Best Practices: Tape Storage Administration with DFSMSrmm

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Best Practices: Tape Administration with DFSMSrmm

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Agenda

- Why DFSMSrmm Best Practices?
- About the RMM CDS:
  Allocation, placement, monitoring and recovery
- Using client/server the right way
- z/OS release coexistence with DFSMSrmm
- Safety Nets
- Diagnostics and Performance hints
- Administrative Practices

Best Practices: Tape Administration with DFSMSrmm

Some good reasons why you may not want to care about DFSMSrmm best practices

- Your life is boring; some excitement would come just right
- Nobody in your shop knows you
- Nobody in your shop –except you- knows what DFSMSrmm is
- Everything is just running fine. Why care?
- You can still read up in the manuals when anything fails:
- You know there should be things you can do but you just don't care

CDS Allocation, Monitoring and Maintenance

- Your CDS is a crucial resource to ensure
  - Continuous availability of the DFSMSrmm subsystem
  - Integrity of data
    - *RMM-internal information*
    - *Consistency with TCDB and Library Manager databases*
  - Your ability to recover quickly from problems
  - DFSMSrmm performance
- The following best practices apply to
  - Allocation and placement
  - Monitoring, and
  - Maintenance of your CDS

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CDS Allocation

- Good starting point for CDS allocation is in SYS1.SAMPLIB(EDGJMFAL)
- Already addresses CISIZEs and Bufferspace

```
DEFINE CLUSTER (NAME(STSGWD.RMM.CDS)                    -
                FILE(MASTER)                            -
                FREESPACE(15 0)                         -
                KEY(56 0)                               -
                REUSE                                   -
                RECORDSIZE(512 9216)                    -
                SHAREOPTIONS(3 3)                       -
                KILOBYTES(4500 1500)                    -
                VOLUMES(DFRMMA))                        -
       DATA    (NAME(STSGWD.RMM.CDS.DATA)               -
                BUFFERSPACE(829440)                     -
                CISZ(26624))                            -
       INDEX   (NAME(STSGWD.RMM.CDS.INDEX)              -
                CISZ(2048))
```

- SMS-managed is preferred
- Add DATACLASS() to use
  - DSNTYPE EXTended REQuired
  - If your CDS is anywhere near to 4GB, define it such that it can extend beyond 4GB
    - Specify EXTENDED ADDRESSABILITY = Y
- Multi-volume allocation possible

- CDS is not a good candidate for striping or compression

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CDS Sizing

- Estimate required space for CDS as documented
  - … and then allocate at least twice that much as primary allocation
- Add secondary allocation to allow for growth
- Recommended: Use GUARANTEEDSPACE in STORAGECLASS

Table 8. DFSMSrmm Control Data Set DASD Space Requirements

Control Data Set Content	DASD Space
Control record	1 MB (MB equals approximately 1 000 000 bytes)
Data sets	512 KB for every 1000 data sets
Shelf locations in the library that do not contain volumes	140 KB for every 1000 shelf locations
Shelf locations in storage locations	140 KB for every 1000 shelf locations
Owners	38 KB per 1000 volumes
Software products, average five volumes per product	420 KB for every 1000 software products
Volumes	1 MB for every 1000 volumes
Vital record specifications	212 KB for every 1000 vital record specifications

CDS Placement

- CDS Placement considerations
  - Space to extend on volume(s)
  - Free entries in VTOC
- Place on suitable volume(s)
  - High performance
  - Consider AVAILABILITY=CONTINUOUS
  - Consider eligibility for concurrent copy/virtual concurrent copy/flashcopy
  - Separate from journal data sets
- If CDS will be shared across Sysplexes RESERVE/RELEASE will be used
  - No other critical data should be placed on same volume(s)
  - Customize GRSRNLxx to avoid GLOBAL ENQ in addition

CDS Monitoring (1)

- Always monitor the CDS for **space** bottlenecks
  - Objective that there is always enough space allocated, or available via secondary extensions
  - It is difficult to determine actual usage of a KSDS cluster
    Focus on ensuring that the CDS either has sufficient space allocated, or that it will be able to extend. Check:
    - HURBA/HARBA in RMM LISTCONTROL or LISTCAT
      - Baseline of % Full changes with allocations
    - Well below 123 extents/volume limit
    - Free space on volume(s) sufficient for secondary allocation(s)
    - VTOC space
    - Current size + secondary space < 4GB or use EF & EA

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CDS Monitoring (1)

- RMM LC STATUS

```
RMM LC ALL
 Control record:
 Type = MASTER    Create date = 10/02/2010 Create time = 09:52:55
                  Update date = 10/02/2010 Update time = 10:46:44
 Journal: Utilization =   0% (75% threshold)     STATUS: = ENABLED
 CDS:     Utilization =   29%
```

- LISTCAT HIGH ALLOCATED RBA
  HIGH USED RBA

```
ALLOCATION
  SPACE-TYPE------CYLINDER      HI-A-RBA------1592647680
  SPACE-PRI-----------1994      HI-U-RBA-------468848640
  SPACE-SEC------------100
VOLUME
  VOLSER------------D$RMM1      PHYREC-SIZE--------26624     HI-A-RBA------1592647680     EXTENT-NUMBER----------1
  DEVTYPE------X'3010200F'      PHYRECS/TRK------------2     HI-U-RBA-------468848640     EXTENT-TYPE--------X'40'
  VOLFLAG------------PRIME      TRACKS/CA-------------15
  EXTENTS:
  LOW-CCHH-----X'00020000'      LOW-RBA----------------0     TRACKS-------------29910
  HIGH-CCHH----X'07CB000E'      HIGH-RBA------1592647679
```

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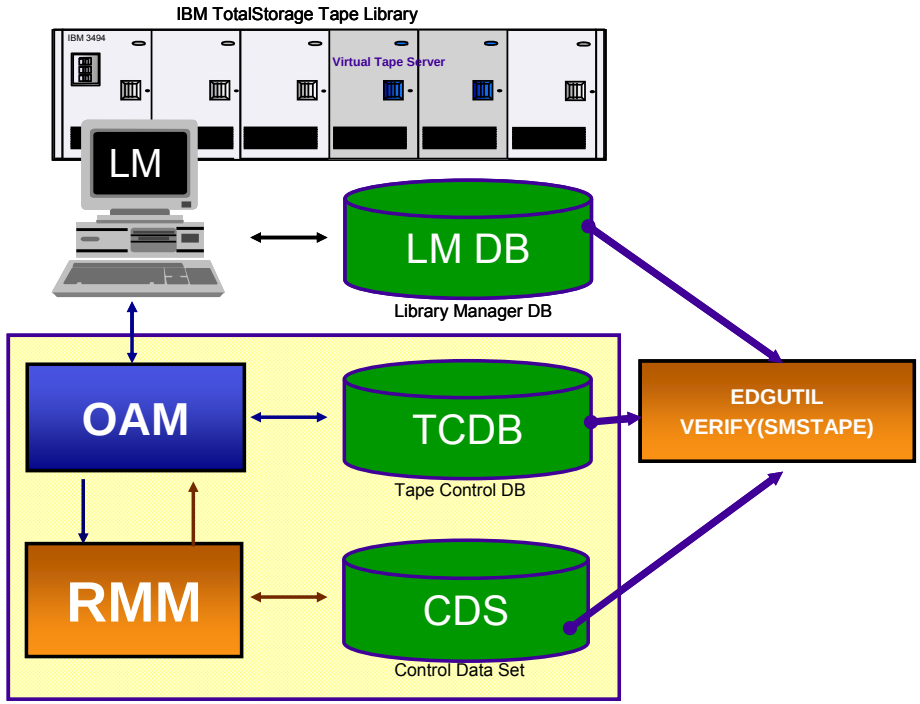
CDS Monitoring (2)

- Regularly monitor the CDS for **integrity**
  - Use EDGUTIL VERIFY(ALL) to check for CDS mismatches
  - Use EDGUTIL VERIFY(SMSTAPE) to check consistency across TCDB, CDS and library manager database



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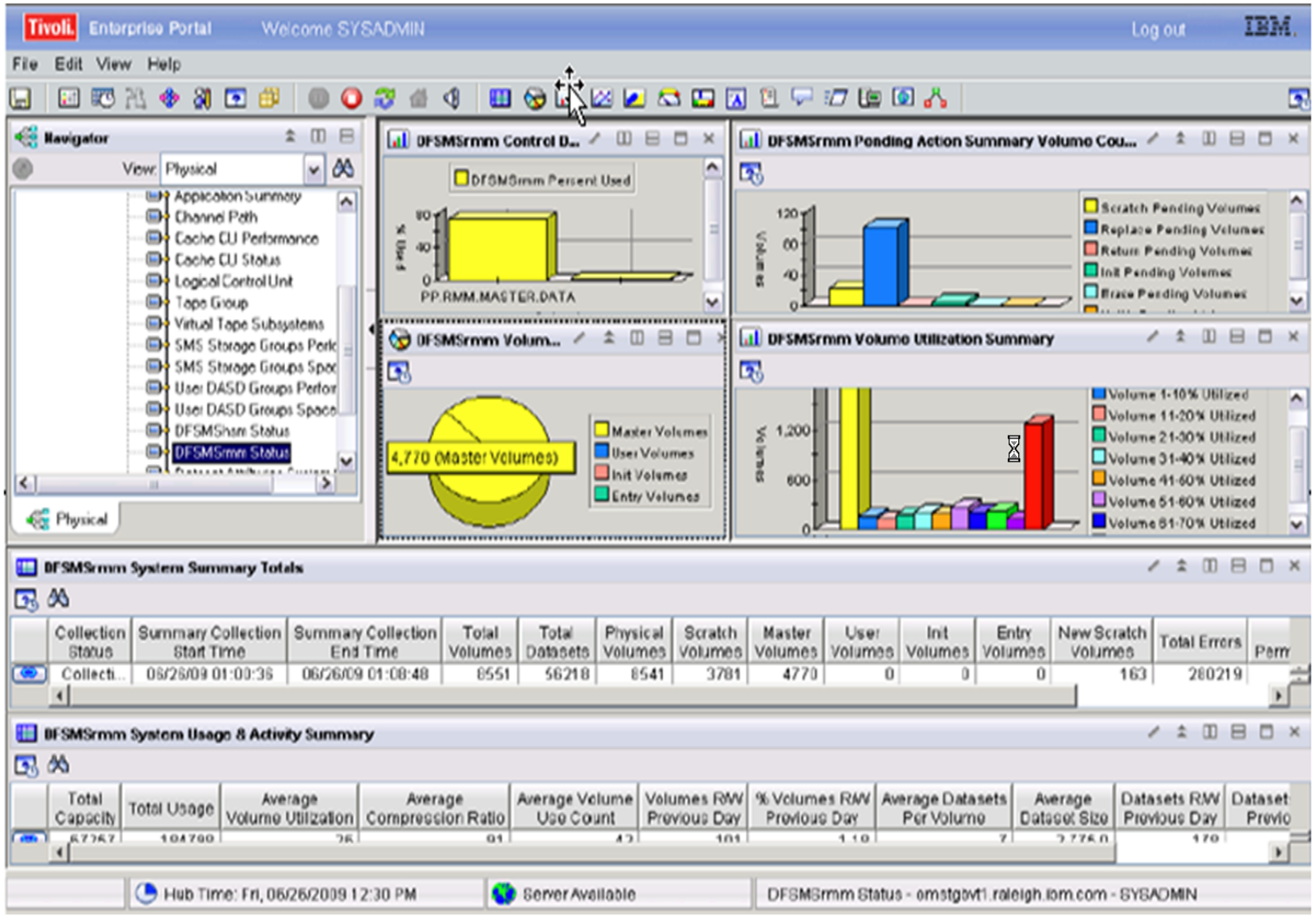
Other Product Interfaces to RMM



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CDS Maintenance

- To reclaim CDS space use EDGBKUP; PARM='BACKUP(REORG)'
  - As in SYS1.SAMPLIB(EDGJBKUP)
  - After the REORG note the HURBA for later comparisons
  - There is little value in REORG other than to reclaim space
    - Frequent REORGs tend to increase the number of CI/CA splits required
  - On z/OS V1.12 and above VSAM CA reclaim should further reduce the requirements for REORGs

- Repair CDS inconsistencies
  - Only when previously identified by VERIFY
  - Run MEND against a copy of the CDS
    - Check changes, then copy back
  - Always quiesce all DFRMM subsystems sharing the CDS

- Recommendation: Test your recovery and REORG procedures

Preparing for CDS Recovery

- Certain events can render the CDS unusable
  - Physical data loss or corruption
  - CDS update errors
    - I/O errors during CDS update
    - “CDS full” condition while doing multi-record updates
- Recommendation: Have current and tested recovery jobs available at any time.
  - Recovery strategy depends on specific situation
  - Incorrect recovery attempts make the problem even worse and cause unneeded outage times
- For recovery procedures, refer to “DFSMSrmm Implementation and Customization Guide”, chapter 17: Maintaining the Control Data Set

Preparing for CDS Recovery

- CDS Backups
  - How frequently
  - Every 24 hours
    - Every 6 hours
    - Every 4 hours

- Recommendation: Repro your CDS to another system and actually recover from different time frames: Collect times, validate your procedures
  - Daytime
  - Middle of Batch window
  - Month End; Quarter End, Fiscal Year End

- For recovery procedures, refer to "DFSMSrmm Implementation and Customization Guide", chapter 17: Maintaining the Control Data Set

Recovery Strategy

- Physical data loss or corruption
  - The CDS needs to be recovered to the most current clean state
    Forward recovery:
    - Base is the last backup taken from the CDS
    - Then apply ("replay") all subsequent changes recorded in the journal data set(s)

- CDS update errors
  1. DFRMM auto-recovery will be attempted
  2. If auto-recovery fails, perform manual recovery
     - Base is the currently active CDS
     - Then apply all subsequent changes recorded in the journal data set(s)

- Journal "replay" depends on the CDS backup format
  - DSS: Start with the journal backup taken at the **same** time
  - AMS: Start with the journal backup taken at the **next** backup

DFRMMs Automatic Attempt to recover

- Automatic recovery
  - `EDG2111I DFSMSrmm STARTING AUTOMATIC RECOVERY OF THE CONTROL DATA SET`
  - DFRMM will automatically use the current journal to perform automatic recovery 
- If successful, DFRMM will continue:
  - `EDG2112I DFSMSrmm AUTOMATIC RECOVERY OF CONTROL DATA SET SUCCESSFUL`
- Otherwise manual recovery needs to be performed:
  - `EDG2115I RECOVERY OF CONTROL DATA SET IS REQUIRED`
  - `EDG2116A DFSMSrmm QUIESCED - START CONTROL DATA SET RECOVERY PROCEDURE`
  - Possible reasons include
    - Journal / CDS mismatch
    - Journal not available or disabled

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How to Solve a CDS full Condition

```
EDG2109I MASTER   FILE IS FULL FOR FUNCTION LADD,18 -
          RC=0008 REAS=001C KEY=…
*nn EDG4001D DFSMSrmm I/O ERROR IN …
ENTER "RETRY" OR "CANCEL"
EDG2110I DFSMSrmm DETECTED A FAILED CONTROL DATA SET UPDATE
EDG2111I DFSMSrmm STARTING AUTOMATIC RECOVERY OF THE CONTROL DATA SET
EDG2109I MASTER   FILE IS FULL FOR FUNCTION LADD,18 - RC=0008 REAS=001C
EDG2114I AUTOMATIC RECOVERY OF CONTROL DATA SET HAS FAILED
EDG2116A DFSMSrmm QUIESCED - START CONTROL DATA SET RECOVERY PROCEDURE
*nn EDG4012D DFSMSrmm INACTIVE FOR …,ENTER "RETRY", "CANCEL" OR "CONTINUE"
```

- **Recovery**:
  - Do not yet reply to EDG4001D
  - Do not reply to EDG4012D. Leave this message outstanding until RMM is active again after the recovery
    - On refresh, RMM will continue without a reply
    - Do not auto-reply to this message
  - Run reorg to reclaim some space:
    - `// EXEC PGM=EDGBKUP,PARM='BACKUP(REORG)'`
  - Reply EDG4001D with “RETRY”

Best Practices: Tape Administration with DFSMSrmm

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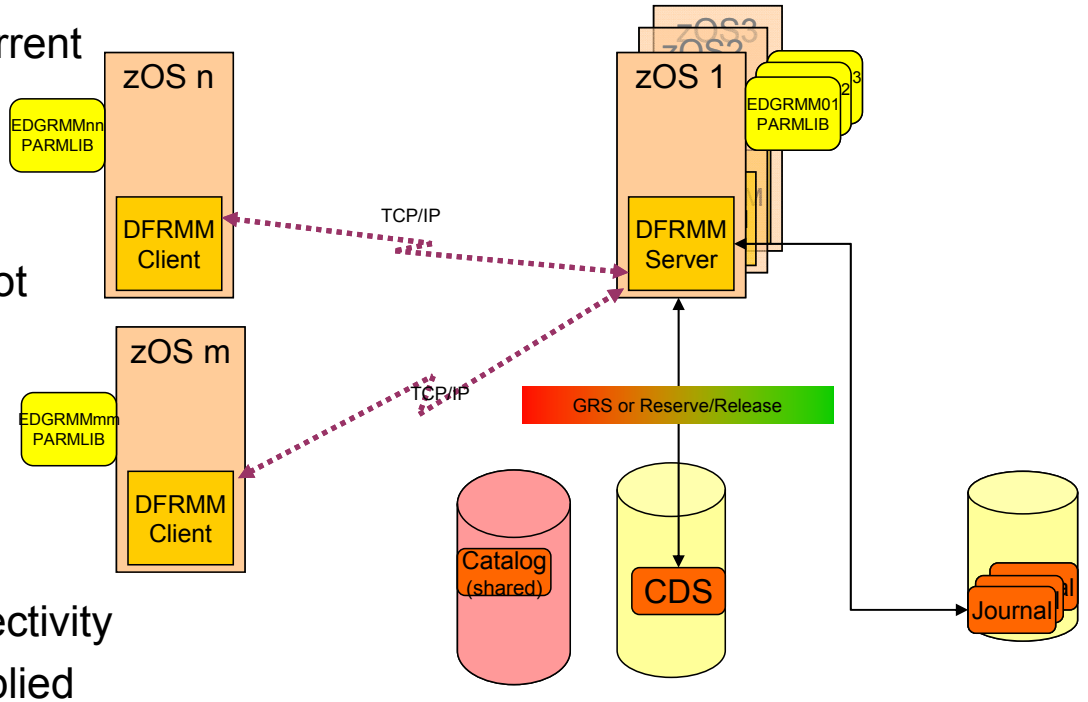
Using DFSMSrmm Client Server the right way

- Reasons for using client/server:
  - Many systems that should share a common database
    - and expect significant concurrent access to CDS
  - No shared volumes available
  - Avoids RESERVE/RELEASE
    - Hyperswap manager does not tolerate cross-plex sharing
  - Catalogs may be shared or non-shared



- Prerequisites for using client/server
  - Reliable network (TCP/IP) connectivity
  - All coexistence maintenance applied
    - Same coexistence requirements as for non-C/S environment!
  - Adjust RMM usage and operational procedures for C/S – see next chart

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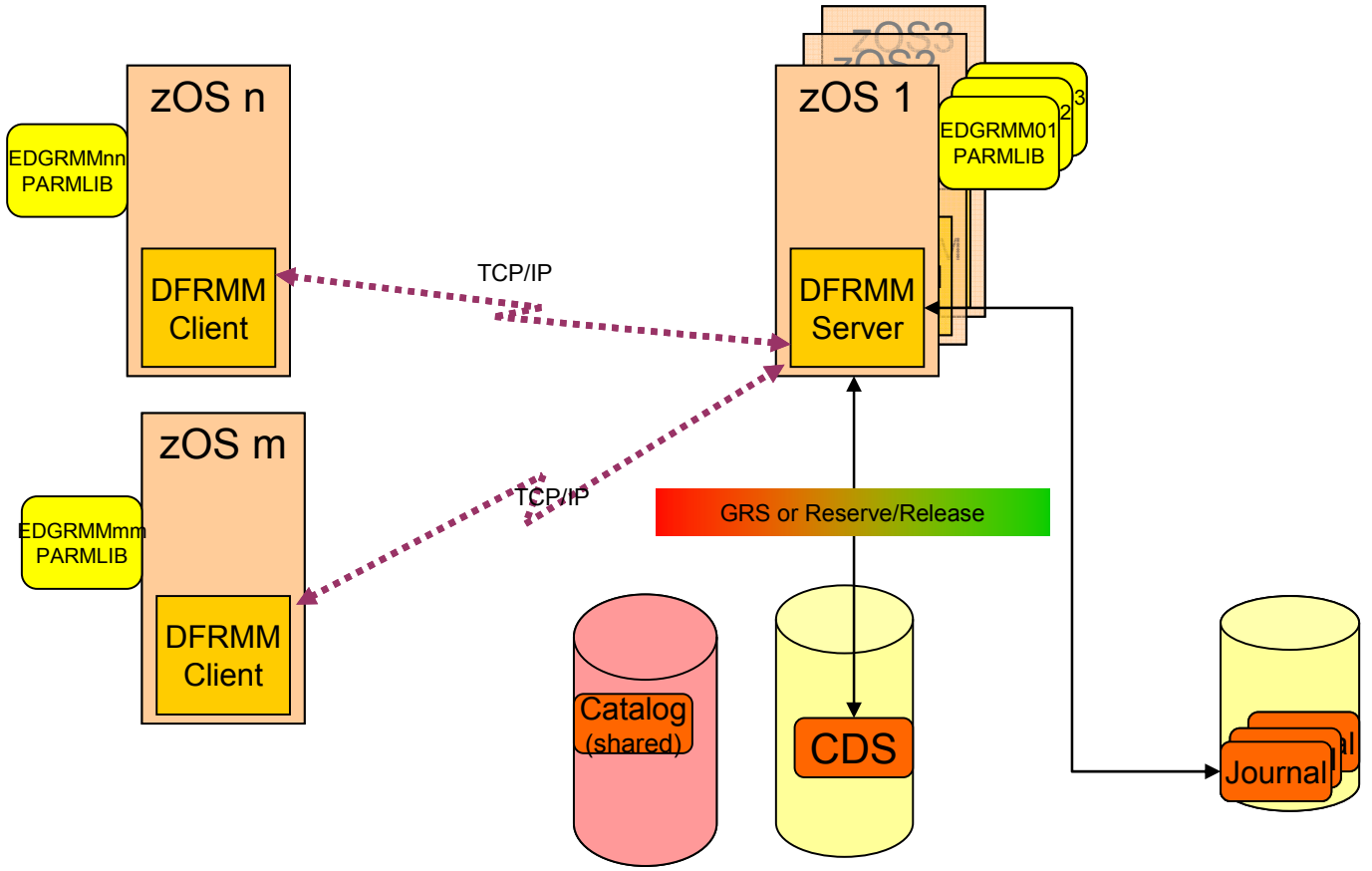
C/S Topology – Shared Catalogs



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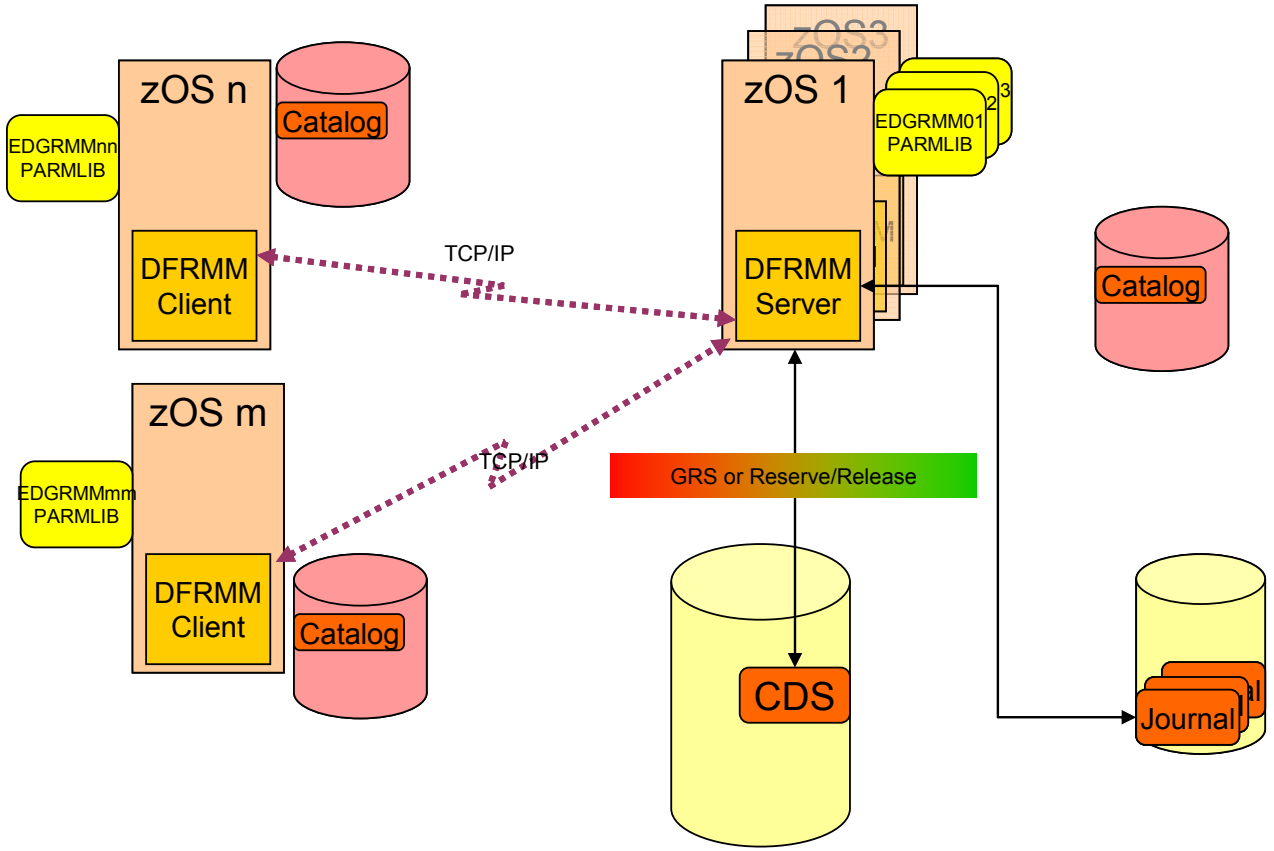
C/S Topology – Non-shared Catalogs



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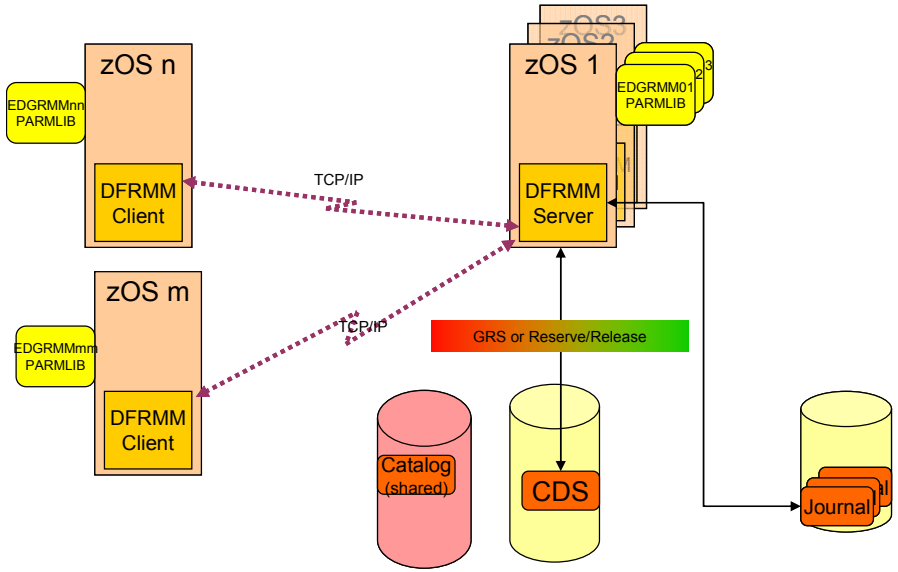
DFSMSrmm Operations and usage in a Client/Server Environment

Must run on client:
- CATSYNCH
- EXPROC



Must run on server:
- BACKUP

Should run on server:
- VRSEL
- DSTORE
- RPTEXT

See next chart for actions to be performed on client side if catalog is not shared.

Preferably use server for all tasks that do not require to run on client.

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DFSMSrmm Operations and usage in a Client/Server Environment with non-shared catalogs

- CATSYSID must define list of systems that share catalogs with the system
- Catalogs and CDS may need resynchronization:
  - Identified EDGHSKP CATSYNCH/VERIFY
  - Synchronization was lost because RMM was unavailable or errors occurred
  - User catalogs were connected or disconnected

SYSID(SYS2)
CATSYSID(SYS1,SYS2, …)

SYSID(SYSn)
CATSYSID(SYSn) CLIENT()

EDGHSKP CATSYNCH

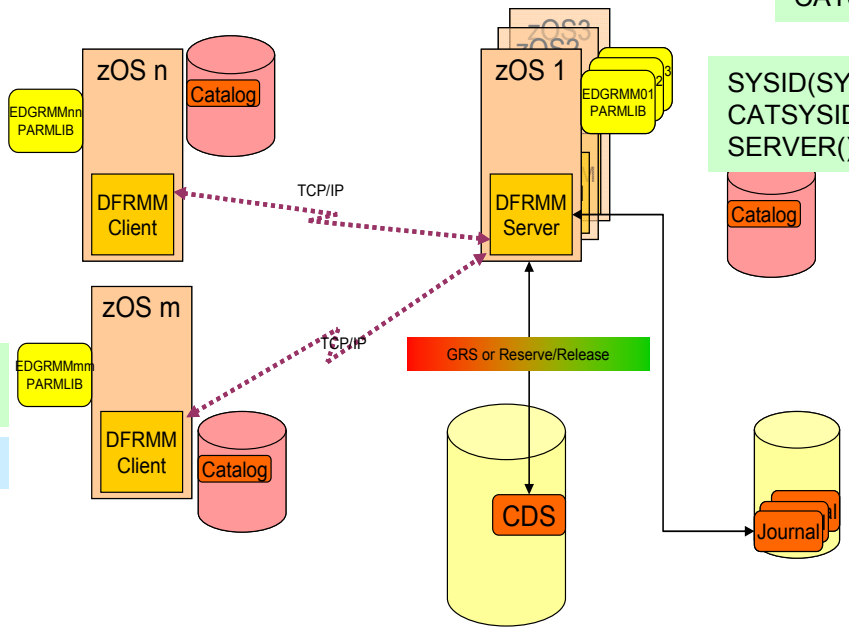
SYSID(SYS1)
CATSYSID(SYS1,SYS2, …)
SERVER()

EDGHSKP CATSYNCH

EDGUTIL UPDATE CONTROL
CATSYNCH(YES)

SYSID(SYSm)
CATSYSID(SYSm) CLIENT()

EDGHSKP CATSYNCH



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z/OS release coexistence with DFSMSrmm

- DFSMSrmm follows z/OS rules for coexistence
- Coexistence maintenance is *critical* if CDS is shared across different releases of z/OS
- Any migration actions required?
  → Check z/OS migration guides applicable to your releases
  → Run migration checks identified for the target release (if any)
    - Refer to DFSMSrmm migration health checks for V1R11
    - MODIFY HZSPROC,ACTIVATE,CHECK=(IBM,ZOSMIGV1R11_RMM_*)
- Any coexistence maintenance required?
  → Run SMP/E FIXCAT to check all required service is applied

```
---------------------------- Fix Category Explorer ----------- Row 1 to 6 of 6
===> _                                                        SCROLL ===> PAGE

Commands: FIND -Find a string, E -Expand all, C -Collapse all, U -Unselect all

Actions:  E -Expand, C -Collapse, S -Select, U -Unselect, V -View patterns

   Fix Categories                                                  Selected
   ---------------------------------------------------------------  --------
  -IBM.*
   +IBM.Coexistence
   +IBM.Device.*
   +IBM.Function.*
    IBM.ProductInst
   +IBM.TargetSyste
```

```
MISSING FIXCAT SYSMOD REPORT FOR ZONE T110019

                                HOLD     MISSING  HELD      ____RESOLVING SYSMOD_____
FIX CATEGORY      FMID          CLASS    APAR     SYSMOD    NAME      STATUS  RECEIVED
_________________ _______       _______  _______  _______   _______   ______  ________
IBM.Coexistence.z/OS.V1R12
                  HBB7760                AA28873  HBB7760   UA53936   HELD    YES
                                         AA30848  HBB7760   UA54053   GOOD    YES
                                         AA32250  HBB7760   UA54344   GOOD    YES
                                         AA32285  HBB7760   UA55013   GOOD    YES
                  HDZ1B1N                AA32804  HDZ1B1N   UA55131   GOOD    YES
                  HJE7760                EA32712  HJE7760   UA54558   GOOD    YES
```

Best Practices: Tape Administration with DFSMSrmm

Health Checker

OA26947: **DFSMSrmm migration health checks for V1R11**
The IBM Health Checker for z/OS is extended with new migration checks for DFSMSrmm.
checks are designed to help you to determine if DFSMSrmm is correctly configured and is consistent with IBM's recommendations.

The IBM Health Checker for z/OS now includes the following checks for DFSMSrmm -
ZOSMIGV1R11_RMM_DUPLICATE_GDG
ZOSMIGV1R11_RMM_REXX_STEM, and
ZOSMIGV1R11_RMM_VRSEL_OLD.

To ACTIVATE the checks using the MODIFY command, issue:
MODIFY HZSPROC,ACTIVATE,CHECK=(IBM,ZOSMIGV1R11_RMM_*)

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z/OS (RMM) release / Function	z/OS V1.12	z/OS V1.11	z/OS V1.10	z/OS V1.9
Retention limit reporting	+	**OA30881**	**OA30881**	
•Volume Hold •EAS Eligibility •OPENRULE IGNORE •IPv6 •AUTOR •Add. Status commands & RAS enhancements	+			
Option to turn uppercasing on/off	+	**OA32661**	**OA32661**	**OA32661**
TS7700 1.6 Support , Logical WORM	+	**OA28637**	**OA28637**	**OA28637**
Report generator extensions	+	+		
Migration checks for z/OS V1.11+ coexistence	+	**OA32028**	**OA26947 OA32028**	**OA26947 OA32028**
z/OS V1.11+ coexistence	-	-	**OA25714 OA28232**	**OA25714 OA28232**

+: Support integrated into release base

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Exploit additional safety nets for your data

- Some problems may cause volumes to be dropped that really should be retained
  - Incorrect VRS changes
  - Operational problems
  - Bugs ☹

- DFSMSrmm offers capabilities to
  - Alert you when an unexpected amount of volumes are dropped
  - Prevent volumes from being dropped permanently

- Use these features as an additional safety net to prevent data loss
  - **EXPDTDROP / VRSDROP / VRSRETAIN**
    - Thresholds may be specified as absolute numbers or as percentages.
    - If threshold is exceeded INFO, WARN, or FAIL actions be performed.
  - Volume “Hold” attribute prevents a volume being set to pending release

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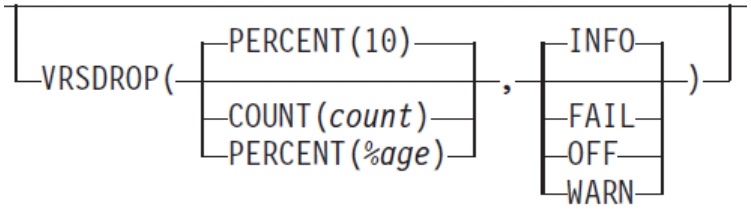
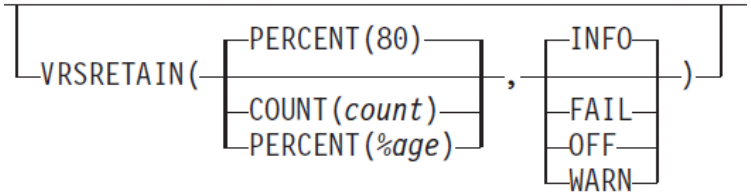
Safety Net EXPDTDROP / VRSDROP / VRSRETAIN

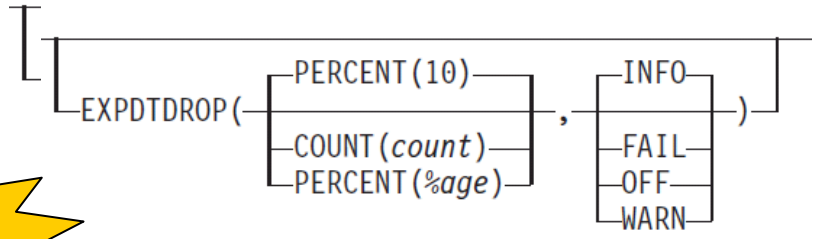
- **VRSDROP** to specifies how many existing VRS-retained volumes may be dropped from vital records retention and the action to be taken by DFSMSrmm.



- **VRSRETAIN** specifies how many newly assigned volumes are to be retained by vital records retention.
  - A newly assigned volume is one that has a volume assignment time that is higher than the run time of the previous VRSEL processing and that is not VRS-retained.



– EXPDTDROP specifies how many existing expiration date retained volumes may be dropped from retention. An EXPDT-retained volume is one that is not VRS-retained and is not newly assigned
  – EXPROC: additional processing may be required



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Safety Net EXPDTDROP / VRSDROP / VRSRETAIN

Set Retention Expectations . . .

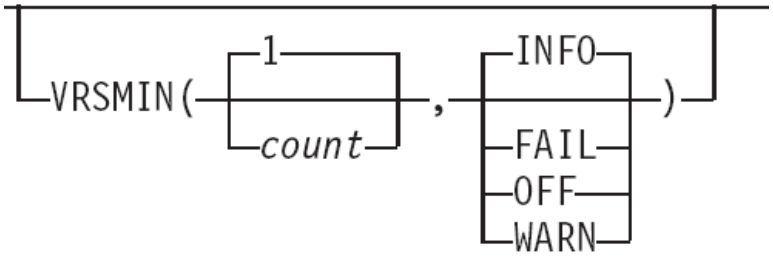
- **MESSAGE file**

```
.....
EDG2420I PHYSICAL VOLUMES READ                          =        150  75%
EDG2420I LOGICAL  VOLUMES READ                          =         30  15%
EDG2420I STACKED  VOLUMES READ                          =         20  10%
EDG2420I TOTAL    VOLUMES READ                          =        200 100%
.....
EDG2242I INITIAL NUMBER OF VRS RETAINED VOLUMES         =         20  40%
EDG2244I NUMBER OF VRS RETAINED VOLUMES TO BE DROPPED   =          2  10%
EDG2243I INITIAL NUMBER OF NEWLY ASSIGNED VOLUMES       =         15  30%
EDG2245I NUMBER OF NEWLY ASSIGNED VOLUMES TO BE RETAINED=          5  33%
EDG2427I INITIAL NUMBER OF EXPDT RETAINED VOLUMES       =         10 100%
EDG2428I NUMBER OF EXPDT RETAINED VOLUMES TO BE DROPPED =          2  20%
.....
EDG2421I PHYSICAL VOLUMES UPDATED                       =          5  33%
EDG2421I LOGICAL  VOLUMES UPDATED                       =          1  33%
EDG2421I STACKED  VOLUMES UPDATED                       =          1  50%
EDG2421I TOTAL    VOLUMES UPDATED                       =          7  35%
```

Best Practices: Tape Administration with DFSMSrmm

Safety Net VRSMIN VRSCHANGE

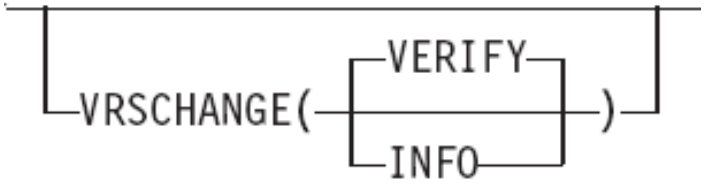
- **VRSMIN** to specify a minimum number of Vital Record Specifications defined in the RMM CDS and what to do with housekeeping should the number drop below this count.



EDG2229I

- **VRSCHANGE(VERIFY)** specifies what to do with inventory management if any VRS changes.
  - Force a VRSEL,VERIFY
  - Recommendation:

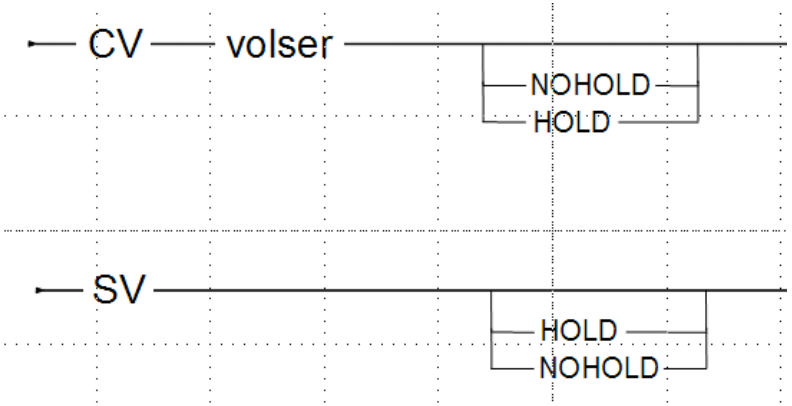
    Format the Activity Report
    SYS1.SAMPLIB(EDGJACTP)



Best Practices: Tape Administration with DFSMSrmm

Safety Net Volume "HOLD"

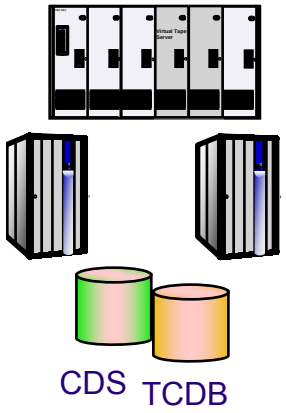
- **Volume "Hold" attribute**
  - prevents a volume being set to pending release
  - only valid for non-scratch, non-pending release volumes
  - DV RELEASE subcommands fail if the HOLD attribute is set
    - DV FORCE is accepted as per normal
  - new HY and HN line commands
- The hold attribute is only honored on z/OS V1.12 and above. Lower levels ignore it!



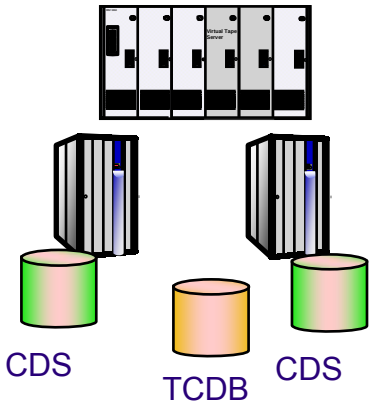
Best Practices: Tape Administration with DFSMSrmm

System managed tape Library partitioning

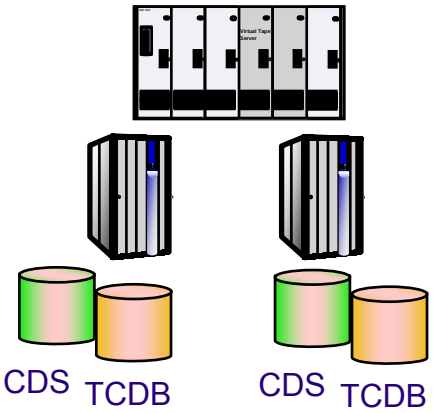
Prior to V1R10



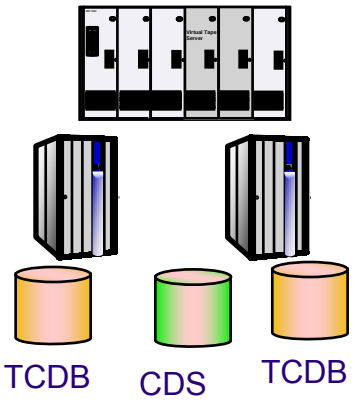
1:1
Partitioned
by exits
CBRUXENT
EDGUX200
scratch categories
EXPROC by system
Shared private



1:n
Partitioned
by cds/system
REJECT ANYUSE
Scratch categories
EXPROC by CDS
Shared private
use 98000



n:n
Partitioned
by system
REJECT ANYUSE
Scratch categories
EXPROC by CDS
No shared private
add TCDBentry &
98000



n:1
Partitioned
by system
custom CBRUXENT
Scratch categories
EXPROC by TCDB
No shared private
add TCDBentry

SHARE in Anaheim 2011

Best Practices: Tape Administration with DFSMSrmm

System managed tape Library partitioning

CURRENT

- **2 Ways to control entry processing**
  - REJECT ANYUSE(*)
    - All volumes undefined in RMM CDS left in insert category
    - Must pre-define volumes to enable entry of volumes
  - No REJECTs or Selective REJECTs
    - All un-REJECTed volumes added automatically to RMM CDS
    - Pre-define volumes to RMM as an exception based on
      - *volume status*
      - *ISMF library default entry status*
- **Any alternative requires CBRUXENT exit customization**
  - For 1:1 case, EDGUX200 logic must match that in CBRUXENT
- **EDGUX200 is required if RMM CDS contains volumes from multiple partitions and TCDB is shared or has entries created manually for private sharing**
  - CATSYSID(sysid_list) can be used instead of EDGUX200
  - Run EXPROC once per scratch category set

Best Practices: Tape Administration with DFSMSrmm

System managed tape Library partitioning

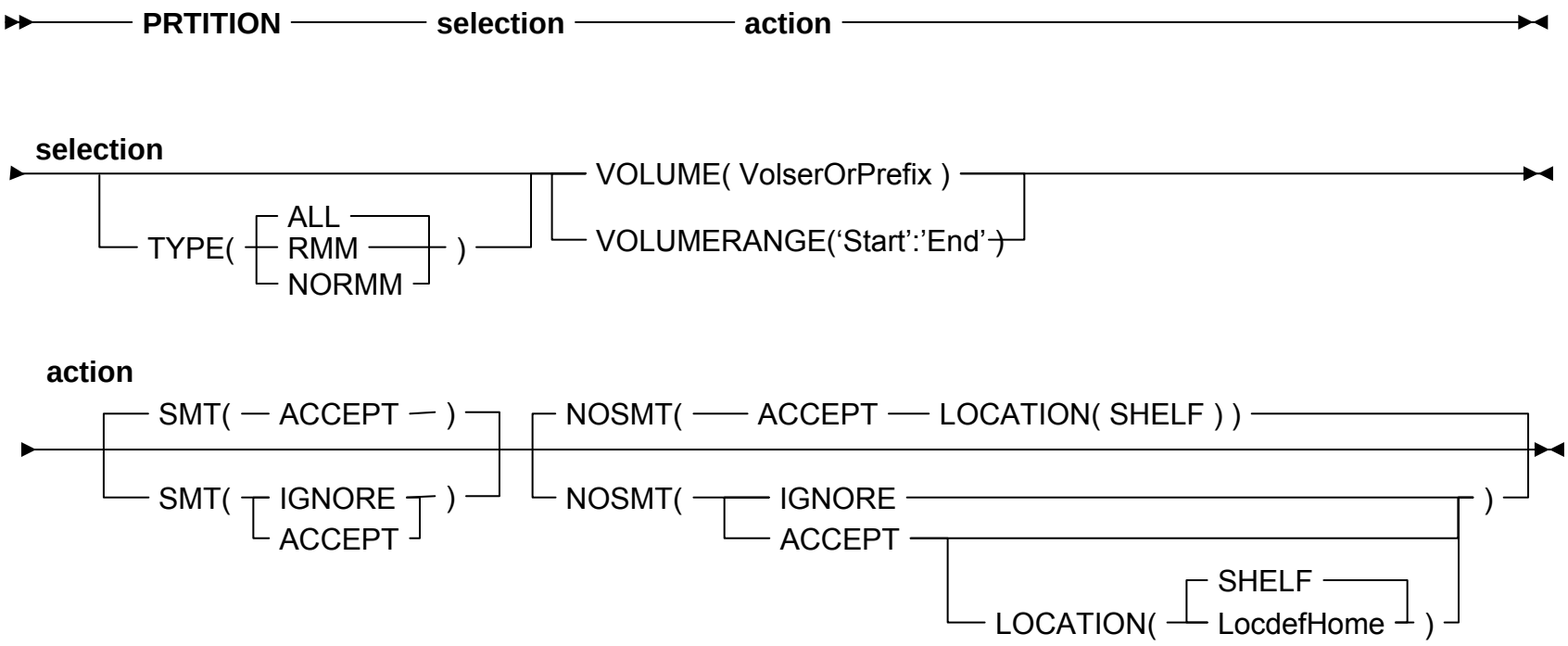
z/OS V1R10

- Addresses many problems:
  - REJECT used for both OPEN and Partitioning
    - New PRTITION and OPENRULE statement
  - Complex environments are unmanageable because of number of REJECTs
    - New options on OPENRULE/PRTITION that allow global action setting then one or more specific overrides based on different options
  - REJECT for partitioning is not effective in Client/Server or if CDS is shared
    - New PRTITION statement allows both RMM and NORMM volumes to be handled
  - Only PREFIX can be defined
    - VOLUMERANGE and VOLUME allow more flexibility including specific and generic volser
  - IGNORE support requires EDGUX100 / EXPDT=98000
    - OPENRULE with ACTION(IGNORE) avoids the need for EDGUX100 customization or JCL EXPDT=98000
  - OPENRULE action REJECT based on creating system
    - Force data sets to be cataloged
    - Cross-check creating SYSID

- **Recommendation**
  - **Use PRTITION / OPENRULE rather than REJECTs!**

Best Practices: Tape Administration with DFSMSrmm

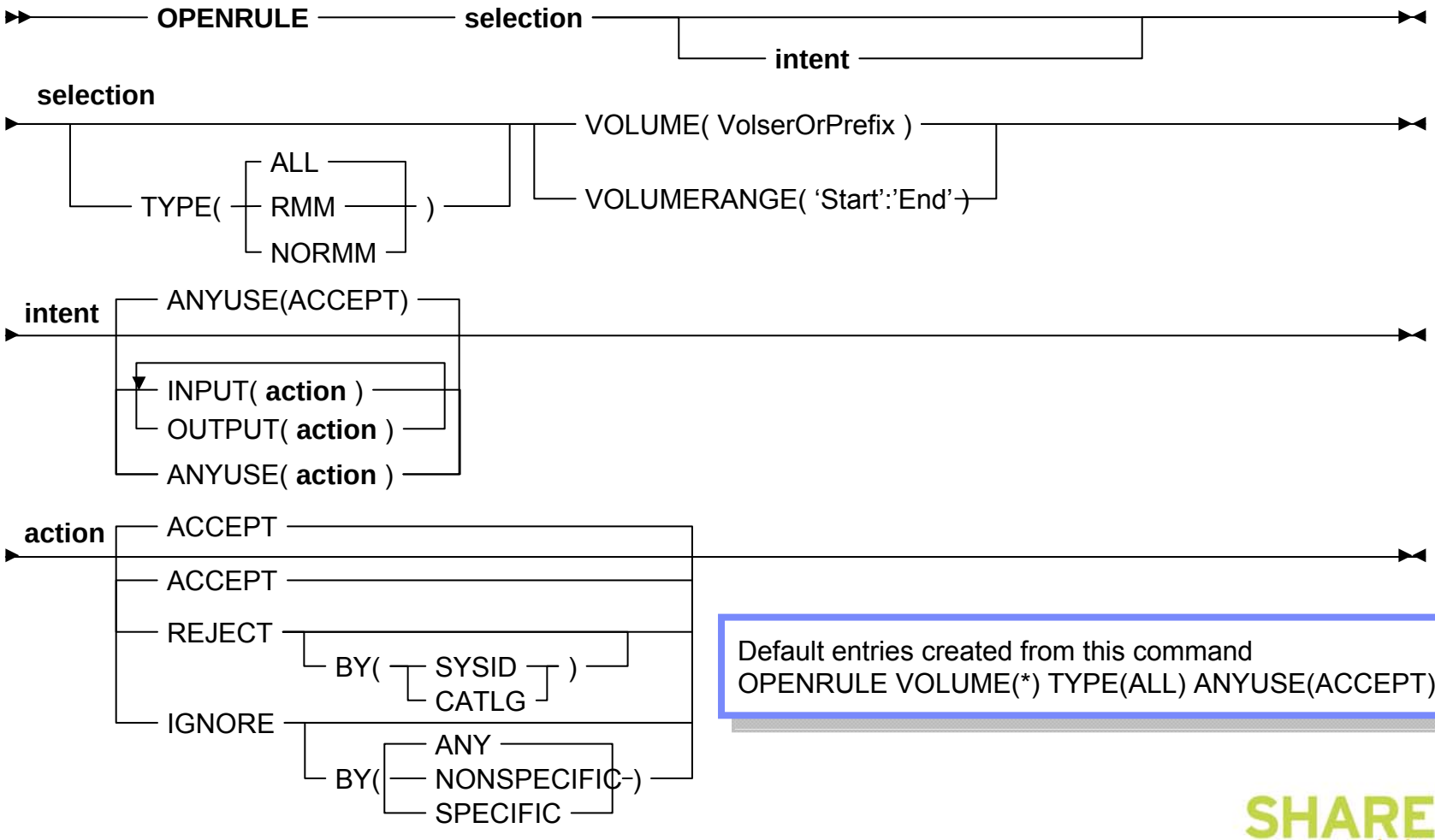
PRTITION syntax



Default entries created from this command
PRTITION VOLUME(*) TYPE(ALL) SMT(ACCEPT) NOSMT(ACCEPT LOCATION(SHELF))

Best Practices: Tape Administration with DFSMSrmm

OPENRULE syntax



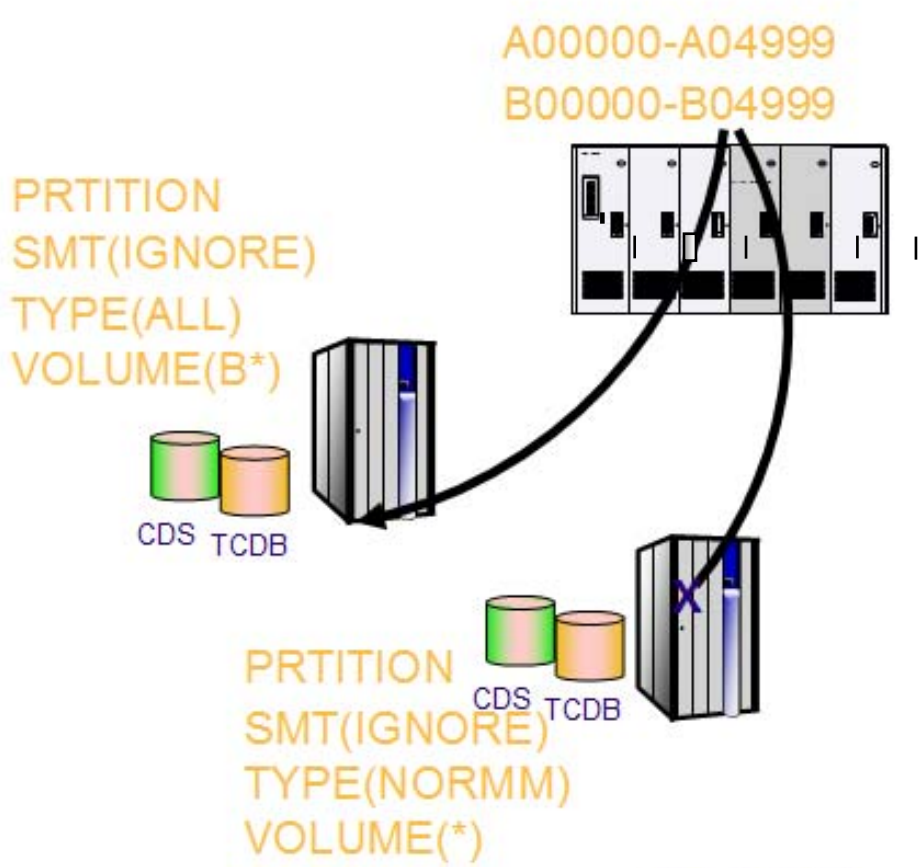
Default entries created from this command
OPENRULE VOLUME(*) TYPE(ALL) ANYUSE(ACCEPT)

Best Practices: Tape Administration with DFSMSrmm

System managed tape Library partitioning

z/OS V1R10 and above

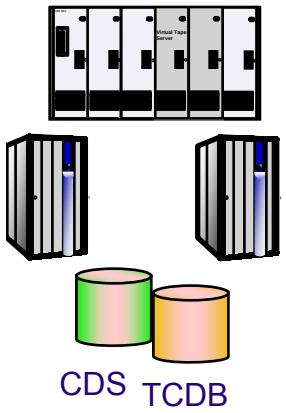
- Parmlib Control using
  - PRTITION VOLUME(prefix) SMT(action)
  - Automatic define unless SMT(IGNORE)
  - OAM Leaves in INSERT category
  -
- At OPEN time
  - OPENRULE determines if Use is rejected
  - Can be ignored using
    - ANYUSE(IGNORE) VOLUME(prefix)
    - EDGUX100



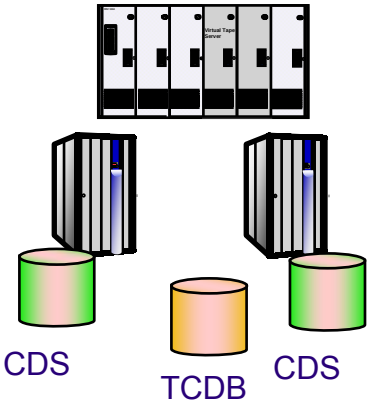
Best Practices: Tape Administration with DFSMSrmm

System managed tape Library partitioning

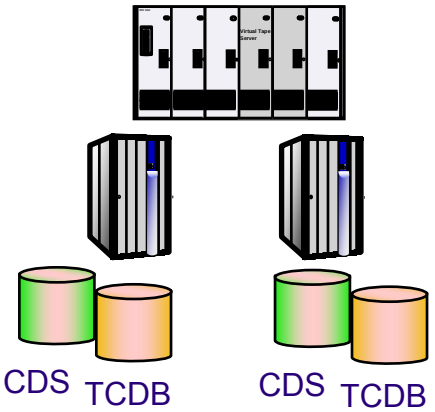
Updated to reflect new options in V1R10



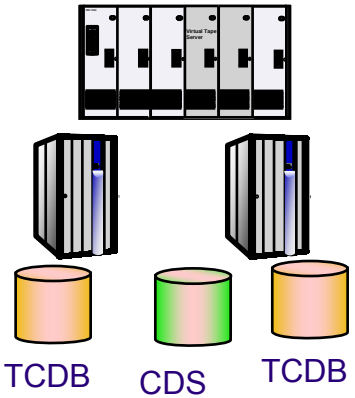
1:1
Partitioned
by system
PRTITION
scratch categories
EXPROC by system
PRTITION
Shared private



1:n
Partitioned
by cds/system
PRTITION
Scratch categories
EXPROC by CDS
Shared private



n:n
Partitioned
by system
PRTITION
Scratch categories
EXPROC by CDS
No shared private
add TCDBentry &
Use; 98000, or,
OPENRULE with
ANYUSE(IGNORE)



n:1
Partitioned
by system
PRTITION
Scratch categories
EXPROC by TCDB
or PRTITION
No shared private
add TCDBentry &
Use; 98000, or,
OPENRULE with
ANYUSE(IGNORE)

SHARE in Anaheim 2011

Best Practices: Tape Administration with DFSMSrmm

System managed tape Library partitioning

Updated to reflect new options in V1R10

- **Ways to control entry processing**
  - PRTITION TYPE(NORMM) VOLUME(*) SMT(IGNORE)
    - All volumes undefined in RMM CDS left in insert category
    - Must pre-define volumes to enable entry of volumes
  - No PRTITIONs and no OPENRULE
    - Processing is as for earlier releases
  - Selective PRTITIONs
    - All ACCEPTed volumes added automatically to RMM CDS
      - *ISMF library default entry status*
    - Pre-defined volumes only considered for TYPE(RMM) cases
      - *volume status set by RMM during volume entry*
- **Any alternative requires CBRUXENT exit customization**
  - In most cases this can now be avoided
- **For EXPROC**
  - PRTITION TYPE(ALL/RMM) action IGNORE skips exproc SCRATCH processing
    - Even if TCDB Entry Exists (TCDB shared or created manually for private sharing)
  - CATSYSID(sysid_list) can also be used to skip volumes
  - Run EXPROC once per scratch category set

Best Practices: Tape Administration with DFSMSrmm

Agenda

- Why DFSMSrmm Best Practices?
- About the RMM CDS:
  Allocation, placement, monitoring and recovery
- Using client/server the right way
- z/OS release coexistence with DFSMSrmm
- Safety Nets
- Diagnostics and Performance hints
- Administrative Practices

Best Practices: Tape Administration with DFSMSrmm

Just in case.. Collect Diagnostic Information

- Collect PDA trace diagnostics
  - Valuable for identifying RMM logic problems at a very small expense
  - The PDA facility consists of
    - in-storage trace (PDA), and
    - optional DASD log data sets. Identified by their DD names, EDGPDOX and EDGPDOY.
  - Recommendation:
    - In EDGRMMxx specify OPTION PDA(ON) PDALOG(ON)
    - Have sufficiently sized PDA log data sets defined
    - For sizing refer to appendixes *"Problem Determination Aid Log Data Set SizeWork Sheet for Long/Short-Term Trace History"* in "DFSMSrmm Implementation and Customization Guide"
      - ROT: Begin with 50 CYL (3390)

- Collect RMM SMF records
  - Use the IBM assigned SMF record type of 42, the audit records subtype of 22, and the security records subtype of 23.
  - OPTION SMFAUD(YES) and SMFSEC(YES).

Best Practices: Tape Administration with DFSMSrmm

Just in case.. keep output of your STC
AND HOUSEKEEPING JOBS

- Output of the RMM started tasks and housekeeping jobs should be kept for “some” time
  - Duration depends on the cycle times of your RMM-processes
  - These jobs may provide important information if a problem is detected
    - What decisions were taken?
    - When were first symptoms of the problem visible
    - What steps might have been involved and eventually lead to the problem?

- What output?
  - JES joblog / Syslog/Operlog
  - Output data sets
    - MESSAGE, REPORT, ACTIVITY files
    - Keep a cycle of generations

Recommended RMM Options and Performance hints

- Recommendation: Synchronize catalogs

  – CATSYSID(…)/CATSYNCH
  – CATSYNCH,VERIFY

  – Upon the following messages synchronization needs to be re-established:
    - `EDG8200E DFSMSrmm INACTIVE DURING CATALOG PROCESSING FOR DATA SET …`
    - `EDG8201E DFSMSrmm SUBSYSTEM REQUEST FAILED RETURN CODE … DURING CATALOG PROCESSING FOR DATA SET …`
    - Should be automated

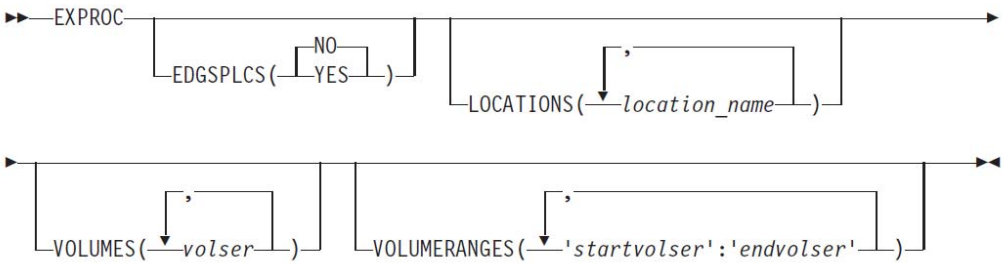
Recommended RMM Options and Performance hints

- Workload Management (WLM) classification of DFRMM address space
  - DFRMM is a system task serving many other jobs
  - Requires appropriately high classification in WLM service definition
  - Recommended: SYSSTC
    - Alternatively: Single period service class with a high importance and tight velocity goal
  - Same consideration applies to RMM housekeeping jobs
    - Depending on setup, JES-managed initiators may result in faster initiation

Best Practices: Tape Administration with DFSMSrmm

Use EDGSPLCS for parallel library updates

- Specify EDGSPLCS(YES) on EXPROC to create that file



- **Run multiple copies of EDGSPLCS** so that processing can be done **in parallel** for multiple libraries

```
//EXEC PGM=EDGSPLCS,PARM='ACTION(S),LOCATION(ATLBA999)'
//INDD DD DISP=SHR,DSN=my.edgsplcs.data.set
//OUTDD DD SYSOUT=*
```

```
//EXEC PGM=EDGSPLCS,PARM='ACTION(S),LOCATION(ATLBA111)'
//INDD DD DISP=SHR,DSN=my.edgsplcs.data.set
//OUTDD DD SYSOUT=*
```

Best Practices: Tape Administration with DFSMSrmm

Agenda

- Why DFSMSrmm Best Practices?
- About the RMM CDS:
  Allocation, placement, monitoring and recovery
- Using client/server the right way
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- Safety Nets
- Diagnostics and Performance hints
- Administrative Practices

Best Practices: Tape Administration with DFSMSrmm

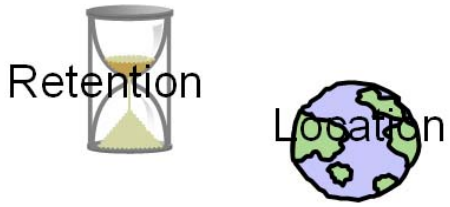
Administrative Practices: Vital Record Specifications

- Know your Vital Record Specifications; Don't ASSUME
- Know what types of VRS' are in place
- Understand priorities for conflicts in Movement
- Understand RELEASE Options To honor or IGNORE EXPDTs
- LOOK AT VRS REPORTS !!!!

Best Practices: Tape Administration with DFSMSrmm

Administrative Practices: Vital Record Specifications

Inventory Management



- Vital Record Selection

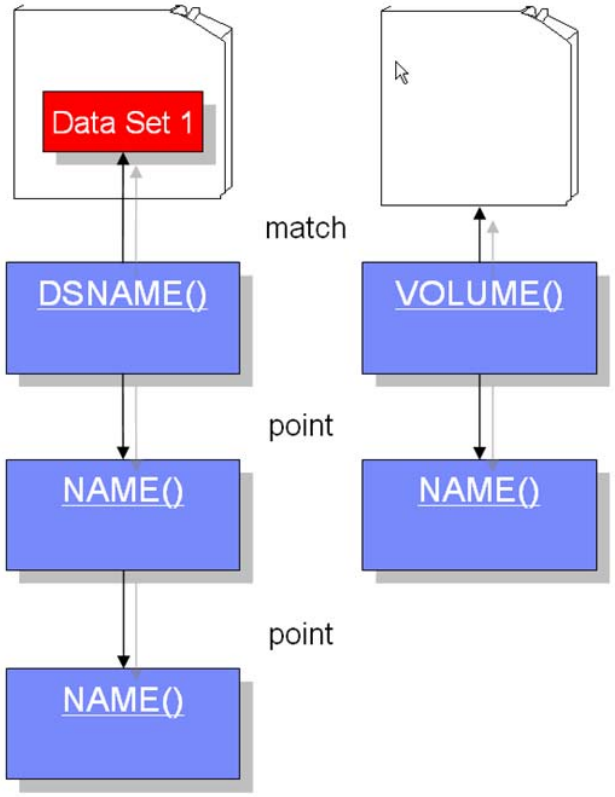
Apply VRS Policies to
  - Data sets
  - Volumes
  - Volume Sets
  - Stacked Volumes
- **Apply Retention Limit Controls**
- **Vital Record Report**
  - Unused VRS Report
- **ACTIVITY File**
- **VERIFY run**

Best Practices: Tape Administration with DFSMSrmm

Administrative Practices: Vital Record Specifications

VRS Types

- **Data Set VRS**
  - Assigned to Data Sets
- **Volume VRS**
  - Assigned to Volumes
- **Name VRS**
  - Pointed by other VRS's
    - Retention Name VRS
    - Location Name VRS



Best Practices: Tape Administration with DFSMSrmm

Administrative Practices: Vital Record Specifications

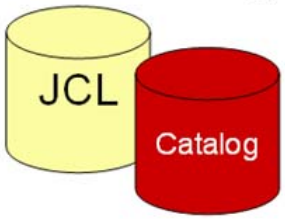
Retention Types

- Specific Date
- Days since Creation
- Days since Last Reference
- Extra Days

- Cycles
- By Days Cycles

- Until Expired
- While Cataloged

- Forever
- Don't retain



Best Practices: Tape Administration with DFSMSrmm

Administrative Practices: Vital Record Specifications

Best Matching Mask

- **IF multiple masks match to a name**
  - Go from left to right
  - Look for first specific qualifier / character

JOHN.LEE.HOOKER

Mask	Matching Order
**.HOOKER	4
..HOOKER	3
%OHN.LEE.HOOKER	2
J*.**	1

Best Practices: Tape Administration with DFSMSrmm

Administrative Practices: Vital Record Specifications

Reserved VRSes for Data Sets

Reserved data set and job names:

- OPEN
- DELETED
- ABEND

Specify policies for:

- Data Sets that are **left open** (OPEN flag in the volume record ON) or are in use during inventory management
- Data Sets Deleted by normal DISPosition
- Data Sets Closed as a result of an **abnormal end** (ABEND flag in the data set record ON) in a task

```
RMM ADDVRS DSNAME('OPEN') LASTREFERENCEDAYS COUNT(5) RELEASE(EXPIRYDATEIGNORE)
RMM ADDVRS DSNAME('**') JOBNAME(DELETED) DAYS COUNT(1) RELEASE(EXPIRYDATEIGNORE)
RMM ADDVRS DSNAME('**') JOBNAME(ABEND) DAYS COUNT(1) RELEASE(EXPIRYDATEIGNORE)
```

Best Practices: Tape Administration with DFSMSrmm

Administrative Practices: Vital Record Specifications

Dsname Mask + Jobname Mask

- **DFSMSrmm concatenates both masks**
  - Order depends on Parmlib Option VRSJOBNAME(1|2)
  - (1) JobnameMask.DsnameMask
  - (2) DsnameMask.JobnameMask – default
- **Example**
  - VRSes
    - ADDVRS DSNAME('*.LEE.HOOKER') JOBNAME(BLUES)
    - ADDVRS DSNAME('JOHN.*.HOOKER') JOBNAME(*)
  - Data Set
    - DSN=JOHN.LEE.HOOKER JOBNAME=BLUES

	VRSJOBNAME(1)	VRSJOBNAME(2)	
Best Match	BLUES.*.LEE.HOOKER	*.LEE.HOOKER.BLUES	
	.JOHN..HOOKER	JOHN.*.HOOKER.*	Best Match

Best Practices: Tape Administration with DFSMSrmm

Administrative Practices: Vital Record Specifications

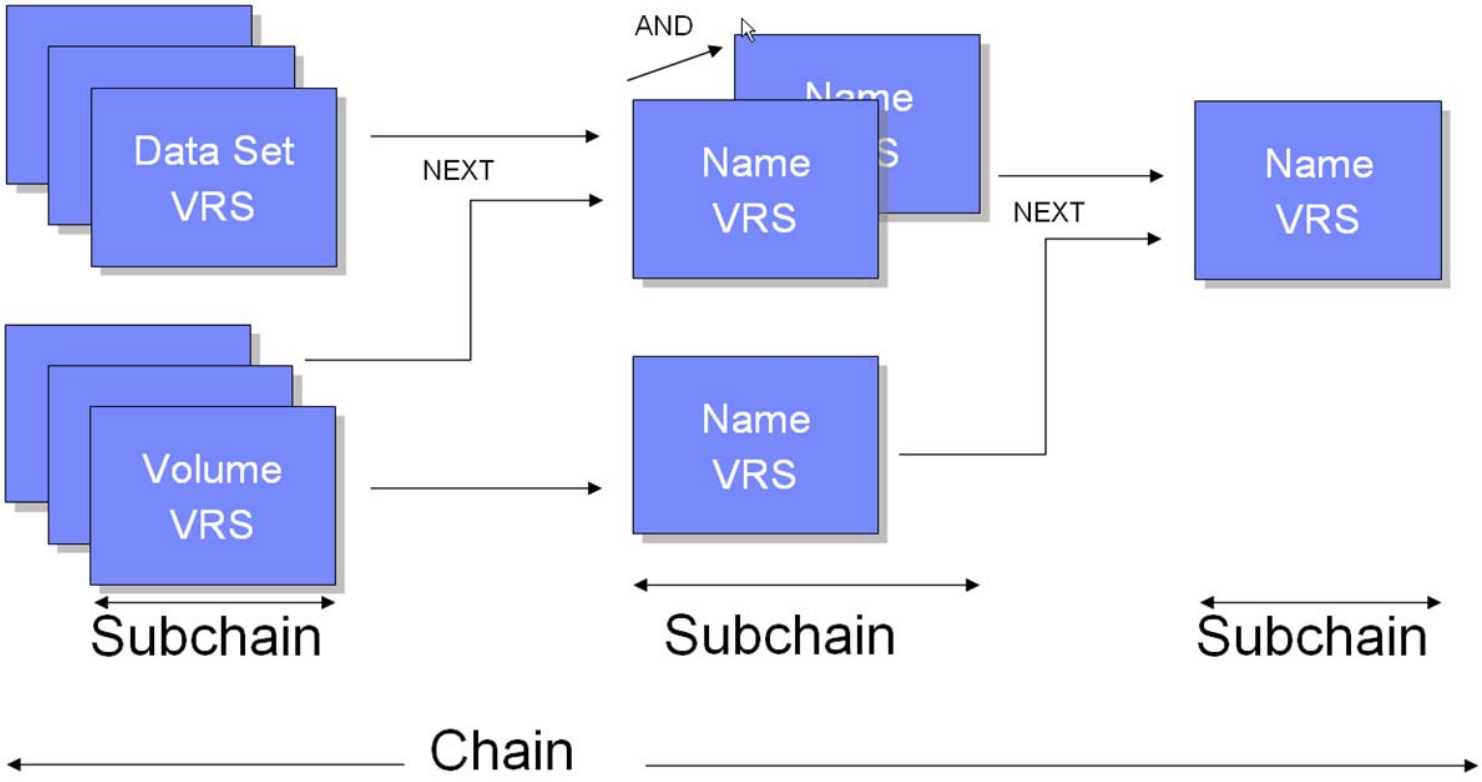
Matching Order of Precedence

Primary VRS	Secondary VRS
OPEN VRS & Data Set is open	
DELETED VRS & DISP=DELETE	
ABEND VRS & Job abended	
Dsname VRS	Management Class VRS
Dsname VRS	Management Value VRS
Dsname VRS	
Management Class VRS	
Management Value VRS	
Default VRS – DSN('**')	

Best Practices: Tape Administration with DFSMSrmm

Administrative Practices: Vital Record Specifications

Chaining Retention and Movement Policies

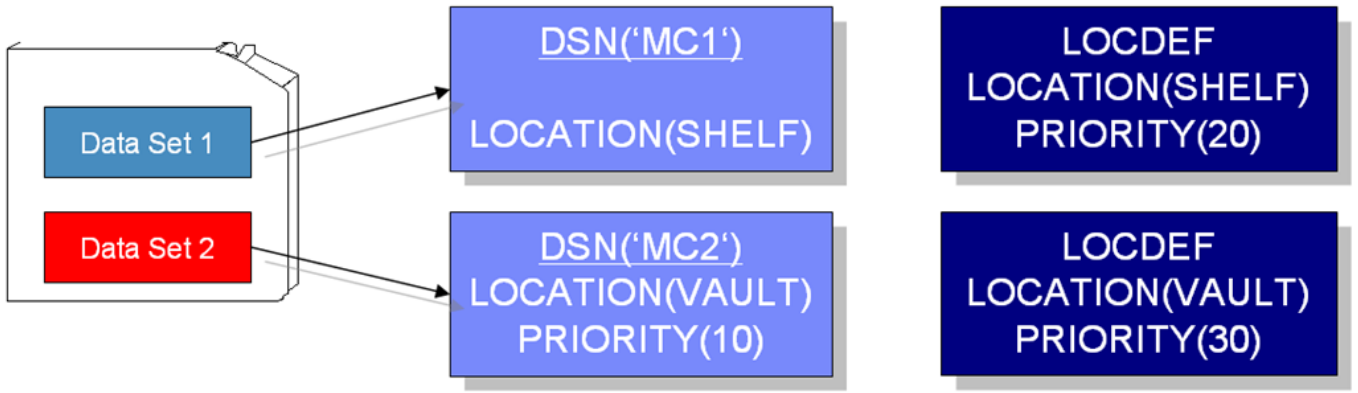


Best Practices: Tape Administration with DFSMSrmm

Administrative Practices: Vital Record Specifications

Location Conflict

- **Solved by Location Priority defined in**
  - EDGRMMxx parmlib member – LOCDEF parameter
  - VRS (overrides LOCDEF)
- **Example: volume retained in VAULT**
  - Lowest number = highest priority

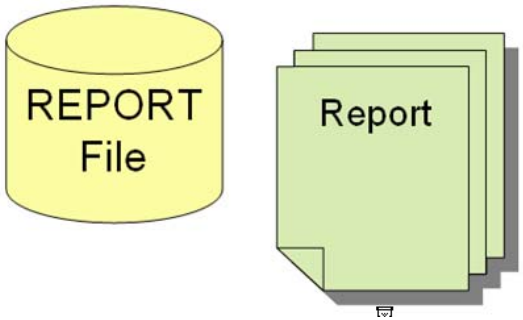


Best Practices: Tape Administration with DFSMSrmm

Administrative Practices: Vital Record Specifications

REPORT File

- **Contents**
  - Formatted report of all retained data set and volumes
  - Sorted by matching Primary VRS
- **Browse it or Print it**



- **Use to identify**
  - groups of data sets
  - cycles
  - what is potentially moved
- **List of Unused VRSs**
  - use it to identify and delete VRSs which are no longer required

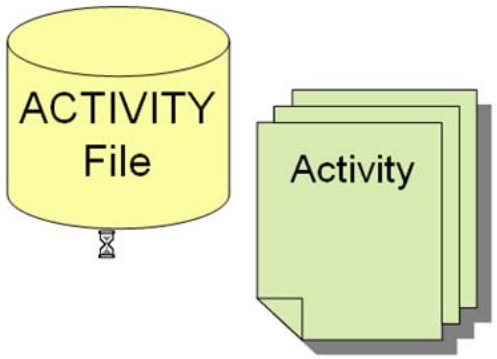
Best Practices: Tape Administration with DFSMSrmm

Administrative Practices: Vital Record Specifications

ACTIVITY File

- **Contents**
  - Header Record
    - Run Time Values
  - Data set Record
    - Details of Changes
- **Browse it or Report on it**

- **Sample Report**
  - EDGJACTP
    - Vital status
    - Retention date
    - Matching VRS
    - VRS subchain
  - Summaries
  - Detailed reports



Recommendation:
Always write ACTIVITY File

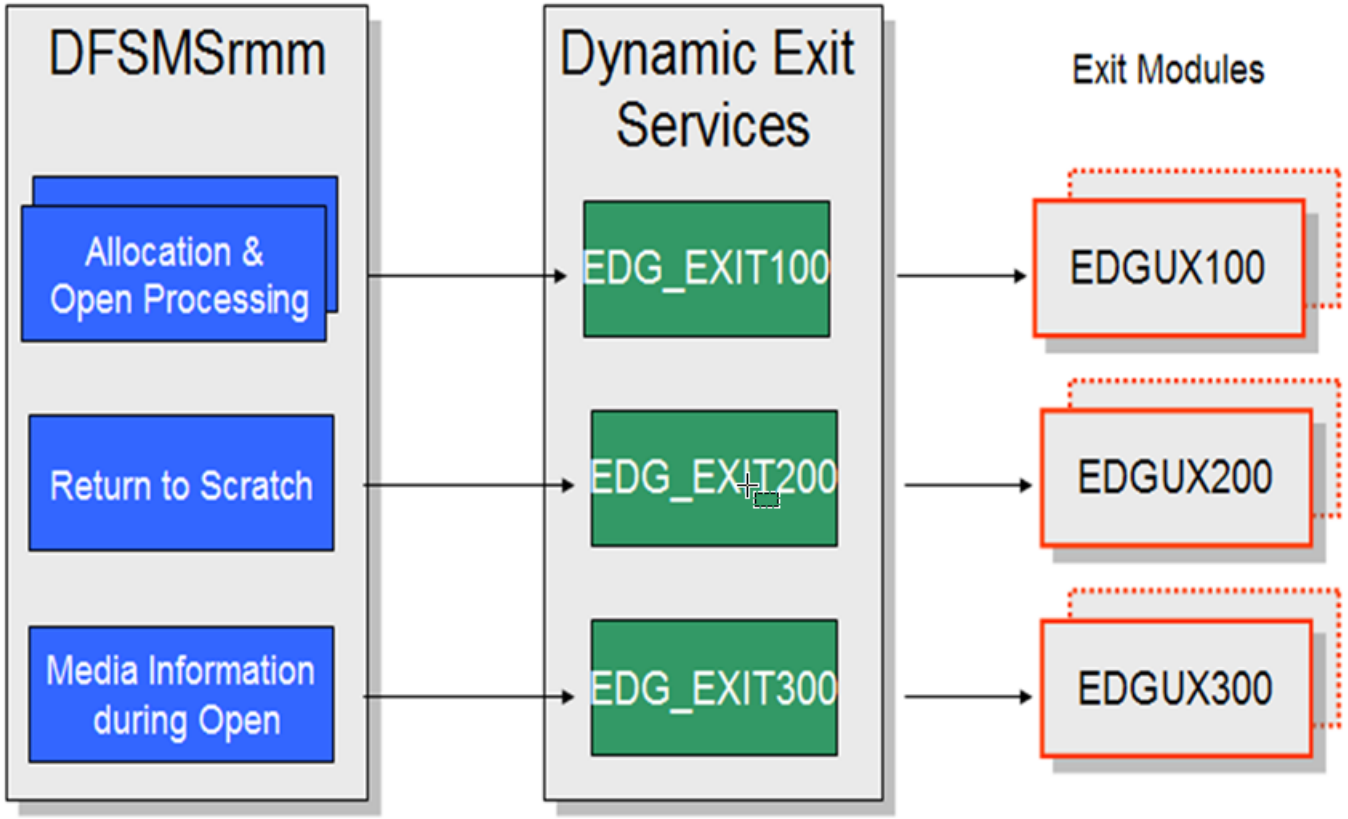
Best Practices: Tape Administration with DFSMSrmm

Administrative Practices: User EXITS

- Know what EXITS are in place
- Know what your EXITS are doing for you
- Keep track of your SOURCE!

Best Practices: Tape Administration with DFSMSrmm

Administrative Practices: EXITS



Best Practices: Tape Administration with DFSMSrmm

धन्यवाद
Hindi

多謝
Traditional Chinese

ขอบคุณ
Thai

Спасибо
Russian

Gracias
Spanish

Thank You
English

شكرا
Arabic

Obrigado
Brazilian Portuguese

多谢
Simplified Chinese

Danke
German

Bedankt
Dutch

Grazie
Italian

Merci
French

நன்றி
Tamil

ありがとうございました
Japanese

감사합니다
Korean