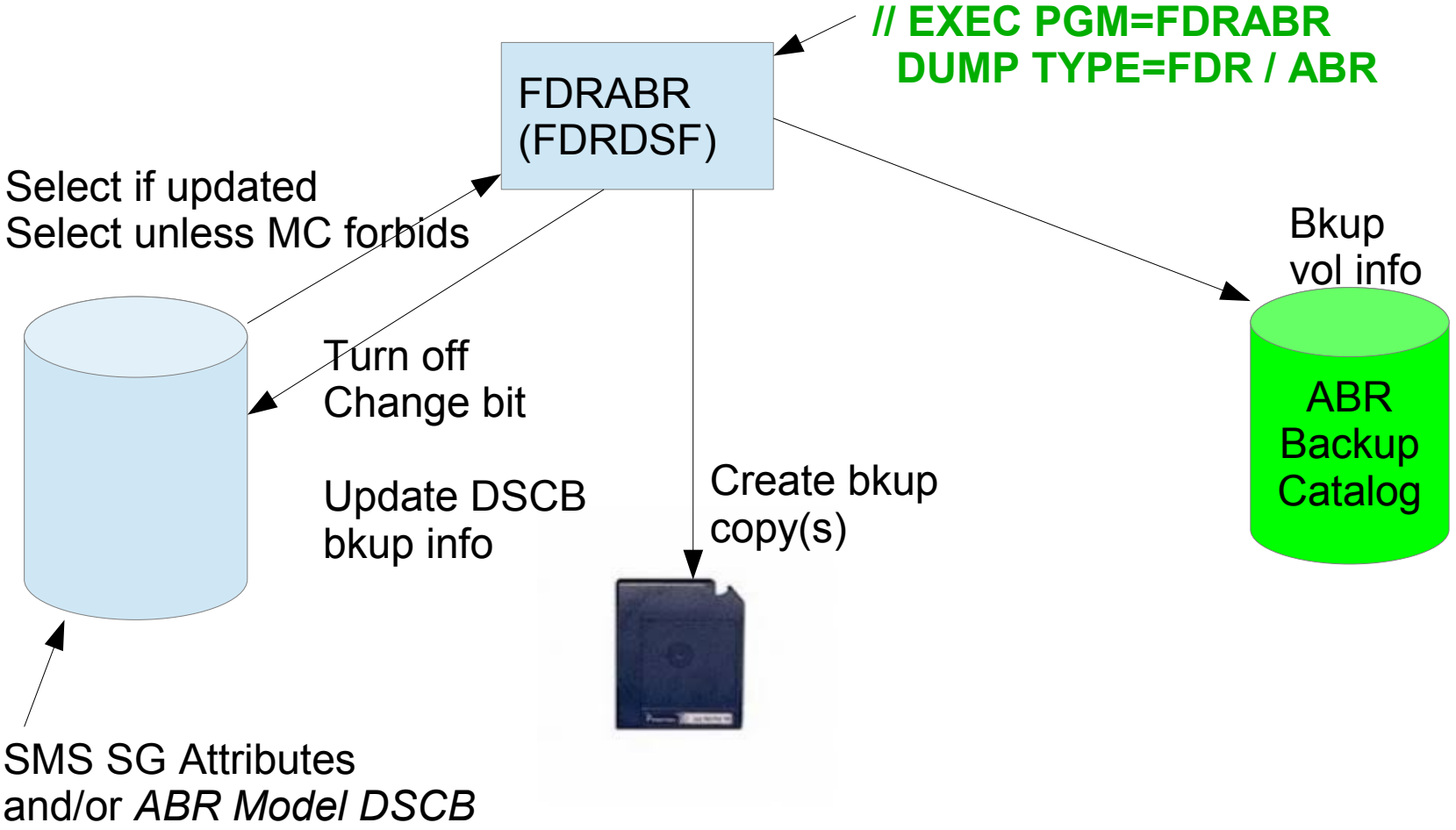


Delete backup version of dataset

FDRABR Backup Process



FDRABR Backup Process



FDRABR Backup Process

Types of Backup

- Incremental

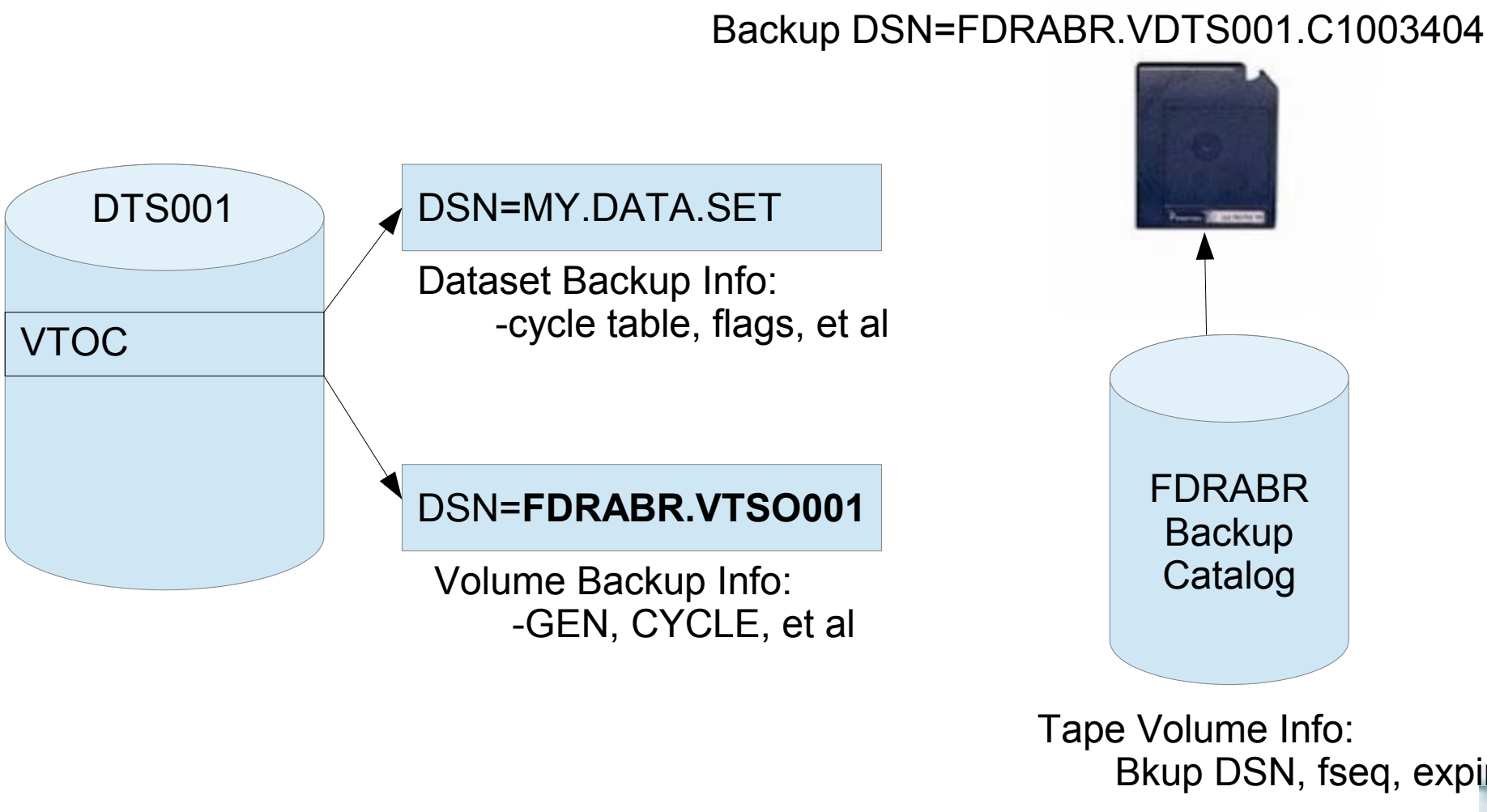
```
DUMP TYPE=ABR
MOUNT VOL=, STORGRP=
```

- Full-Volume

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

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

FDRABR Backup Architecture

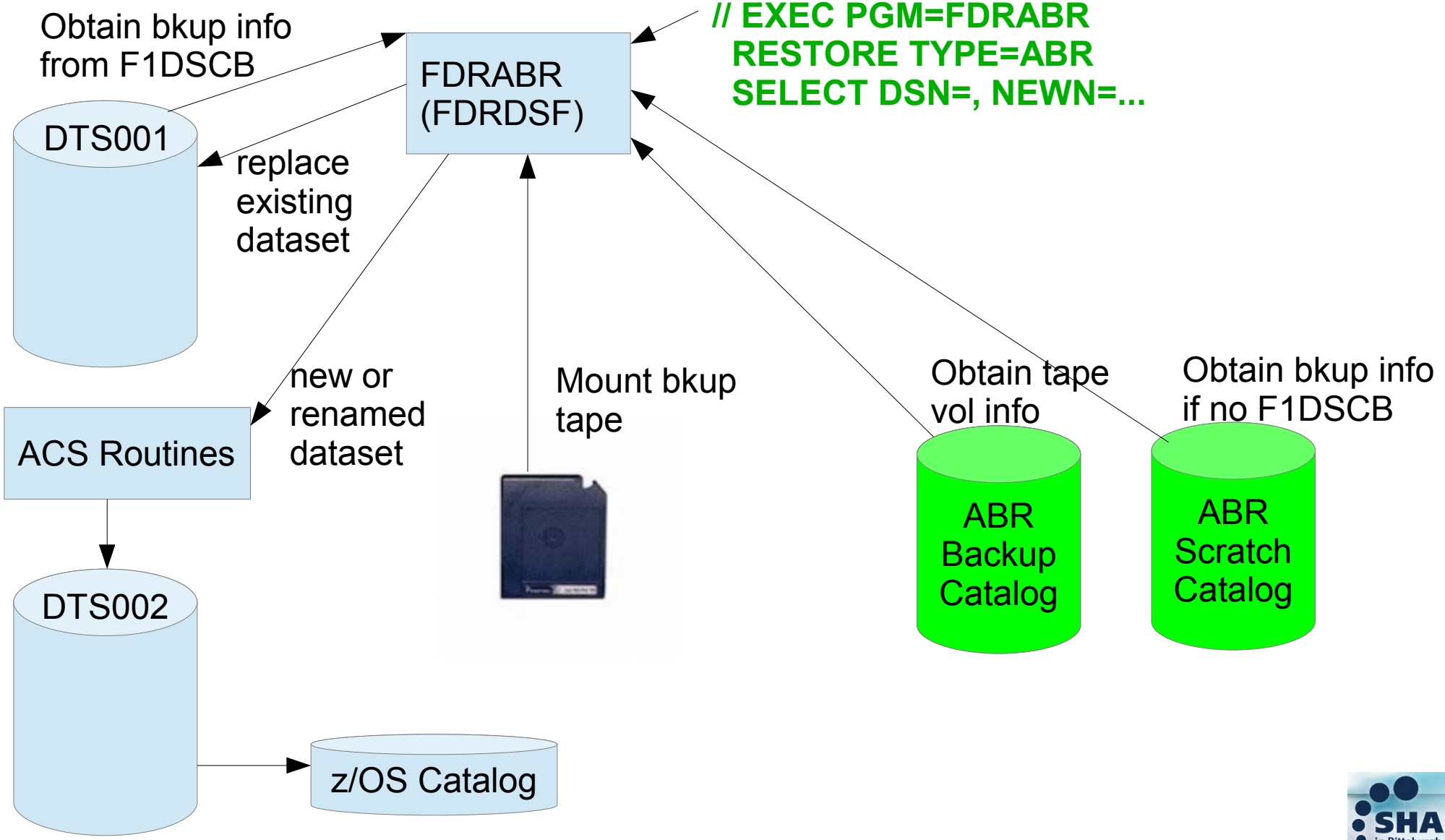


FDRABR – Locating the Backup

- 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

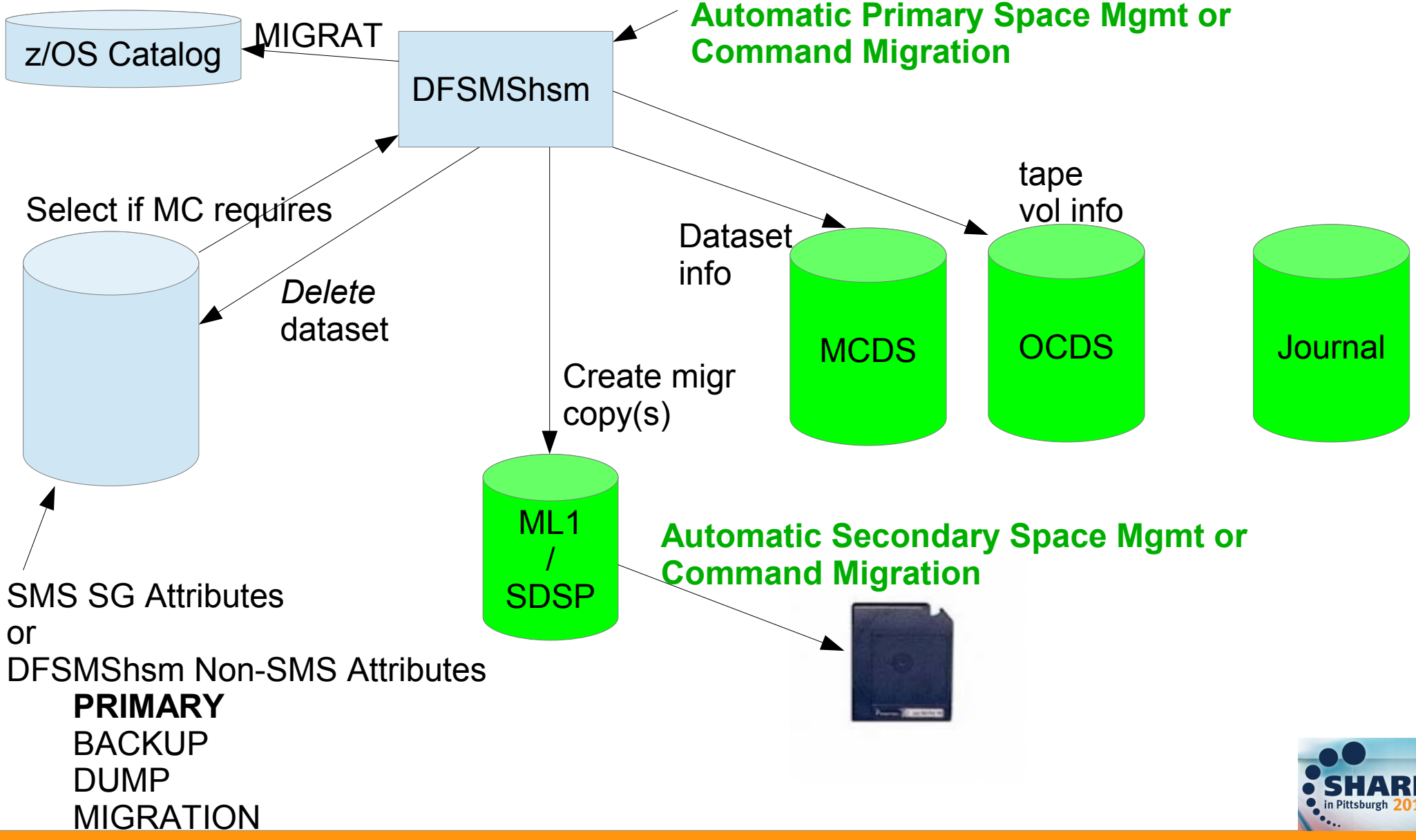
Migrate / Recall

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

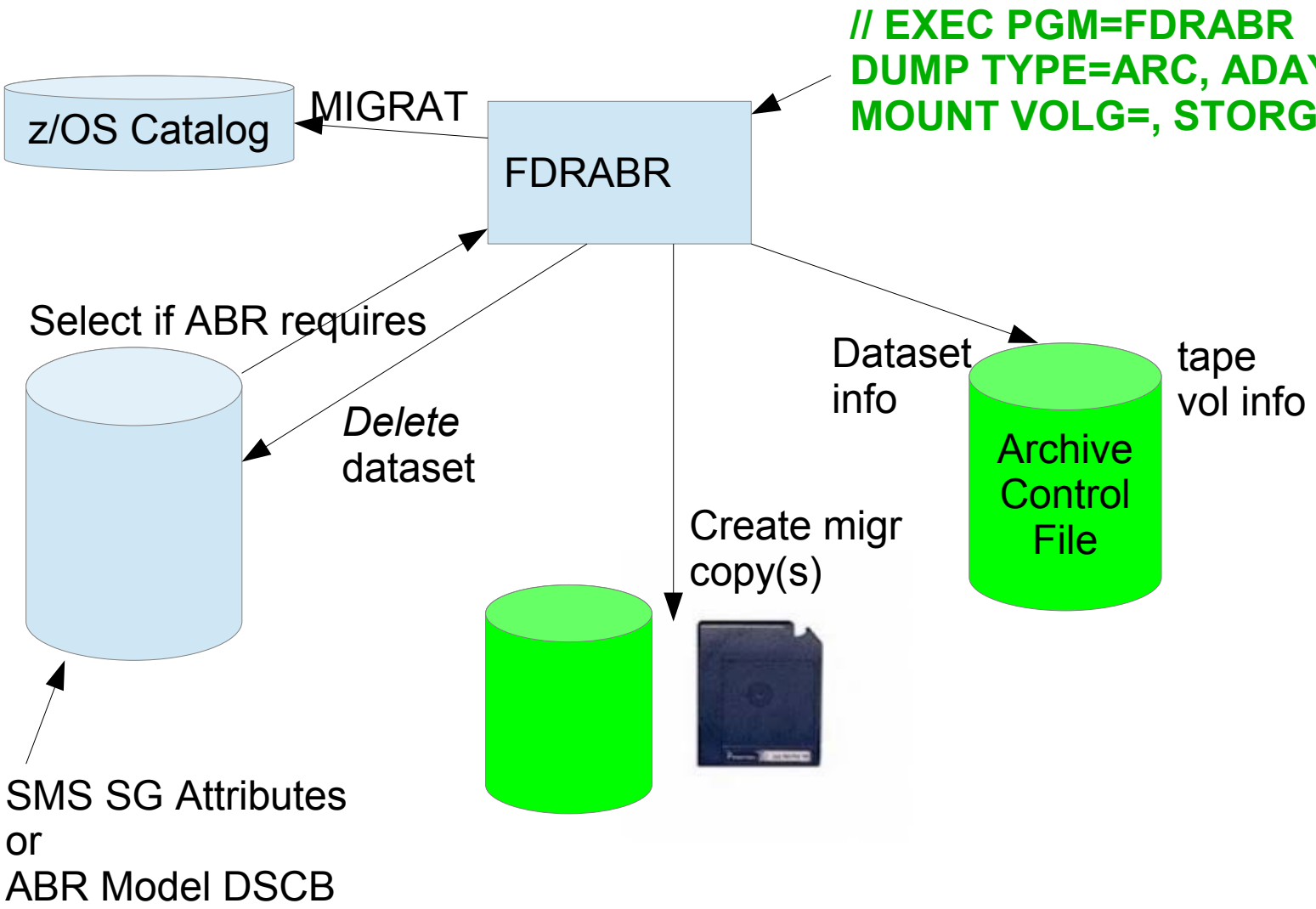
```
DEFINE PRIMARYSPMGMTCYCLE (YYYYYYY CYCLESTARTDATE(YYYY/MM/DD))
SETSYS PRIMARYSPACEMANAGEMENTSTART(hhmm hhmm)
SETSYS MAXMIGRATIONTASKS(nn)
SETSYS MAXEXTENTS(nn)

SETSYS SECONDARYSPACEMANAGEMENTCYCLE (YYYYYYY)
CYCLESTARTDATE(yyyy/mm/dd))
SETSYS SECONDARYSPMGMTSTART(1400)
SETSYS MAXSSMTASKS (CLEANUP(2) TAPEMOVEMENT(1))
SETSYS SMALLDATASETPACKING(KB(110))
```

Space Management Commands

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

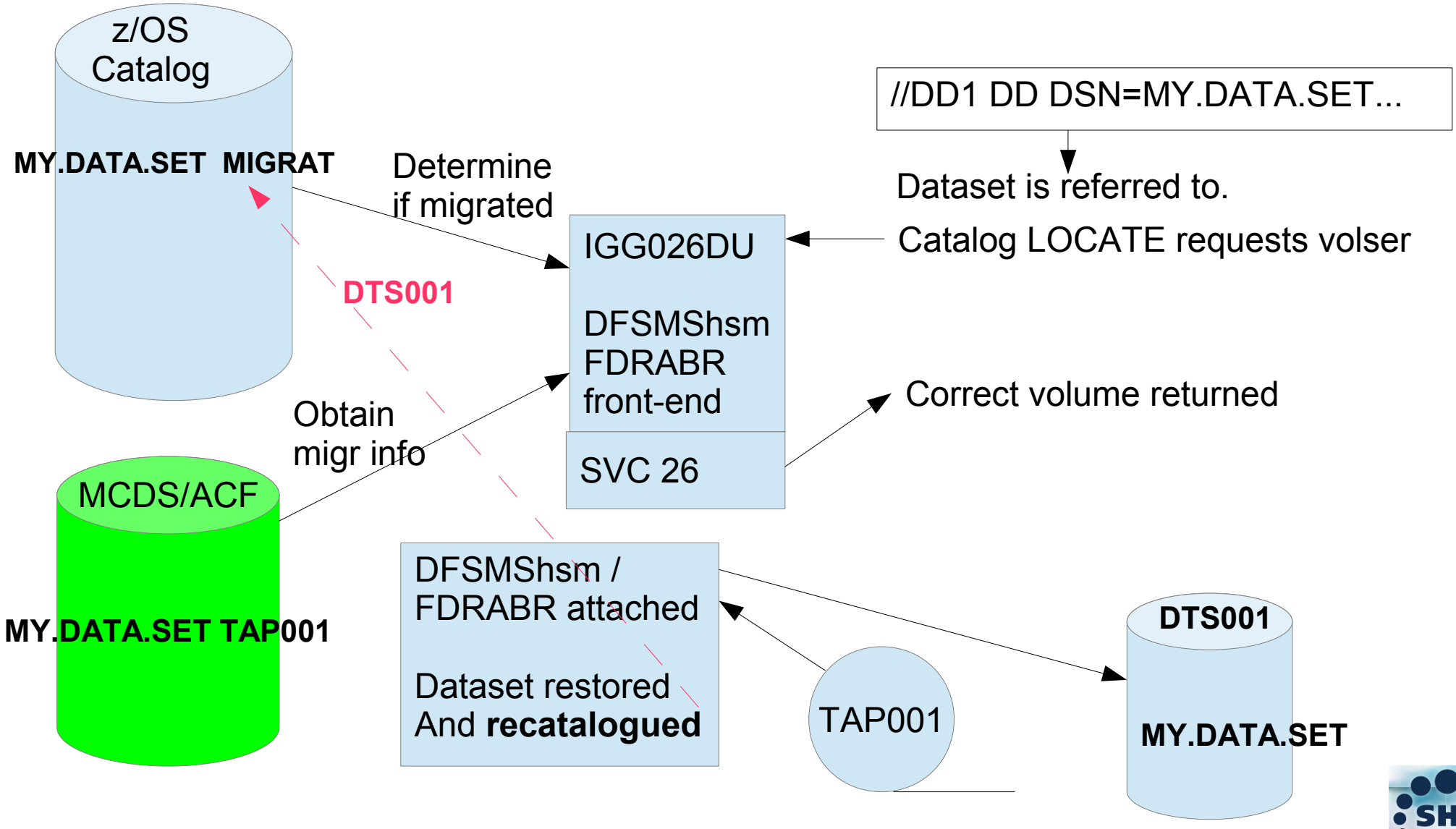
FDRABR Archive Process



Locating the Migration Copy

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

Automatic Recall DFSMShsm and FDRABR



FDRABR Selection Criteria

- SMS Selection Criteria
  - Management Class Migration Attributes
  - Management Class Expiration Attributes optional

- FDRABR Selection Criteria
  - ADAYS, IFNOTCAT, EXPIRED, MAXGDG, DSN

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

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/CCONTENTS?SHELF=DGT2BKB0&DN=SC35-0421-12&DT=20110618155526
- FDR System User's Guide
  - ftp://ftp.fdrinnovation.com/Public/MANUALS/
  -

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