Employing External Retention Management Techniques in a DFSMSrmm Environment

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Employing External Retention Management Techniques in a DFSMSrmm Environment

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  - DFSMSdss
  - DFSMShsm
  - DFSMSrmm
  - DFSORT

  - IBM
  - RACF
  - TotalStorage
  - z/OS
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Employing External Retention Management Techniques in a DFSMSrmm Environment

- Agenda
  - Why?
  - Overview
    - RMM
    - HSM
    - Tape volume Exits
    - RACF considerations
  - VRS Considerations
    - Special VRSes
    - Retention Method
  - Case example
  - RMM/HSM aids

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Employing External Retention Management Techniques in a DFSMSrmm Environment

- Why revisit DFSMSrmm and DFSMShsm interface?
  - Both manage long-term historical / critical data
  - Probably implemented decades ago:
    - not necessarily at the same time
    - by someone other than yourself
  - Changes to your core business requirements
  - How you do business
  - Changing legal requirements
  - Product enhancements over the years
  - Currently not using it <= are you one of these folks???

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Employing External Retention Management Techniques in a DFSMSrmm Environment

- Overview
  - HSM
    - Tracks and controls its own data retention
    - Determines when to expire its volumes
    - Assigns "permanent" retention (EXPDT=99365)
    - Communicates "release" actions to RMM
  - RMM
    - Protects HSM tape data via:
      - HSM Vital Record Specification (VRS)
      - "PERM" VRS Management Value (VRS MV)
    - Receives "release" actions from HSM
    - Expired volume set to "Pending Release" status
    - "Pending Release" volume scratched by EXPROC

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- DFSMS Tape Volume Exits
  - ARCTVEXT
    - Standard tape exit code supplied with z/OS
    - Informs tape manager that DFSMShsm is releasing ownership of a DFSMShsm tape
  - DFSMShsm V1R4 and subsequent releases no longer use the ARCTVEXT exit to communicate with DFSMSrmm
  - ARCTVEXT (or facsimile) typically used if interfacing to non-RMM tape manager

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- DFSMS Tape Volume Exits (cont'd)
  - Non-RMM environment, ARCTVEXT receives control during DFSMShsm tape deletion processing:
    - When all valid data is removed from a tape
    - When a RECYCLE FORCE command is issued
    - Backup of the CDSes and Journal if the SETSYS CDSVERSIONBACKUP command has been specified (exit called after HSM uncatalogs the oldest backup version). The exit is called separately for each tape associated with the version being rolled off
    - Tape replace processing when an original tape is replaced by an alternate tape. The ARCTVEXT exit releases the original tape

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- DFSMS Tape Volume Exits (cont'd)
  - EDGTVEXT
    - Calls EDGDFHSM if RMM active
    - Can be called by other "external" retention controlling products
      - Can be used if you are using more than one tape management product
    - Accepts the ARCTVEXT parameter list
    - TVEXTPURGE option can be used to extend retention

  - EDGDFHSM
    - Automatic invocation by RMM
    - Accepts only 1 volume at a time
    - TVEXTPURGE option can be used to extend retention

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- Misc HSM commands
  - If RMM in use:
    - SETSYS EXITOFF(ARCTVEXT)
  - HSM,RELEASE RMM to re-enable HSM->RMM Exit . . .
    - Exit could became disabled due to bouncing RMM while HSM RECYCLE was processing . . .

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- RACF Considerations
  - DFSMShsm STC
    - STGADMIN.EDG.RELEASE   READ
    - STGADMIN.EDG.MASTER   READ
    - STGADMIN.EDG.OWNER.hsmid   UPDATE
  - ABARS
    - STGADMIN.EDG.RELEASE   READ
    - STGADMIN.EDG.MASTER   READ
    - STGADMIN.EDG.OWNER.abarsid   UPDATE

- Same examples would apply to TSM, OAM, and other ISV externally-managed tape data sets.
- Regardless if DFSMShsm STC defined as "TRUSTED" or not.

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- Vital Record Specification (VRS) Considerations
  - VRS policies applied based on "best match"
  - Special reserved name VRSes applied ahead of other VRS matches:
    - *OPEN* - currently OPEN at time of VRSEL
    - *DELETED* - created with normal disposition of DELETE
      - DISP=(NEW,DELETE)
      - System temporary tape files (DSN=&&TEMP)
    - *ABEND* – left open at time of ABEND
  - Reserved name can be specified in JOBNAME or DSNAME
    - Can be tailored for given situations

VRS Processing Order "Refresher"

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- ## HSM VRS Considerations
  - Making all HSM datasets "permanent" in RMM
    - RMM ADDVRS DSNAME('*mprefix*.**') JOBNAME(hsm_proc) +
      COUNT(99999) DAYS RELEASE(EXPIRYDATEIGNORE)
    - RMM ADDVRS DSNAME('*bprefix*.**') JOBNAME(hsm_proc) +
      COUNT(99999) DAYS RELEASE(EXPIRYDATEIGNORE)
    - RMM ADDVRS DSNAME('*authid*.**') JOBNAME(hsm_proc) +
      COUNT(99999) DAYS RELEASE(EXPIRYDATEIGNORE)

  - Same examples would apply to TSM, OAM, and other ISV externally-managed tape data sets.

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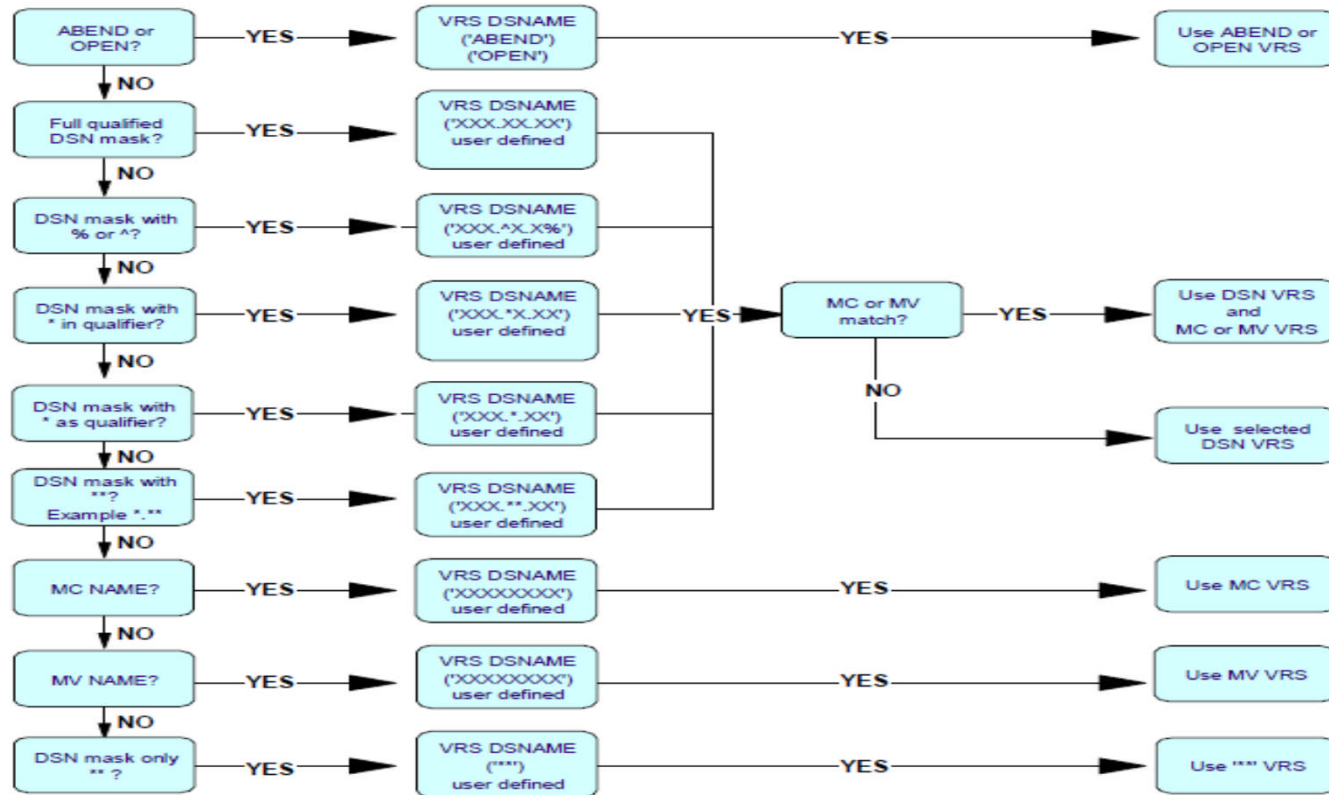# Employing External Retention Management Techniques in a DFSMSrmm Environment

- Situational handling of HSM/ABARS data sets
  - RMM ADDVRS DSNAME('ABEND') JOBNAME(hsm_proc) COUNT(99999) +
    DAYS RELEASE(EXPIRYDATEIGNORE)
  - RMM ADDVRS DSNAME('ABEND') JOBNAME(abars_proc) COUNT(99999) +
    DAYS RELEASE(EXPIRYDATEIGNORE)
  - RMM ADDVRS DSNAME('OPEN') JOBNAME(hsm_proc) COUNT(99999) +
    DAYS RELEASE(EXPIRYDATEIGNORE)
  - RMM ADDVRS DSNAME('OPEN') JOBNAME(abars_proc) COUNT(99999) +
    DAYS RELEASE(EXPIRYDATEIGNORE)

- Examples would apply to ABARS/TSM, OAM, and other ISV externally-managed tape data sets.

Employing External Retention Management Techniques in a DFSMSrmm Environment

```
  Panel   Help

                       DFSMSrmm Add Data Set VRS
Command ===> _____

Data set mask . : 'ABEND'                                   GDG . . NO
     Job name mask . : DFHSM*

Count . . . . 99999            Retention type . . . . . . DAYS
                               While cataloged . . . . . . NO
Delay . . . . 0   Days         Until expired . . . . . . . NO

Location . . . . . . HOME
Number in location   99999
Priority . . . . . . 0

                               Release options:
Next VRS in chain . . _____   Expiry date ignore . . . . YES
    Chain using . . . ____        Scratch immediate . . . . . NO

Owner . . . . . . . DFRMM
Description . . . _____
Delete date . . . 1999/365    ( YYYY/DDD )

Press ENTER to ADD the VRS, or END command to CANCEL.
```

Employing External Retention Management Techniques in a DFSMSrmm Environment

- Situational handling . . . (cont'd)
  - VRSes for other ISV externally-managed data sets
    - RMM ADDVRS DSNAME('prefix.**') JOBNAME(ABEND) COUNT(99999) + DAYS RELEASE(EXPIRYDATEIGNORE)
    - RMM ADDVRS DSNAME('prefix.**') JOBNAME(OPEN) COUNT(99999) + DAYS RELEASE(EXPIRYDATEIGNORE)

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- Retention Method (cont'd)
  - TVEXTPURGE(RELEASE) vs (EXPIRE(days))
    - After primary HSM lifecycle VRS
    - If RM(VRSEL):
      - Use TVEXTPURGE(EXPIRE(days)) to add extra days beyond expdt
    - If RM(EXPDT):
      - Datasets excluded from VRSEL processing
      - Only EXPROC required to expire volumes

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- Retention Method (cont'd)
  - Why force VRS usage if it isn't necessary ?
    - More environments are replicating instead of moving
    - If you don't require special retention or volume movement you don't require a VRS
    - UXTABLE can be used to assign RETPD without involving a VRS or the need for JCL changes
  - Easier to change when necessary
    - Just a single CV command
    - No need to try and evaluate what VRS processing will do down the road

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- Retention Method (cont'd)
  - All volumes in a set will expire at the same time, governed by RETAINBY(SET) behavior
  - OPEN, DELETED and ABEND datasets will expire per their specified expiration date

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- Retention Method (cont'd)
  - Use EDGRMMxx parmlib option to set global default action for all new volume activity:

  ```
  RETENTIONMETHOD(─┬─VRSEL─┬─
                   └─EXPDT─┘
  ```
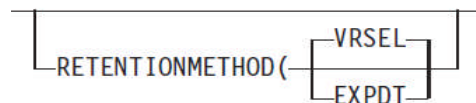
  - Use RMM CV commands to change the retention method for active volumes:

  ```
                                    (4)
  RETENTIONMETHOD(─┬─EXPDT─┬─)
                   └─VRSEL─┘
  ```
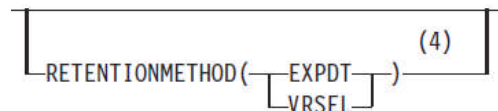
  - Can also be used on the RMM AV command when adding non-scratch volumes

Employing External Retention Management Techniques in a DFSMSrmm Environment

- Retention Method (RM)
  - Introduced in z/OS v1.13, Retention Method is a RMM option by which you can exclude a volume, range of volumes or the entire environment from VRS selection processing
  - Huge performance benefit
    - Datasets excluded from VRSEL processing
      - Reduces VRSEL Housekeep overhead
    - Only EXPROC required to expire volumes
  - Immediate visibility to volume expiration
    - You don't need to worry about it changing the next time inventory management runs

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- Potential uses for RM(EXPDT)
  - Most environments cannot implement system wide default of RM(EXPDT)
    - No support for special dates
    - No support for automated volume movement
    - No support for enhanced retention options like WHILECATLG, CYCLE or LDATE
  - DFSMShsm (and other externally managed data)
    - Use UXTABLE to set RM(EXPDT) and also force EXPDT=99365
    - Typically large users of tape in an environment
    - Consider loss of functionality provided by special VRSes

Employing External Retention Management Techniques in a DFSMSrmm Environment

- Potential uses for RM(EXPDT) (cont'd)
  - Specific applications
    - Require clear line of sight to volume expiration
    - No specific requirement for VRS
  - Ability to control through UXTABLE is a huge benefit to support partial usage. UXTABLE can be used to selectively override Retention Method during O/C/EOV:

```
        EDGCVRSG DSN=HSM.*,            X
                 JOB=HSM*,             X
                 RO=NO,                X
                 RM=EXPDT
```

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- Problem case example:
  - Volume with non-HSM data is prematurely released and subsequently re-used/overwritten with new data
  - The user's non-HSM data <u>did</u> have a matching RMM VRS
  - User tries to access their data on the volume but finds it's been overwritten . . .

. . . Data loss

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- What happened?
  - Volume was originally written with HSM data
  - Encountered ABEND during the HSM process
  - HSM.** DSN VRS with "permanent" retention existed in RMM

  - "generic" ABEND VRS existed (DAYS=3) also existed in RMM
    - DSN=" ** " VRS

  - Recall that in RMM: OPEN, DELETED, and ABEND VRS take precedence over any other VRS matches*

    * assumes RM(VRSEL) and/or not excluded from VRSEL processing

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- What happened? (cont'd)
  - During VRSEL, "generic" 3-day ABEND VRS assigned
    - HSM** "perm" VRS is NOT assigned
  - 3 days later, RMM (not HSM) scratches volume
  - 3+ days: Volume gets re-used. HSM data is overwritten
  - Up to this point, no HSM activity against the volume . . .
    - Volume/data is not requested (i.e. HSM Recall)
    - As far as HSM is concerned, all is well . . .

  - . . . and HSM still thinks volume is under HSM control

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- What happened? (cont'd)
  - 4 days: HSM RECYCLE "releases" the volume
    - HSM is officially no longer managing the volume
  - 4+ days: volume with the user data is scratched
  - 4+ days: volume is re-used again, overwriting the user data
  - 4+ days: user calls you to find out what happened to their 2-day old data

  - ??+ days: trying to figure out what happened or how to reconstruct the user's data

Employing External Retention Management Techniques in a DFSMSrmm Environment

- RMM items analyzed
  - Journal file records
  - Vital Records Retention Report (REPORT DD in PGM=EDGHSKP)
  - Report Extract file
  - Housekeeping JOBLOG
- Other possible diagnostics
  - PDA log files history
  - Housekeep Message files history
  - VRS Activity file (ACTIVITY DD in PGM=EDGHSKP)

Employing External Retention Management Techniques in a DFSMSrmm Environment

- Conclusion
  - No special HSM ABEND VRS existed
    - "generic" 3-day ABEND only existed and was applied
    - Volume was actually "released" twice
    - 1st time: RMM; 2nd time by HSM
  - During the events, HSM never accessed the volume/data so no signs of a problem were evident to HSM
    - Made user data loss to appear not HSM-related
  - Proper HSM ABEND VRS was coded in RMM (moving forward/preventative)

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Employing External Retention Management Techniques in a DFSMSrmm Environment

- RMM / HSM aids:
  - Tivoli Advanced Audit for DFSMShsm
    - Creates an RMM extract file and compares with other HSM "extract" files created from Advanced Audit.
    - Identifies differences between RMM and HSM
    - Can correct discrepancies
  - "REXX friendly"
    - User-written code to compare valid HSM volumes against RMM status

Employing External Retention Management Techniques in a DFSMSrmm Environment

- References
  - z/OS DFSMSrmm Implementation and Customization Guide
    - SC26-7405-12 (v1.13)
    - SC23-6874-00 (v2.1)
  - z/OS DFSMSrmm Managing and Using Removable Media
    - SC26-7404-12 (v1.13)
    - SC23-6873-00 (v2.1)
  - z/OS DFSMSrmm Reporting
    - SC26-7406-11 (v1.13)
    - SC23-6875-00 (v2.1)
  - z/OS DFSMSrmm Application Programming Interface
    - SC26-7403-11 (v1.13)
    - SC23-6872-00 (v2.1)

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Questions?

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Thank You!