

Best Practices for Maximizing Your DFSMsrm Investment

-Draft-

Horst Sinram
sinram@de.ibm.com

09 Aug 2011
SHARE in Orlando - Session 9967

Legal Disclaimer



NOTICES AND DISCLAIMERS

Copyright © 2008 by International Business Machines Corporation.

No part of this document may be reproduced or transmitted in any form without written permission from IBM Corporation.

Product information and data has been reviewed for accuracy as of the date of initial publication. Product information and data is subject to change without notice. This document could include technical inaccuracies or typographical errors. IBM may make improvements and/or changes in the product(s) and/or programs(s) described herein at any time without notice.

References in this document to IBM products, programs, or services does not imply that IBM intends to make such products, programs or services available in all countries in which IBM operates or does business. Consult your local IBM representative or IBM Business Partner for information about the product and services available in your area.

Any reference to an IBM Program Product in this document is not intended to state or imply that only that program product may be used. Any functionally equivalent program, that does not infringe IBM's intellectually property rights, may be used instead. It is the user's responsibility to evaluate and verify the operation of any non-IBM product, program or service.

THE INFORMATION PROVIDED IN THIS DOCUMENT IS DISTRIBUTED "AS IS" WITHOUT ANY WARRANTY, EITHER EXPRESS OR IMPLIED. IBM EXPRESSLY DISCLAIMS ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT. IBM shall have no responsibility to update this information. IBM products are warranted according to the terms and conditions of the agreements (e.g., IBM Customer Agreement, Statement of Limited Warranty, International Program License Agreement, etc.) under which they are provided. IBM is not responsible for the performance or interoperability of any non-IBM products discussed herein.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not necessarily tested those products in connection with this publication and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

The provision of the information contained herein is not intended to, and does not, grant any right or license under any IBM patents or copyrights. Inquiries regarding patent or copyright licenses should be made, in writing, to:

IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
U.S.A.

Trademarks



The following are trademarks of the *International Business Machines Corporation*:

IBM, DFSMS/MVS, DFSMSHsm, DFSMSrmm, DFSMSdss, DFSMSopt, DFSMS Optimizer, z/OS, eServer, zSeries, MVS, FlashCopy®

The information contained in this presentation is distributed on an 'AS IS' basis without any warranty either expressed or implied, including, but not limited to, the implied warranties of merchantability or fitness for a particular purpose. The use of this information is a customer responsibility and depends on the customer's ability to evaluate and integrate it into the customer's operational environment.

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



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

Best Practices: Tape Administration with DFSMSrmm



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

Best Practices: Tape Administration with DFSMSrmm



CDS Allocation

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

```
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))
```

Best Practices: Tape Administration with DFSMSrmm



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 |

Best Practices: Tape Administration with DFSMSrmm



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 RESERVE/RELEASE is used (always true when shared across sysplexes):
 - No other critical data should be placed on same volume(s)
 - Customize GRSRNLxx to avoid GLOBAL ENQ in addition



Best Practices: Tape Administration with DFSMSrmm

CDS Monitoring (1)

- Always monitor the CDS for **space** bottlenecks
 - Objective: Make sure there is always enough space allocated, or available via secondary extensions

 - It is difficult to determine true 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



Best Practices: Tape Administration with DFSMSrmm

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

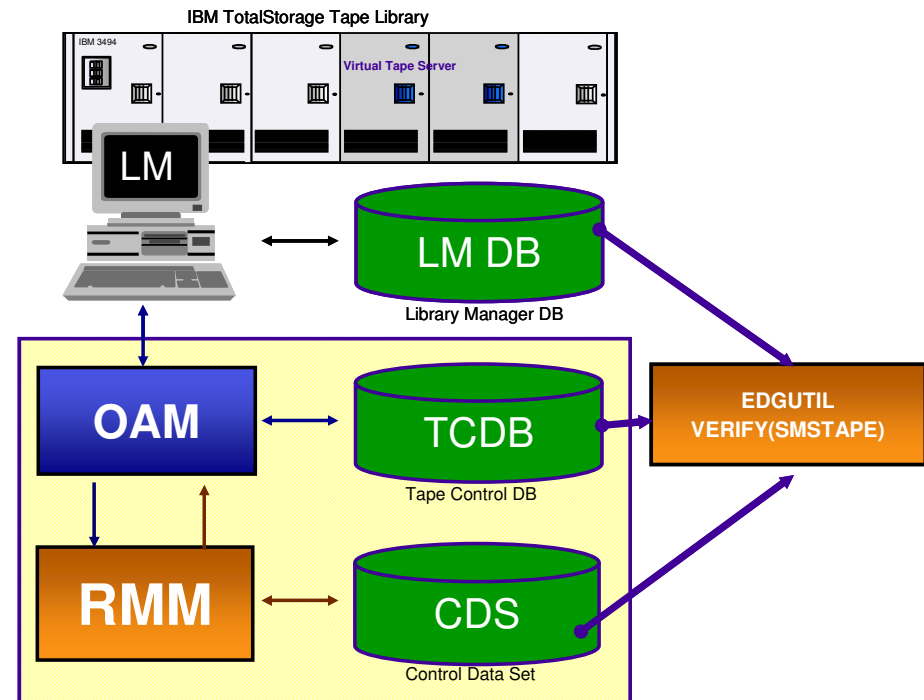
| | | | | |
|---------------------------|-------------------------|-------------------------|-----------------------|--|
| ALLOCATION | | | I | |
| SPACE-TYPE-----CYLINDER | HI-A-RBA-----1592647680 | | | |
| SPACE-PRI-----1994 | HI-U-RBA-----468848640 | | | |
| SPACE-SEC-----100 | | | | |
| VOLUME | | | | |
| 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 | | | |

Best Practices: Tape Administration with DFSMSrmm



CDS Monitoring (2)

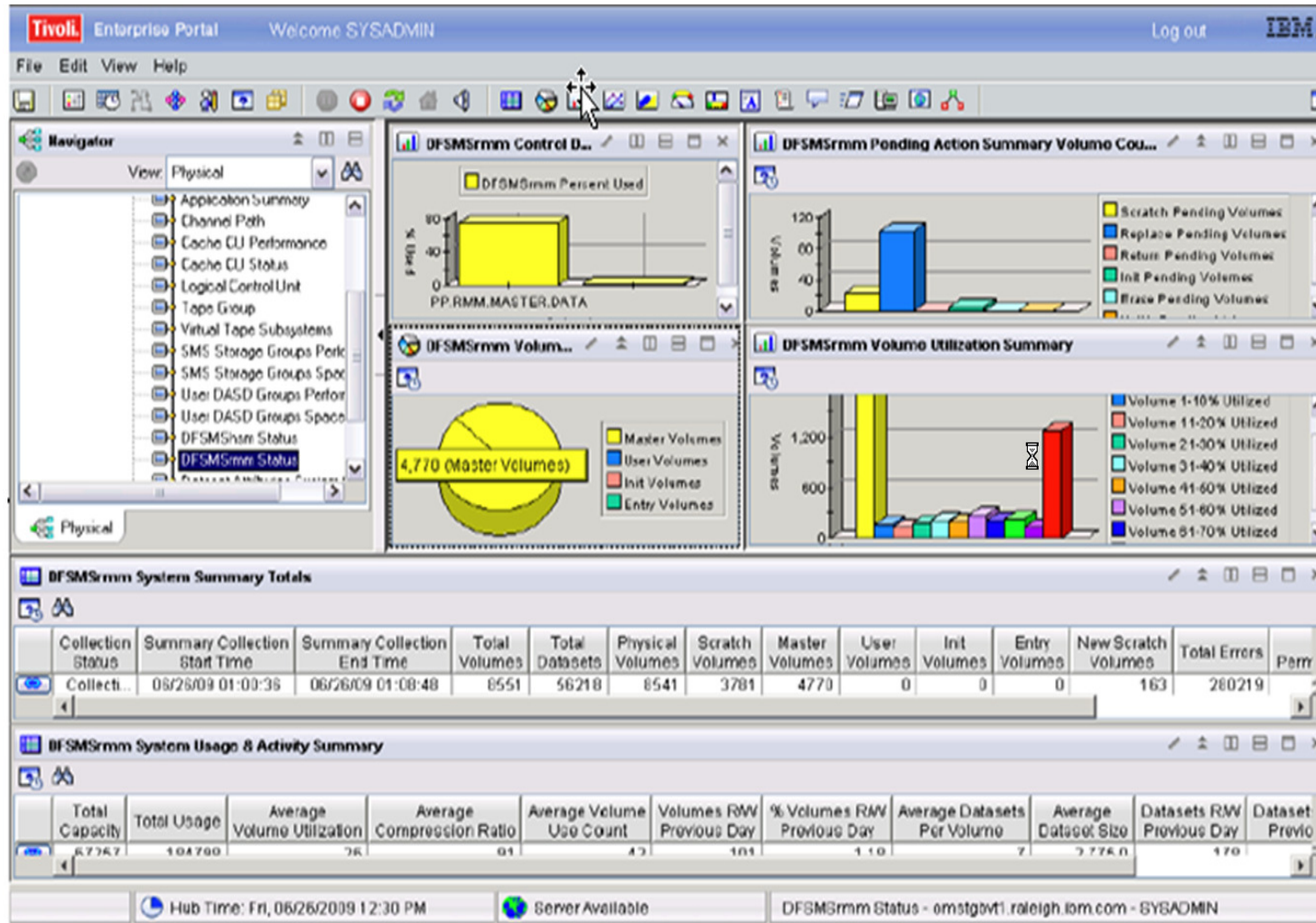
- Regularly monitor the CDS for **integrity**
 - Use **EDGUTIL VERIFY(ALL)** to check for CDS mismatches
 - Use **EDGUTIL VERIFY(SMSTAPE)** to check consistency across TCDB, CDS and library manager database



Best Practices: Tape Administration with DFSMSrmm



Other Product Interfaces to RMM



Best Practices: Tape Administration with DFSMSrmm



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
 - Too frequent REORGs 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

Best Practices: Tape Administration with DFSMSrmm



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

Best Practices: Tape Administration with DFSMSrmm



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

Best Practices: Tape Administration with DFSMSrmm




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

Best Practices: Tape Administration with DFSMSrmm



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

Best Practices: Tape Administration with DFSMSrmm



How to resolve 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



Agenda

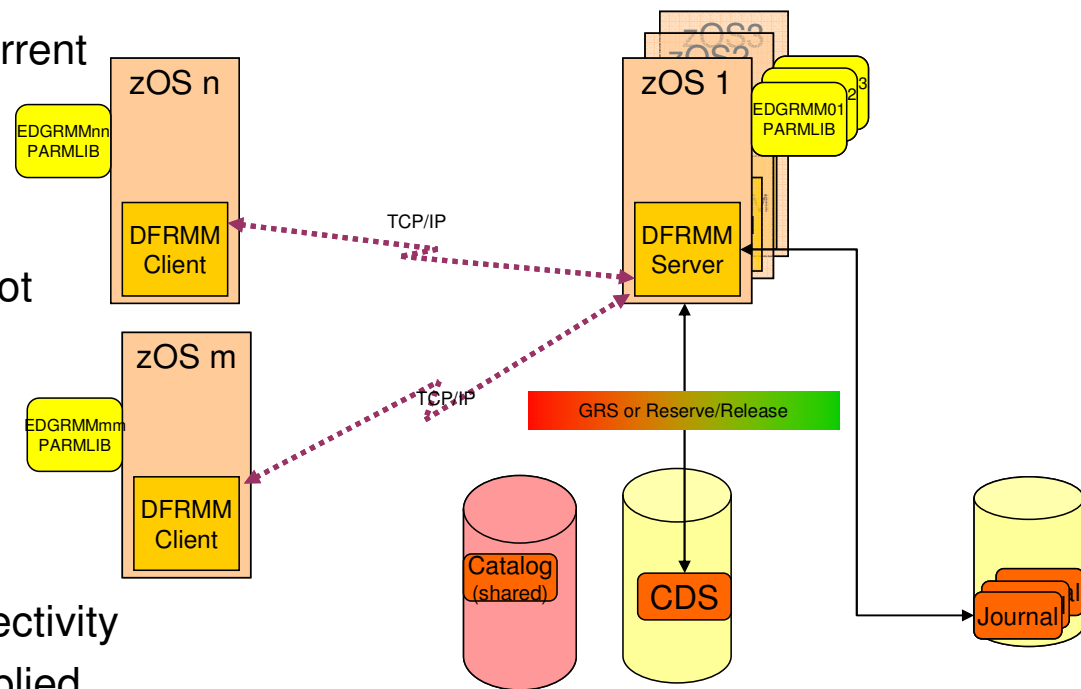
- Why DFSMSrmm Best Practices?
- About the RMM CDS:
 - Allocation, placement, monitoring and recovery
- Using client/server the right way
- z/OS release coexistence with DFSMSrmm
- Safety Nets
- Diagnostics and Performance hints
- Administrative Practices



Best Practices: Tape Administration with DFSMSrmm

Using DFSMSrmm Client Server the right way

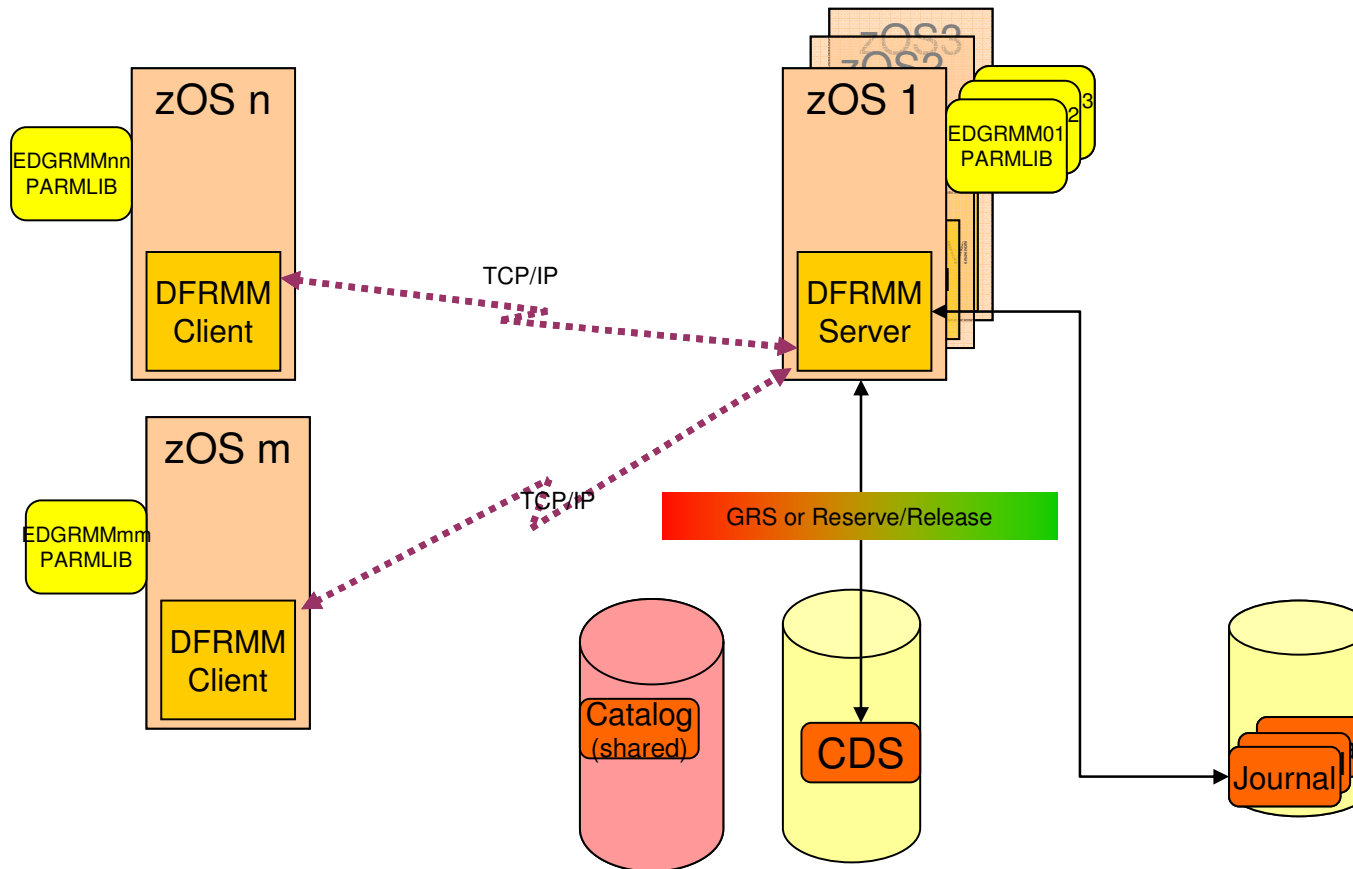
- Reasons for using client/server:
 - Many systems that should share a common database
 - and expect significant concurrent access to CDS
 - No shared volumes available
 - Avoids RESERVE/RELEASE
 - Hyperswap manager does not tolerate cross-plex sharing
 - Catalogs may be shared or non-shared
- Prerequisites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



Best Practices: Tape Administration with DFSMSrmm

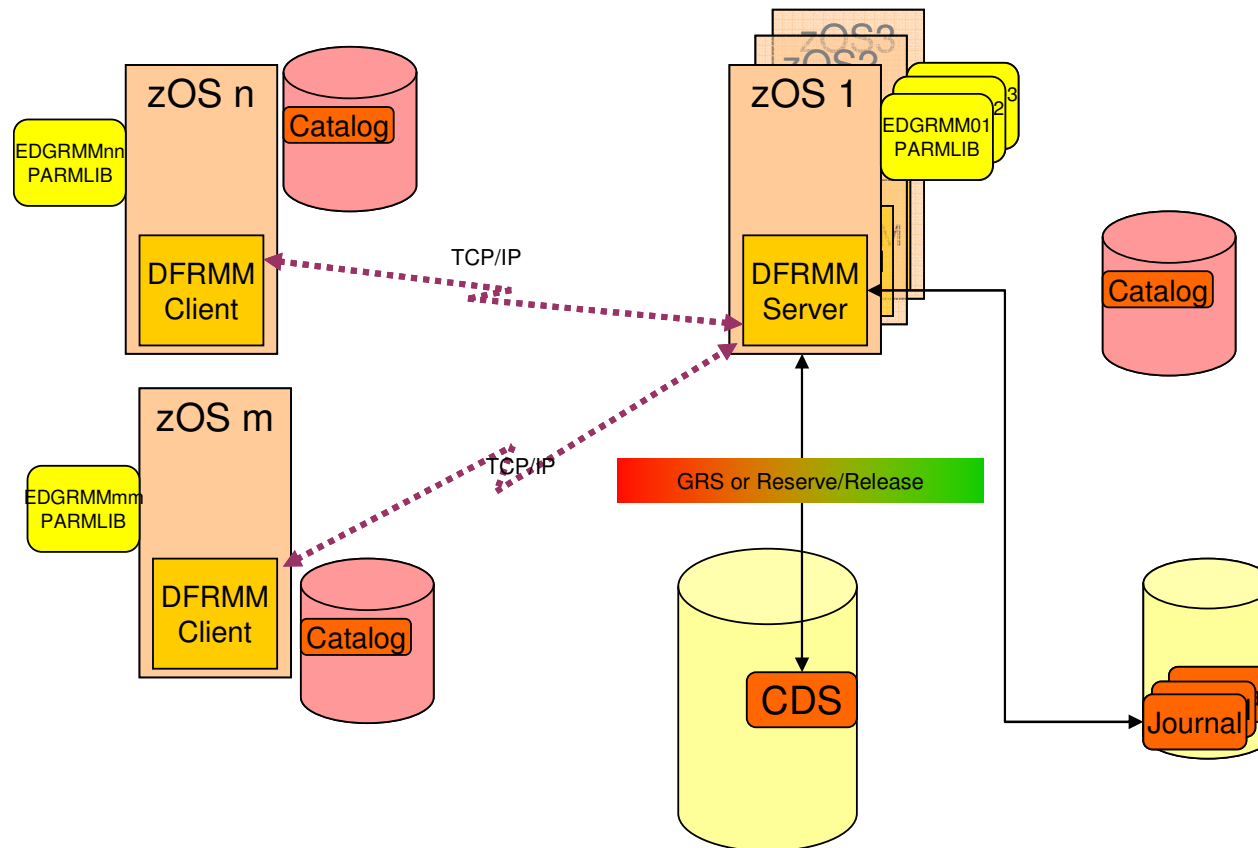


C/S Topology – Shared Catalogs



Best Practices: Tape Administration with DFSMSrmm

C/S Topology – Non-shared Catalogs

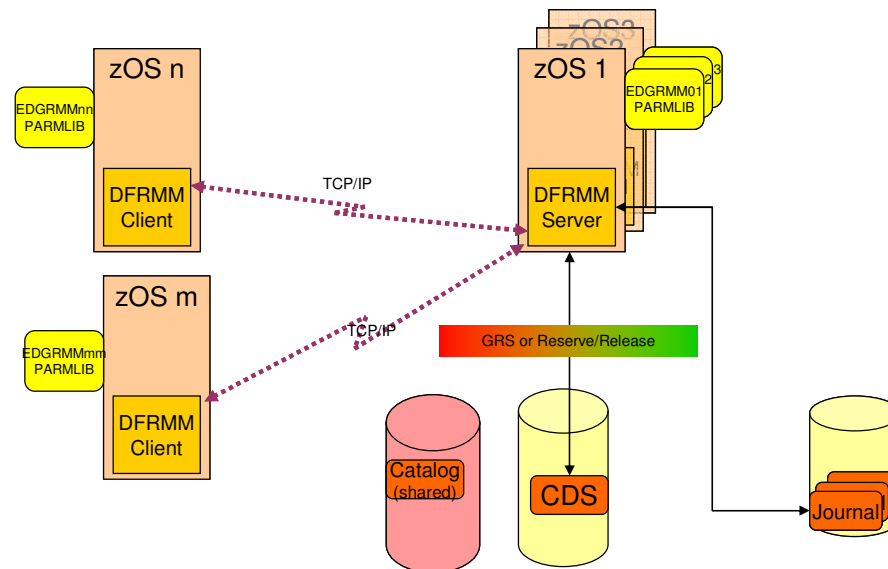


Best Practices: Tape Administration with DFSMSrmm

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

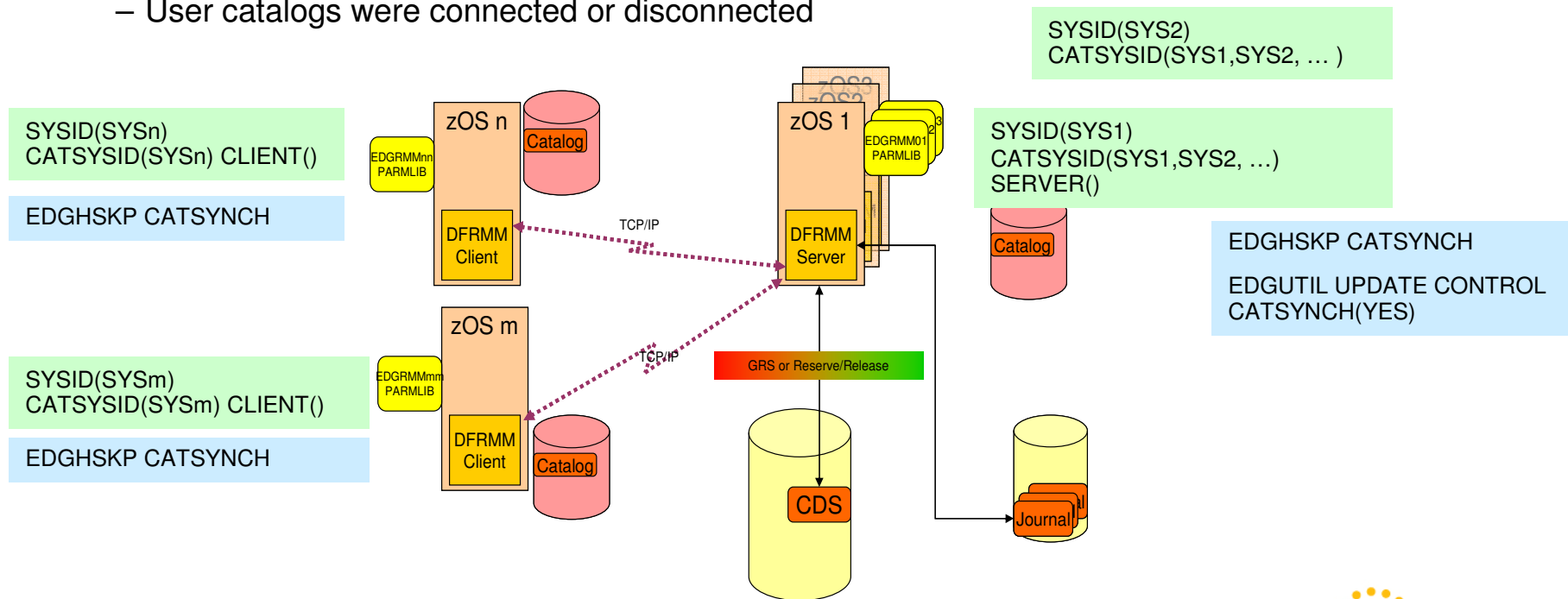
See next chart for actions to be performed on client side if catalog is not shared.

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

Best Practices: Tape Administration with DFSMSrmm

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



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

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.TargetSystem
```

MISSING FIXCAT SYSMOD REPORT FOR ZONE T110019

| FIX CATEGORY | FMID | HOLD CLASS | MISSING APAR | HELD SYSMOD | RESOLVING 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 for z/OS V1.11 or above.

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_*)

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

Exploit additional safety nets for your data



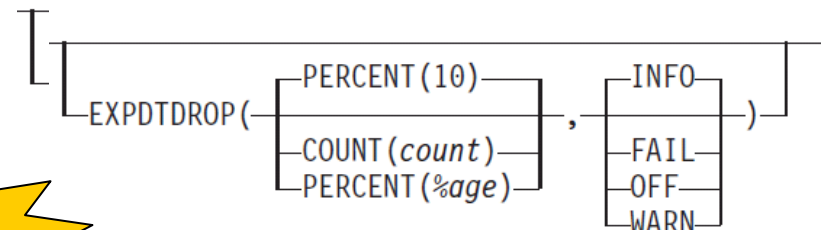
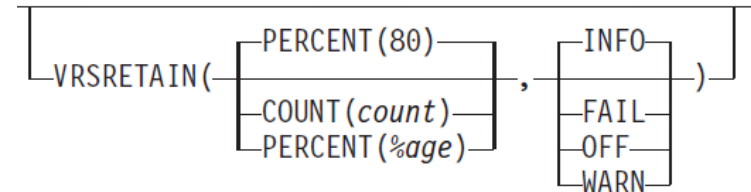
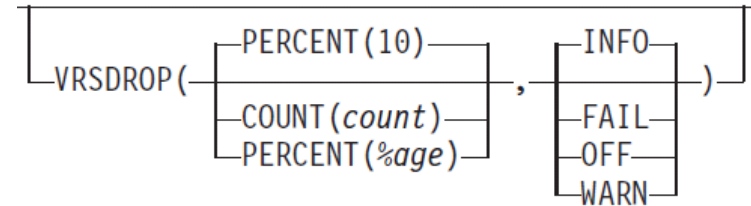
- Some problems may cause volumes to be dropped that really should be retained
 - Incorrect VRS changes
 - Operational problems
 - Bugs ☹️
- DFSMSrmm offers capabilities to
 - Alert you when an unexpected amount of volumes are dropped
 - Prevent volumes from being dropped permanently
- Use these features 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

Best Practices: Tape Administration with DFSMSrmm

Safety Net EXPDTDROP / VRSDROP / VRSRETAIN



- **VRSDROP** 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



Best Practices: Tape Administration with DFSMSrmm

Safety Net EXPDTPROP / 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% ←

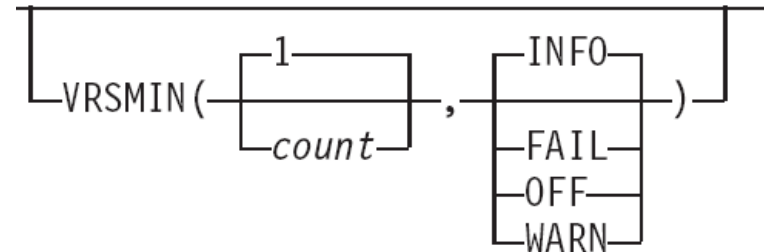
.....
EDG2242I INITIAL NUMBER OF VRS RETAINED VOLUMES = 20 40% ←
EDG2244I NUMBER OF VRS RETAINED VOLUMES TO BE DROPPED = 2 10% ←
EDG2243I INITIAL NUMBER OF NEWLY ASSIGNED VOLUMES = 15 30% ←
EDG2245I NUMBER OF NEWLY ASSIGNED VOLUMES TO BE RETAINED = 5 33% ←
EDG2427I INITIAL NUMBER OF EXPDPT RETAINED VOLUMES = 10 100% ←
EDG2428I NUMBER OF EXPDPT 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

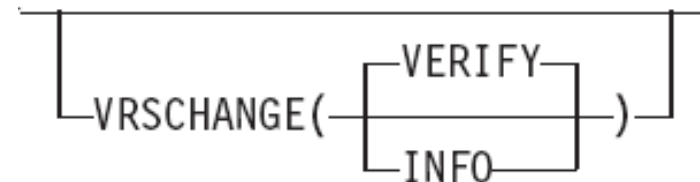
Safety Net VRSMIN VRSCHANGE

- **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)



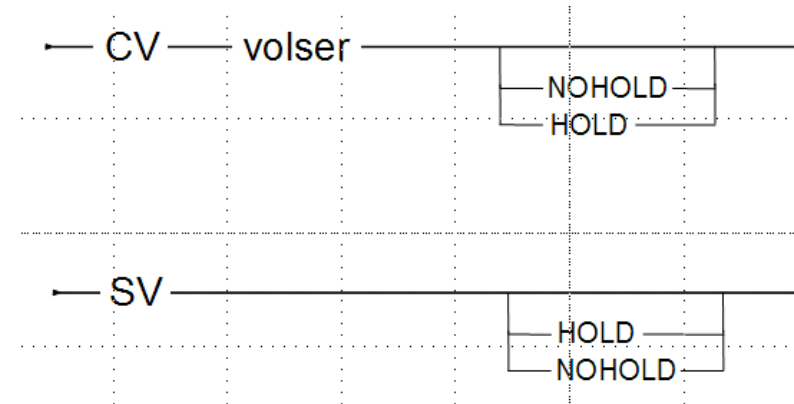
Best Practices: Tape Administration with DFSMSrmm

Safety Net Volume “HOLD”



▪ Volume “Hold” attribute

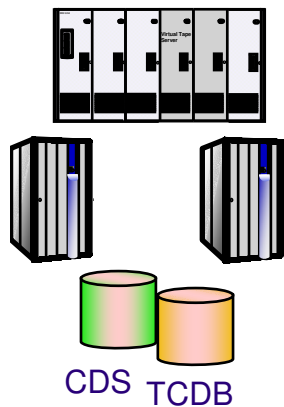
- prevents a volume being set to pending release
 - only valid for non-scratch, non-pending release volumes
 - DV RELEASE subcommands fail if the HOLD attribute is set
 - DV FORCE is accepted as per normal
- new HY and HN line commands



Best Practices: Tape Administration with DFSMSrmm

System managed tape Library partitioning

Prior to V1R10



1:1

Partitioned

by exits

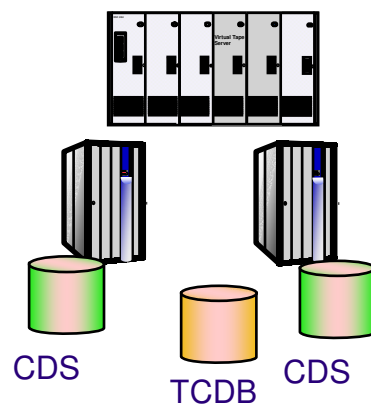
CBRUXENT

EDGUX200

scratch categories

EXPROC by system

Shared private



1:n

Partitioned

by cds/system

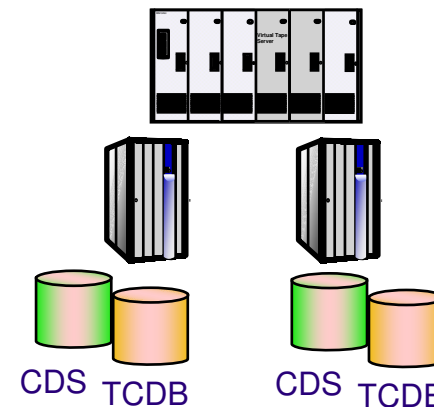
REJECT ANYUSE

Scratch categories

EXPROC by CDS

Shared private

use 98000



n:n

Partitioned

by system

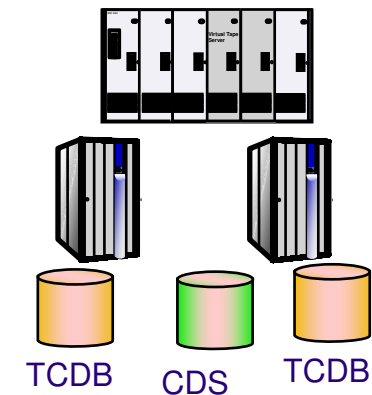
REJECT ANYUSE

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

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

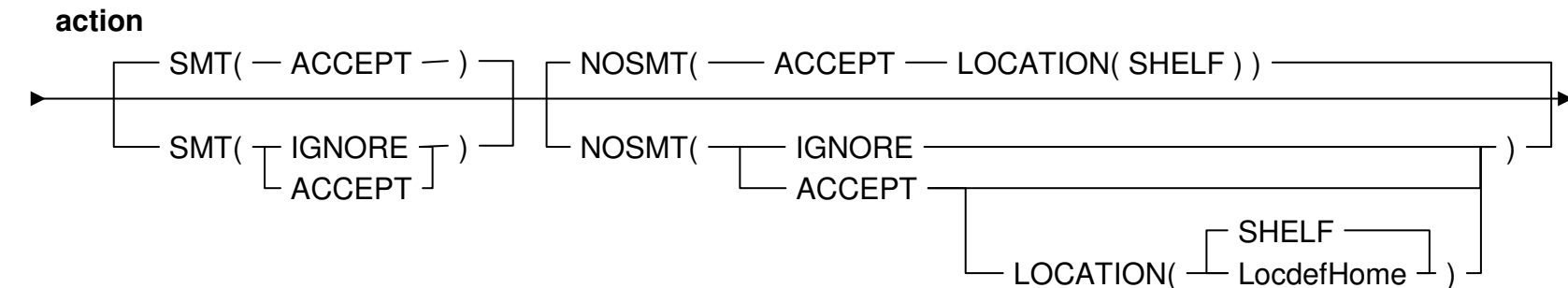
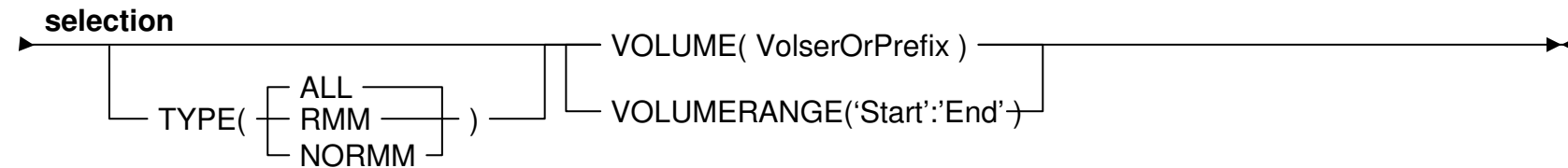
- Use PRTITION / OPENRULE rather than REJECTs!

Best Practices: Tape Administration with DFSMSrmm

PRTITION syntax



► PRTITION — selection — action —►

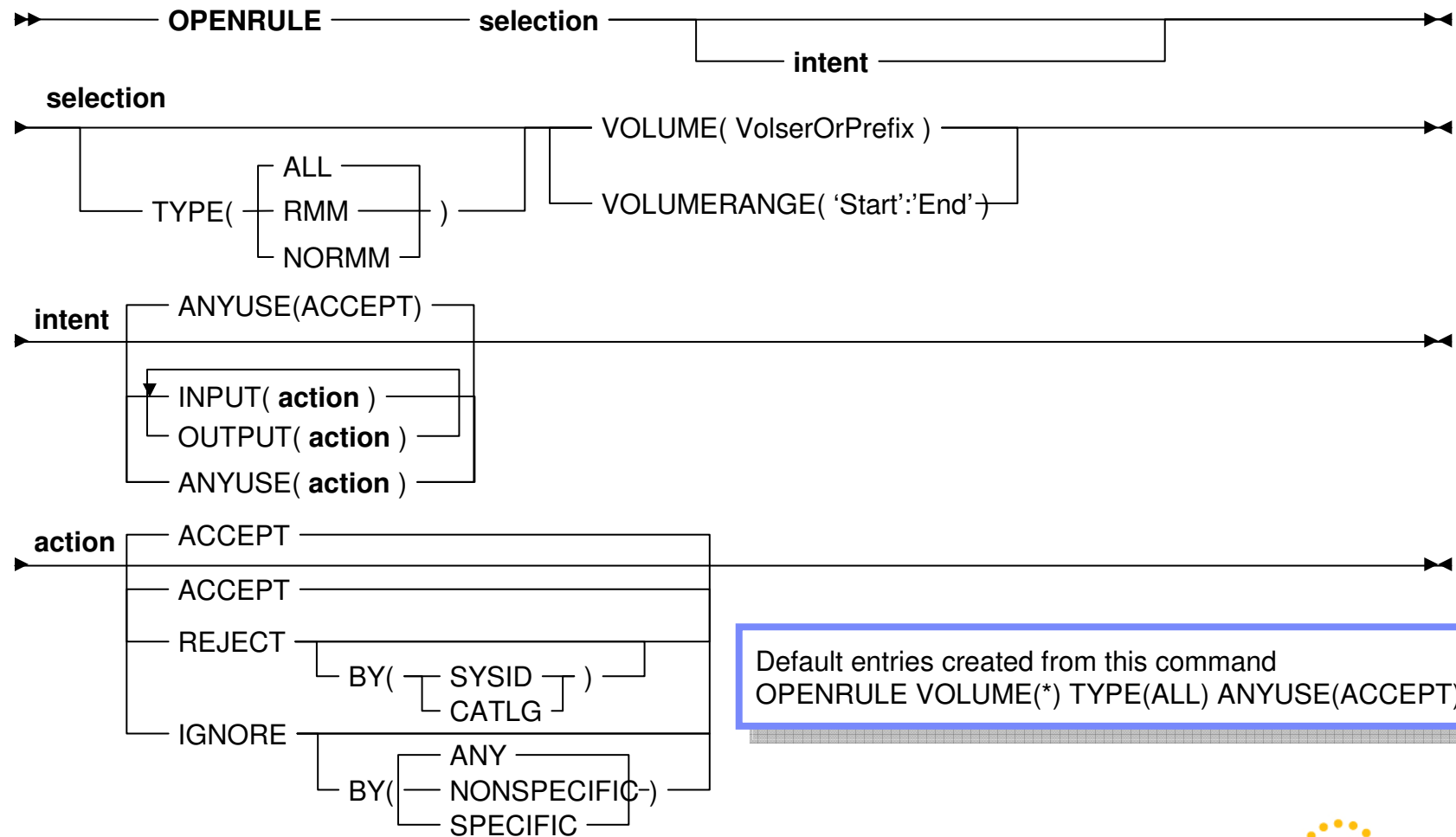


Default entries created from this command
 PRTITION VOLUME(*) TYPE(ALL) SMT(ACCEPT) NOSMT(ACCEPT LOCATION(SHELF))

Best Practices: Tape Administration with DFSMSrmm



OPENRULE syntax



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

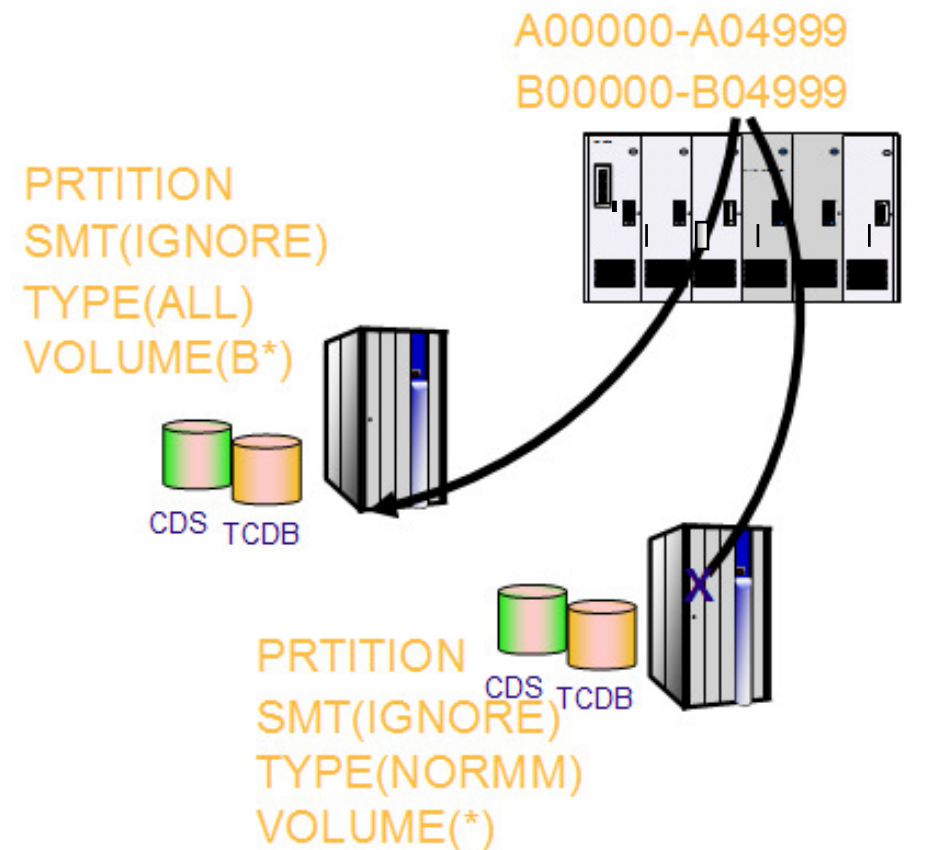
Best Practices: Tape Administration with DFSMSrmm

System managed tape Library partitioning

z/OS V1R10 and above



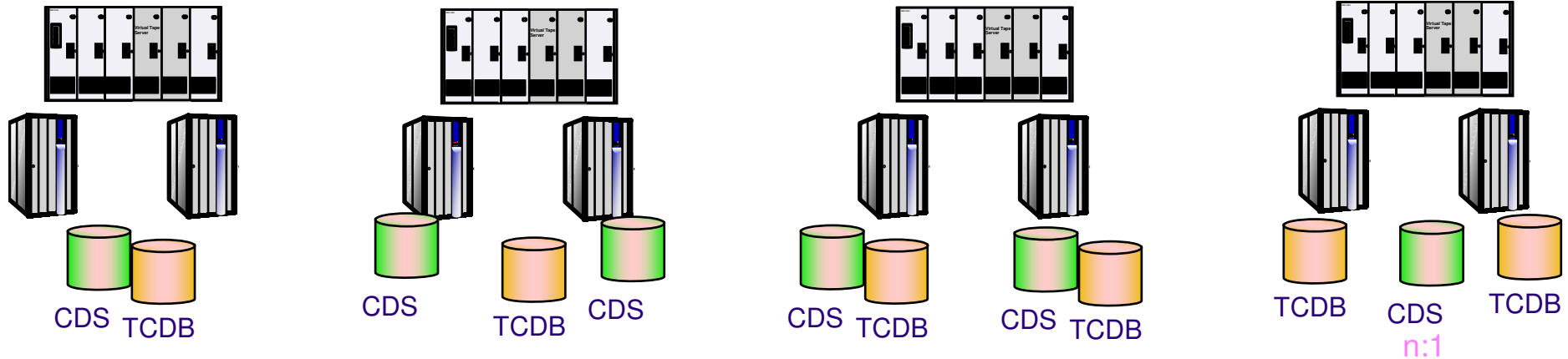
- Parmlib Control using
 - PRTITION VOLUME(prefix)
SMT(action)
 - Automatic define unless
SMT(IGNORE)
 - OAM Leaves in INSERT category
-
- At OPEN time
 - OPENRULE determines if Use is rejected
 - Can be ignored using
 - ANYUSE(IGNORE)
VOLUME(prefix)
 - EDGUX100



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)



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 **PRTITION**s
 - 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 Size Work 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



Best Practices: Tape Administration with DFSMSrmm

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

Best Practices: Tape Administration with DFSMSrmm

Recommended RMM Options and Performance hints



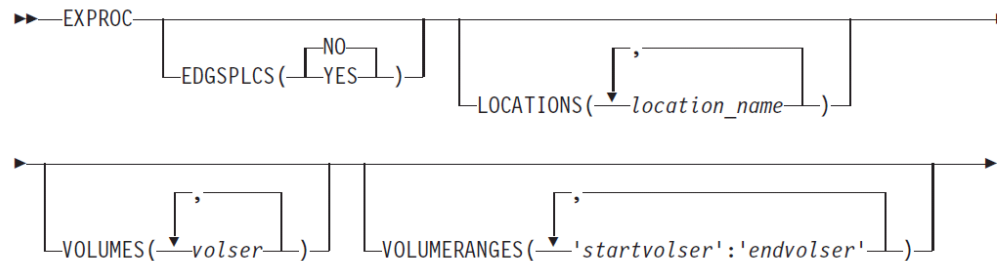
- Workload Management (WLM) classification of DFRMM address space
 - DFRMM is a system task serving many other jobs
 - Requires appropriately high classification in WLM service definition
 - Recommended: SYSSTC
 - Alternatively: Single period service class with a high importance and tight velocity goal
 - 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.edgsp1cs.data.set  
//OUTDD DD SYSOUT=*
```

```
//EXEC PGM=EDGSPLCS, PARM='ACTION(S), LOCATION(ATLBA111)'  
//INDD DD DISP=SHR, DSN=my.edgsp1cs.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
- z/OS release coexistence with DFSMSrmm
- Safety Nets
- Diagnostics and Performance hints
- Administrative Practices



Best Practices: Tape Administration with DFSMSrmm

Administrative Practices: Vital Record Specifications



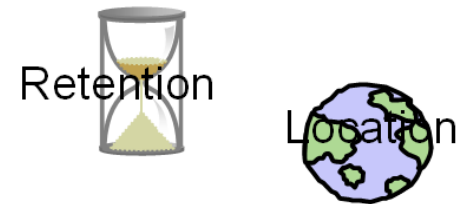
- Know your Vital Record Specifications; Don't ASSUME
- Know what types of VRS' are in place
- Understand priorities for conflicts in Movement
- Understand RELEASE Options To honor or IGNORE EXPDTs
- LOOK AT VRS REPORTS !!!!

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**

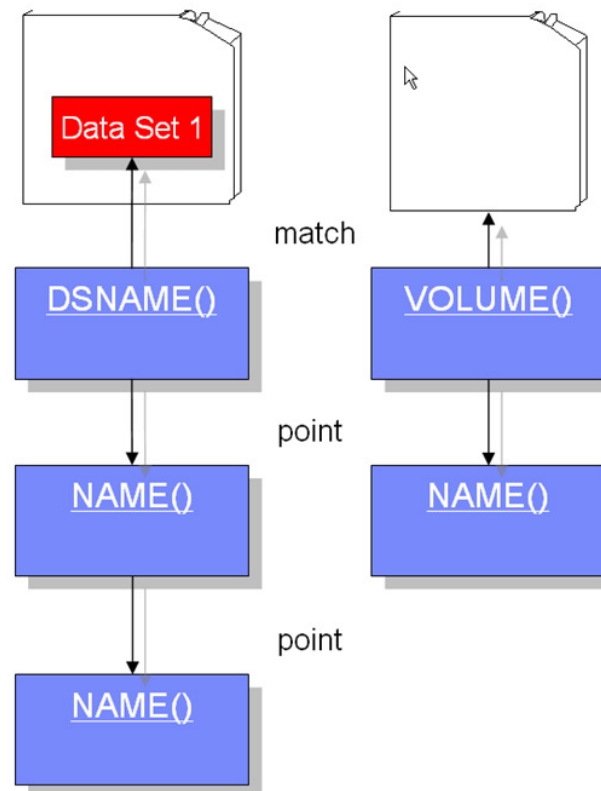
Best Practices: Tape Administration with DFSMSrmm



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

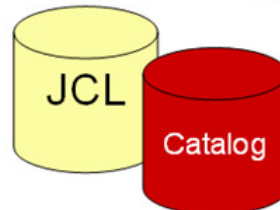
Retention Types

- 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) |
|--------------------|--------------------|
| BLUES.*.LEE.HOOKER | *.LEE.HOOKER.BLUES |
| *.JOHN.*.HOOKER | JOHN.*.HOOKER.* |

Best Match →

← Best Match



Best Practices: Tape Administration with DFSMSrmm

Administrative Practices: Vital Record Specifications

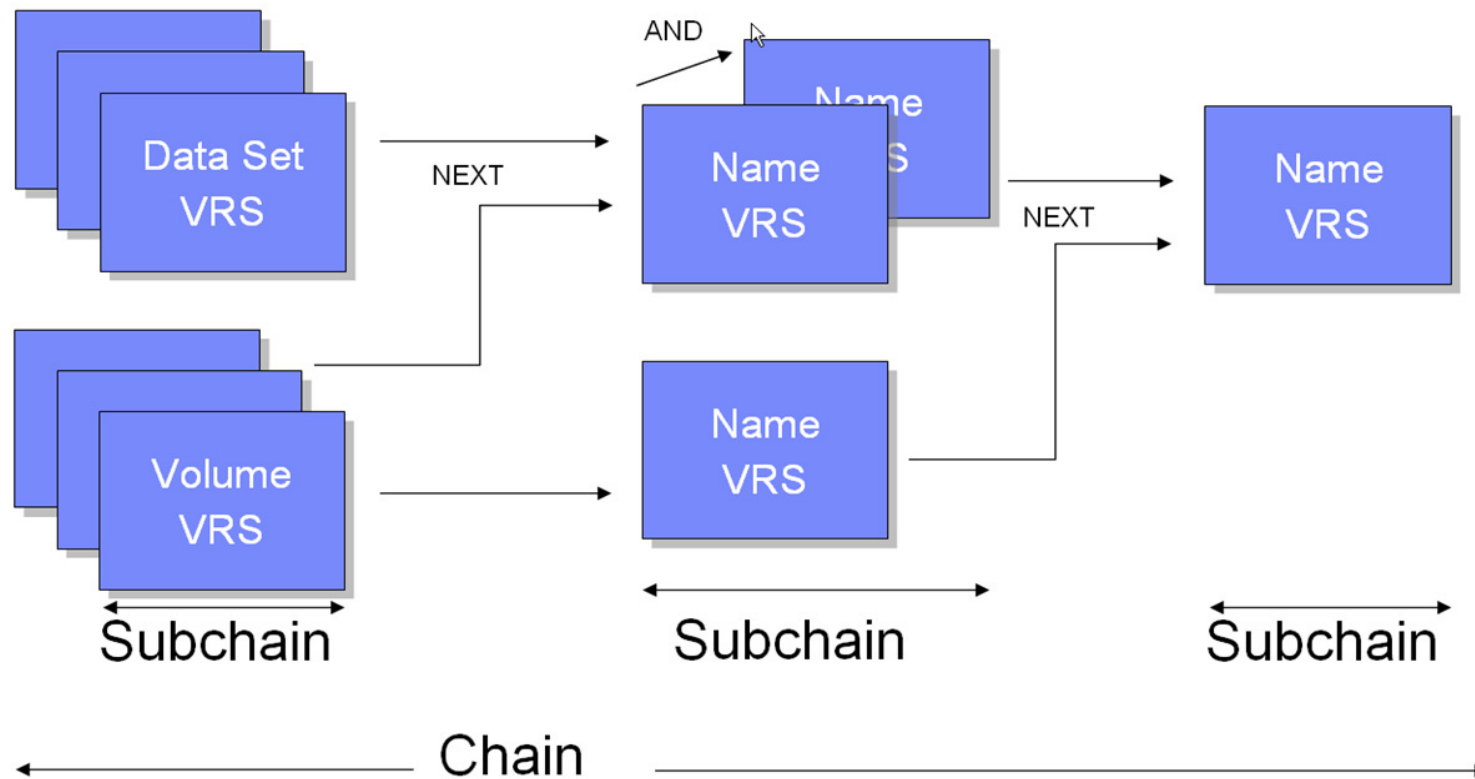
Matching Order of Precedence

| 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

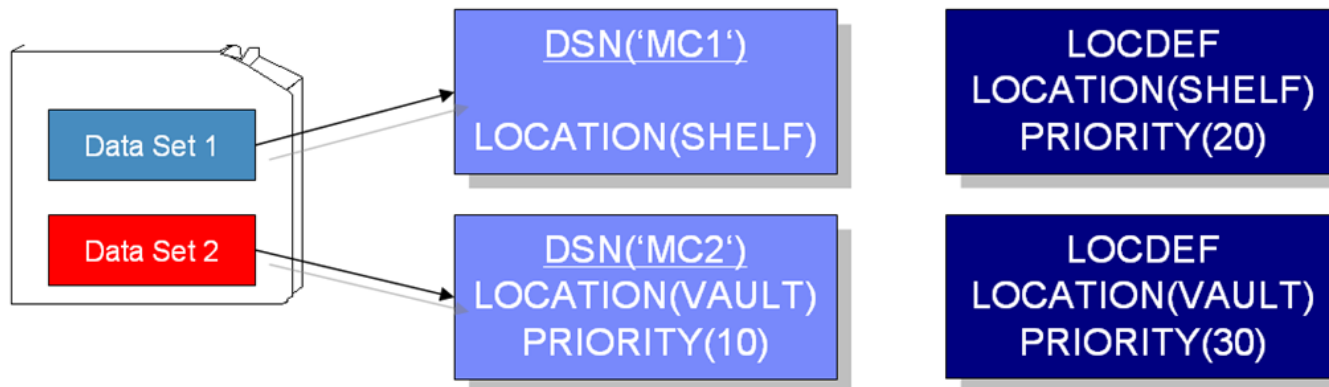


Best Practices: Tape Administration with DFSMSrmm

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

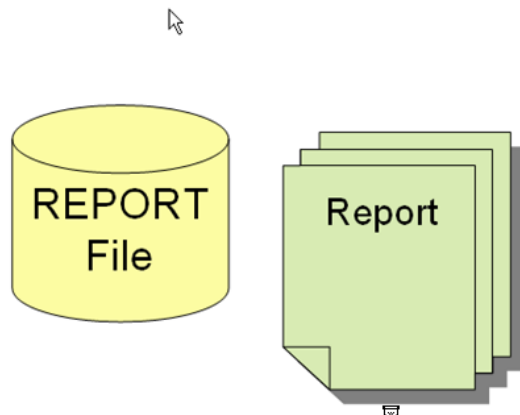


Best Practices: Tape Administration with DFSMSrmm

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

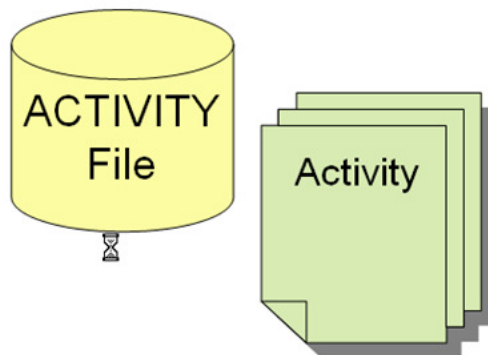
- **Contents**

- 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

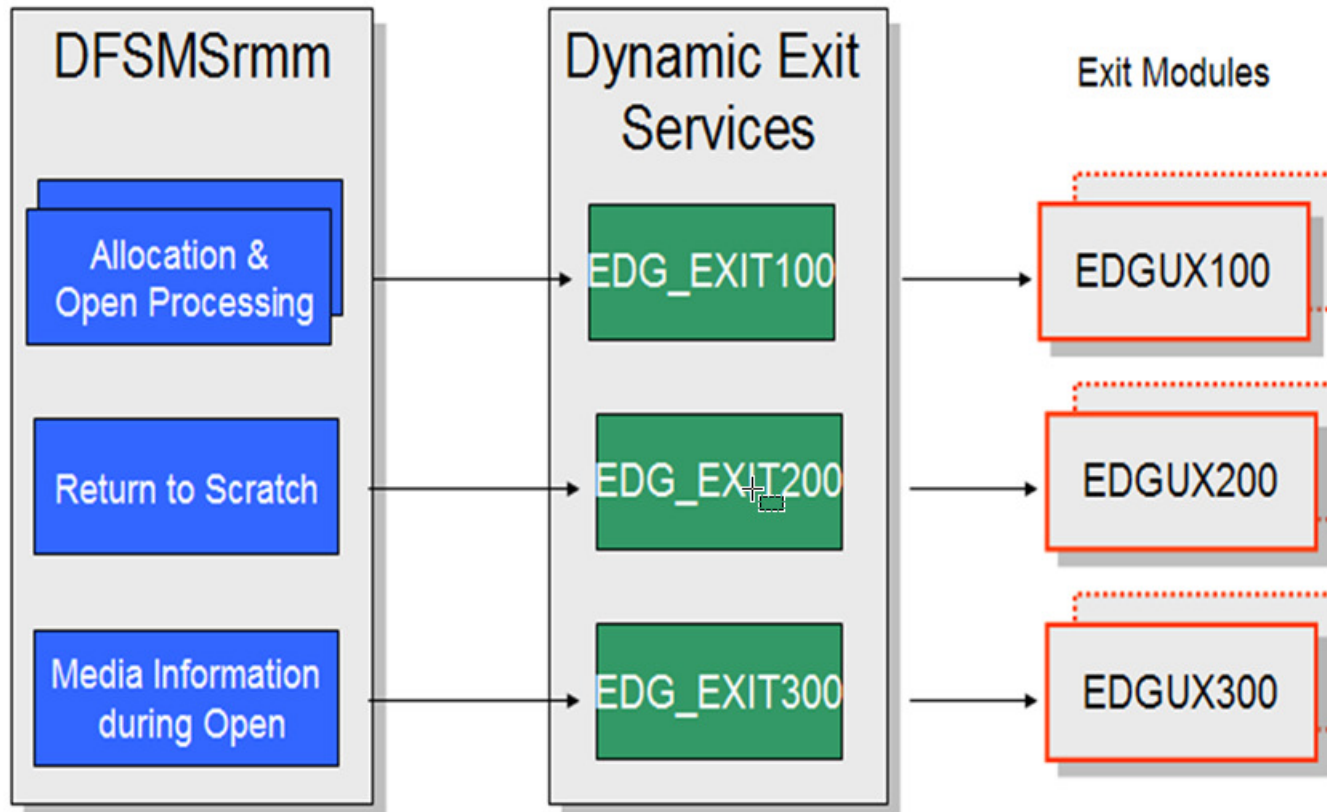
Administrative Practices: User EXITS



- 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



Summary of z/OS DFSMSrmm V1R13


+: Support integrated into release base



| <i>Function</i> | <i>z/OS (RMM) release</i> | <i>z/OS V1.13</i> | <i>z/OS V1.12</i> | <i>z/OS V1.11</i> | <i>z/OS V1.10</i> |
|---|---------------------------|-------------------|-------------------------|---------------------------------------|---------------------------------------|
| <i>VRSELEXCLUDE & RM(EXPDT)</i> | | + | OA32984 (Toleration) | OA32984 (Toleration) | OA32984 (Toleration) |
| <i>Tbd</i> | | | | | |
| <ul style="list-style-type: none"> • <i>Selective volume movement</i> • <i>More „Last change“ details</i> • <i>Last Reference Date for VRS</i> • <i>ISPF Navigation Enhancements</i> • <i>Show Effective Retention/Expiration Date</i> • <i>Search Dataset Extensions</i> • <i>TVEXTPURGE Extra Days</i> • <i>More information on Expiry Date source</i> • <i>Enhanced Tape Copy Support</i> | | + | | | |
| <i>Retention limit reporting</i> | | + | + | OA30881 | OA30881 |
| <i>Volume Hold</i> | | + | + | OA30436 (Honor Volume Hold) | OA30436 (Honor Volume Hold) |
| <ul style="list-style-type: none"> • <i>EAS Eligibility</i> • <i>OPENRULE IGNORE</i> • <i>IPv6</i> • <i>AUTOR</i> • <i>Addt. Status commands & RAS enhancements</i> | | + | + | | |
| <i>Option to turn uppercasing on/off</i> | | + | + | OA32661 | OA32661 |
| <i>TS7700 1.6 Support , Logical WORM</i> | | + | + | OA28637 | OA28637 |

Where to go for more information on DFSMSrmm



- DFSMSrmm Homepage: <http://www.ibm.com/systems/storage/software/sms/rmm>
 - DFSMSrmm Enhancements: <https://www.ibm.com/support/docview.wss?q1=T1010391&rs=0&uid=isg3T1010391>
- z/OS V1.12 DFSMS library: <http://www.ibm.com/systems/z/os/zos/bkserv/r12pdf/#dfsms>, especially
 - DFSMSrmm Managing and Using Removable Media
<http://publibz.boulder.ibm.com/epubs/pdf/dgt2r390.pdf>
 - DFSMSrmm Implementation and Customization Guide
<http://publibz.boulder.ibm.com/epubs/pdf/dgt2c890.pdf>
-  **Redbooks** DFSMSrmm Primer:
<http://www.redbooks.ibm.com/abstracts/SG245983.html>
- Contact the DFSMSrmm team: DFSMSrmm@de.ibm.com

Best Practices: Tape Administration with DFSMSrmm



धन्यवाद

Hindi

多謝

Traditional Chinese

ขอบคุณ

Thai

Спасибо

Russian

Gracias

Spanish

Thank You

English

Obrigado

Brazilian Portuguese

شكراً

Arabic

Grazie

Italian

多谢

Simplified Chinese

Danke

German

Bedankt

Dutch

Merci

French

நன்றி

Tamil

ありがとうございました

Japanese

감사합니다

Korean