z/OS V1R13

DFSMSoam: Usability and reliability enhancements

Session objectives

- Explain OAM Usability and Reliability Enhancements (UaRE)
  - Wildcard in F OAM,S,STORGRP command
  - Extend object expiration beyond 27 years
  - Dynamic update of SGMAXTAPERETRIEVETASKS and SGMAXTAPESTORETASKS settings
  - Improved media migration
  - Enhanced OAM messages for specific DB2® errors
  - SMF counter scalability
  - CTICBR00 PARMLIB member
  - CBR9875I Recycle candidates display enhancement
  - Miscellaneous internal RAS enhancements

Overview - Wildcard in F OAM,S,STORGRP command

- Problem Statement / Need Addressed
  - Operators have to enter command for each object and/or object backup storage group he wanted OAM to process. Customers requested mechanism to cut back on keystrokes.
- Solution
  - The **MODIFY OAM,S,STORGRP,*groupname*** command has been enhanced to support a single asterisk as the last or only character in the *groupname*. It is called a "wild card".
    - Ex: **F OAM,S,STORGRP,GROUP*** starts processing for all object or object backup storage groups starting with GROUP.
    - Ex: **F OAM,S,STORGRP,*** starts processing for all object or object backup storage groups defined in the ACDS.
      - ***Note**: F OAM,S,OSMC command can be used to start processing of all object storage groups, but ignores object backup storage groups.*
- Benefit / Value
  - Installations with multiple object and or object backup storage groups can now start multiple storage group processes with a single command invocation.
- Customer Requirements:
  - MR0506092602

Overview - Extend object expiration beyond 27 years

- Problem Statement / Need Addressed
  - Prior to this support, the maximum expiration criteria specified via SMS management class definition (other than NOLIMIT) was 9999 days (roughly 27 years).
- Solution
  - Objects can still be retained FOREVER (or NOLIMIT) however the 9999 day maximum associated with management class Retention Limit, Expire after Date/Days, and Expire after Days Non-usage has been expanded to 93000 days.
  - Additionally, the maximum number of days specified via the RETPD and EVENTEXP keywords on the OSREQ API has also been expanded to 93000.
- Benefit / Value
  - The net result is that the retention/expiration criteria for an object can now be set up to 93000 days (approximately 255 years).
- Customer Requirements:
  - MR0513051837

Overview - Dynamic update of SGMAXTAPESTORETASKS and SGMAXTAPERETRIEVETASKS

- Problem Statement / Need Addressed
  - In order to change the distribution of tape drives allocated for OAM object and object backup storage groups, installations have to modify SGMAXTAPESTORETASKS and SGMAXTAPERETRIEVETASKS values in the CBROAMxx Parmlib member and restart OAM.
  - Customers requested a mechanism to alter these values dynamically.
- Solution
  - Values specified for the SETOAM keywords SGMAXTAPERETRIEVETASKS and SGMAXTAPESTORETASKS, are dynamically changeable via the F OAM,UPDATE,SETOAM operator command. No restart of the OAM address space is required.
- *Note: This support applies to SGMAXTAPERETRIEVETASKS and SGMAXTAPESTORETASKS keywords which are specified at a storage group level. The MAXTAPERETRIEVETASKS and MAXTAPESTORETASKS keywords which are specified at a global level are still not dynamically changeable.*
- Benefit / Value
  - Distribution of tape resource can be biased towards object or object backup storage groups as required.
- Customer Requirements:
  - MR00072500

Overview - Improved media migration

- Problem Statement / Need Addressed
  - When processing tape or optical volumes with a large number of collections, a significant amount of time could elapse between the time the MOVEVOL command is issued for a volume and the time of the first write to a new volume.
  - Running MOVEVOL on one member of an OAMplex resulted in measurable CPU usage on 'idle' members in the OAMplex in reaction to XCF messages broadcast by the 'active' member.
- Solution
  - OAM's media migration utility, MOVEVOL, is changed to no longer process objects on a collection boundary.
  - With this support, the frequency of the broadcast messages relating to all tape reads and writes (not just MOVEVOL) from the 'active' member will be significantly reduced.
- Benefit / Value
  - This new algorithm should result in a better performance when moving objects from a source volume that contains a large number of OAM collections.
  - The frequency of the broadcast messages from the 'active' member will be significantly reduced *for all tape reads and writes* (not just MOVEVOL) thereby resulting in much lower CPU usage on the 'idle' systems.
- Customer Requirements:
  - MR0311053048, MR00067458, MR060705401, MR1127094917

Overview - Enhanced OAM messages for specific DB2 errors

- Problem Statement / Need Addressed
  - OAM currently issues generic messages that display DB2 SQL codes when a DB2 error is encountered. The system programmer must convert the hex return/reason code into a negative decimal SQL code and then look up the codes in DB2 manuals.
- Solution
  - This enhancement will print out additional information for 'common' SQL codes.
- Benefit / Value
  - Save the operator and storage administrator the trouble of having to derive the SQL codes and look up the codes in the DB2 manuals.

Overview - SMF counter scalability

- Problem Statement / Need Addressed
  - Some four-byte counter fields in SMF Type 85, subtypes 32-35 and 87 containing kilobyte values potentially could overflow as workloads and tape capacity increase.
- Solution
  - New eight-byte counter fields have been added to SMF Type 85, subtypes 32-35 and 87 to protect against potential overflow. The new eight-byte counters contain values in bytes.
- Benefit / Value
  - This enhancement avoids inaccuracies due to counter overflow (the four-byte counters will contain X'FFFFFFFF' if overflow condition is detected).
  - The new eight-byte counters provide more granularity. They contain number of bytes (vs number of kilobytes in the old four-byte fields).

- The following OAM Subtype 32-35 counters are four-byte fields which could potentially overflow. A value of X'FFFFFFFF' in one of these fields indicates an overflow was detected. New eight-byte fields are introduced in R13 which supersede these four-byte fields.
  - ST32PDWK ST32PDRK ST32PDDK ST32POWK ST32PORK ST32PODK ST32PTWK ST32PTRK ST32PTDK ST32BOWK ST32BORK ST32BODK ST32BTWK ST32BTRK ST32BTDK ST32B2OWK ST32B2ORK ST32B2ODK ST32B2TWK ST32B2TRK ST32B2TDK ST32RCLK ST32PUWK ST32PURK ST32PUDK

- The following OAM Subtype 87 counters are four-byte fields which could potentially overflow. A value of X'FFFFFFFF' in one of these fields indicates an overflow was detected. New eight-byte fields are introduced in R13 which supersede these eight-byte fields.
  - ST87NKBW ST87NKBR
- New eight-byte counter fields for SMF Subtypes 32-35 are added to prevent overflow. The new fields are listed in this table:

```
OFFSETS NAME LEN FORMAT DESCRIPTION
 268 10C ST32PEWO 4 binary Number of primary objects written to disk sublevel 2 (file system).
 272 110 ST32PERO 4 binary Number of primary objects read from disk sublevel 2 (file system).
 276 114 ST32PEDO 4 binary Number of primary objects deleted from disk sublevel 2 (file system).
 280 118 ST32PDWB 8 binary Number of bytes of primary object data written to disk sublevel 1 (DB2).
 288 120 ST32PDRB 8 binary Number of bytes of primary object data read from disk sublevel 1 (DB2).
 296 128 ST32PDDB 8 binary Number of bytes of primary object data deleted from disk sublevel 1 (DB2).
304 130 ST32POWB 8 binary Number of bytes of primary object data written to optical.
312 138 ST32PORB 8 binary Number of bytes of primary object data read from optical.
320 140 ST32PODB 8 binary Number of bytes of primary object data deleted from optical.
328 148 ST32PTWB 8 binary Number of bytes of primary object data written to tape.
336 150 ST32PTRB 8 binary Number of bytes of primary object data read from tape.
344 158 ST32PTDB 8 binary Number of bytes of primary object data deleted from tape.
352 160 ST32BOWB 8 binary Number of bytes of backup object data written to optical.
360 168 ST32BORB 8 binary Number of bytes of backup object data read from optical.
368 170 ST32BODB 8 binary Number of bytes of backup object data deleted from optical.

376 178 ST32BTWB 8 binary Number of bytes of backup object data written to tape.
384 180 ST32PTRB 8 binary Number of bytes of backup object data read from tape.
392 188 ST32BTDB 8 binary Number of bytes of backup object data deleted from tape.
```

```
400 190 ST32B2OWB 8 binary Number of bytes of BACKUP2 objects written to optical.
408 198 ST32B2ORB 8 binary Number of bytes of BACKUP2 objects read from optical.
416 1A0 ST32B2ODB 8 binary Number of bytes of BACKUP2 objects deleted from optical.
424 1A8 ST32B2TWB 8 binary Number of bytes of BACKUP2 objects written to tape.
432 1B0 ST32B2TRB 8 binary Number of bytes of BACKUP2 objects read from tape.
440 1B8 ST32B2TDB 8 binary Number of bytes of BACKUP2 objects logically deleted from tape.
448 1C0 ST32RCLB 8 binary Number of bytes of recalled objects processed this storage group cycle. Valid only for
  subtype 32.
 456 1C8 ST32PUWB 8 binary Number of bytes of primary objects written to tape sublevel 2.
 464 1D0 ST32PURB 8 binary Number of bytes of primary objects read from tape sublevel 2.
 472 1D8 ST32PUDB 8 binary Number of bytes of objects deleted from tape sublevel 2.
 480 1E0 ST32PEWB 8 binary Number of bytes of primary objects written to disk sublevel 2 (file system).
 488 1E8 ST32PERB 8 binary Number of bytes of primary objects read from disk sublevel 2 (file system).
 496 1F0 ST32PEDB 8 binary Number of bytes of primary objects deleted from disk sublevel 2 (file system).
```

- New eight-byte counter fields for SMF Subtype 87 are added to prevent overflow. The new fields are listed in this table.

```
 OFFSETS NAME LEN FORMAT DESCRIPTION
68 44 ST87NBW 8          binary Number of logical bytes of object data
   written to this tape volume while it was
   mounted.
76 4C ST87NBR 8          binary Number of bytes of object data read from
   this tape volume while it was mounted.
```

Overview - CTICBR00 PARMLIB member

- Problem Statement / Need Addressed
  - Installations had to copy CBRCTI00 member from SAMPLIB into PARMLIB with a rename to CTICBR00 in order to define OAM default trace options via PARMLIB member.
- Solution
  - OAM will ship CTICBR00 directly to PARMLIB therefore the copy/rename step is no longer required.
- Benefit / Value
  - Simplifies OAM installation / migration.
- Customer Requirements
  - MR0419101031

Overview - RECYCLE candidates display enhancement

- Problem Statement / Need Addressed
  - When an F OAM,START,RECYCLE command is issued, the Recycle Candidates display message, CBR9875I, followed by a list of up to 40 volumes that have met the criteria specified by the RECYCLE command is generated and sent to hard copy SYSLOG.
  - The total number of volumes that meet the criteria for the RECYCLE command is not displayed.
- Solution
  - The message line that is displayed at the end of the Recycle Candidates display is updated to show a count of the total number of volumes that met the criteria specified in the RECYCLE command.
- Benefit / Value
  - Enables installation to better plan for tape recycle.

Overview - Miscellaneous internal RAS enhancements

- Problem Statement / Need Addressed
  - Focus areas were identified within OAM relating to reliability and serviceability.
- Solution
  - Several areas including serialization, FFDC (first failure data capture), IPCS, internal trace mechanisms and latent defects were addressed in R13.
- Benefit / Value
  - More reliable and serviceable product.

Usage and invocation

- These operator commands have been updated with this release:
  - The **'F OAM,UPDATE,SETOAM,*scope*,SGMAXTPS,new_*value*'** operator command can be used to dynamically update the SGMAXTAPESTORETASKS associated with the specified storage group(s).
  - The **'F OAM,UPDATE,SETOAM,*scope*,SGMAXTPR,new_*value*'** operator command can be used to dynamically update the SGMAXTAPERETRIEVETASKS associated with the specified storage group(s).
  - The **'F OAM,START,STORGRP,*group-name*'** operator command can now accept a wild-card asterisk to replace zero or more characters in the *group-name*.

Usage and invocation

- To exploit the expanded SMS retention period available in z/OS® V1R13,
  - the storage administrator can optionally set higher values in the following SMS Management Class attributes via ISMF.
    - Retention Limit
    - Expire after Days Non-usage
    - Expire after Days/Date
  - the application programmer can optionally set higher values in the following OSREQ keywords.
    - RETPD
    - EVENTEXP

Interactions and dependencies

- Software dependencies
  - None
- Hardware dependencies

  - None
- Exploiters
  - None

Migration and coexistence considerations

- Migration:
  - There are no specific migration actions for this support.
  - Migration step to copy CBRCTI00 into PARMLIB and rename to CTICBR00 is no longer required and has been removed from migration steps in the OAM PISA.
  - 'Standard' migration steps (ex: run OAM bind jobs) detailed in OAM PISA.
- Coexistence:
  - PTFs for APAR OA33022 will be provided for z/OS V1R10, V1R11 and V1R12 which will allow instances of OAM on pre-R13 level systems to tolerate extended retention limits and expiration attributes introduced in the SMS management class construct in z/OS V1R13.
  - On an z/OS V1R13 level system, a storage administrator could modify an SMS Management Class Retention Limit and/or Expiration Attribute to 93000 days in a given SCDS. If that SCDS is activated and shared in an SMSplex with systems that are at pre-R13 levels then the new 93000 day values for Retention Limit and Expiration Attributes are available to all the systems. PTFs are required on the pre-R13 level systems to prevent unexpected results.
  - With the coexistence PTFs installed, if a MC Retention Limit and/or Expiration Attribute value of 9999-93000 is returned from SMS on a pre-R13 level system, OAM will interpret those values as 9999.
  - *Note: this implies that an object that has a management class with expiration criteria of 93000 days from create on an R13 level system will be interpreted as an expiration criteria of 9999 days from create on a pre-R13 level system. Therefore whereas an OSMC cycle processed on an R13 level system could result in a Pending Action Date (ODPENDDT) of create date + 93000, processing that same object on a pre-R13 level system will result in a Pending Action Date of create-date + 9999.*
- This table shows the maximum values that are supported by OAM running on z/OS V1R13 and pre-R13 level systems.

Attribute	R13	Pre-R13
Management Class Retention Limit	93000	9999
Management Class Expiration Attributes	93000	9999
Expire after Days Non-Usage	93000	9999
Expire after Days/Date	93000	9999
OSREQ RETPD	93000	32767
OSREQ EVENTEXP	93000	32767

Installation

- Installation step to copy CBRCTI00 into PARMLIB and rename to CTICBR00 is no longer required and has been removed from installation steps in the OAM PISA.

Session summary

- OAM Usability and Reliability Enhancements (UaRE) for R13
  - Wildcard in F OAM,S,STORGRP command
  - Extend object expiration beyond 27 years
  - Dynamic update of SGMAXTAPERETRIEVETASKS and SGMAXTAPESTORETASKS settings
  - Improved media migration
  - Enhanced OAM messages for specific DB2 errors
  - SMF counter scalability
  - CTICBR00 PARMLIB member
  - CBR9875I Recycle candidates display enhancement
  - Misc internal RAS enhancements

Appendix - References

- *z/OS DFSMS Object Access Method (OAM) Planning, Installation, and Storage Administration Guide for Object Support,* SC35-0426
- *z/OS DFSMS Object Access Method (OAM) Application Programmer's Reference,* SC35-0425
- *z/OS DFSMSdfp Diagnosis Reference*, GY27-7618
- *z/OS System Messages Vol 4 (CBD-DMO),* SA22-7634
- *z/OS Migration Guide,* GA22-7499
- *z/OS DFSMS Using the New Functions,* SC26-7473
- *z/OS DFSMSdfp Storage Administration,* SC26-7402