

IBM Education Assistance for z/OS V2R2

Items: VSAM Performance Enhancements
Support DB2 2M Open Datasets
Chained I/O for Spanned Records
IDCAMS VERIFY RECOVER Enhancements
VSAM RAS

Element/Component: VSAM



Agenda

- Trademarks
- Presentation Objectives
- Overview, Usage & Invocation
- Installation
- Presentation Summary
- Appendix



Presentation Objectives

The objective is to familiarize the listener with the different changes that were made to enhance VSAM in z/OS V2R2. This is not a complete list of VSAM changes since the larger, multi-component items are discussed in their own presentations.

- VSAM Performance Enhancements
- Support for DB2 to open more than 2M Datasets
- Chained I/O for Spanned Records
- IDCAMS VERIFY RECOVER Enhancements
- VSAM RAS Enhancements
 - Message for all VSAM auto dumps
 - EOV recovery for non-SMS managed VSAM data sets
 - Dynamic buffer addition
 - LISTCAT statistics for Catalogs



Overview, Usage & Invocation

VSAM Performance Enhancement

- Problem Statement
 - DB2 can keep up to 200,000+ Linear data sets open at a time. This leads to large AMBL chains and much time used just searching the chain at close time to see if the close is the last close for the data set.
- Solution
 - A binary tree is built to keep track of the opens for each data set. This was done for linear data sets only.
- Benefit / Value
 - A faster search can be done to determine the last open. Performance is not enhanced for a small number of open data sets, but for a larger number testing showed up to a 40% decrease in the time it takes to close.
- Usage/Invocation
 - This enhanced feature is in the product and no action on the part of the user is necessary.



Overview, Usage & Invocation

Support for DB2 greater than 2M Open Data sets

- Problem Statement
 - DB2 can keep up to 200,000+ data sets open at a time. This leads to large amounts of virtual storage for VSAM control blocks and is a limiting factor in the total number of data sets that can be opened.
- Solution
 - The extent control blocks for Linear data sets are moved to above the bar storage if requested by the Media Manager caller.
- Benefit / Value
 - This frees up much virtual storage and allows the storage capacity to open more linear DB2 data sets at one time.
- Usage/Invocation
 - This enhanced feature can only be used by authorized Media Manager callers and will be utilized by a future release of DB2. Media Manager is not an externally documented interface.



Overview, Usage & Invocation

Chained I/O for Spanned Records

- Problem Statement
 - Segments of a spanned record are typically written one segment at a time. If the process is interrupted by an error for any reason, the record will be left in an inconsistent state.
- Solution
 - This new feature will chain the I/O for the multiple segments of a spanned record so that only one I/O is needed to write out the spanned record. This will be available for NSR buffering only (not LSR or GSR).
- Benefit / Value
 - Recovery is not needed because the segments stay in sync.
- Usage/Invocation
 - This enhanced feature is available by default, however enough NSR buffers to contain all the segments must be available to utilize the feature. If not enough are available, VSAM will get as many buffers as possible, but multiple I/O's will be necessary to write out the record.



Overview, Usage & Invocation

IDCAMS VERIFY RECOVER Enhancements

- Problem Statement
 - When EXAMINE shows breakage in a KSDS, the file must be recovered to correct the errors.
- Solution
 - This new feature will detect and correct the following errors found by EXAMINE.
 - IDC11718I DATA COMPONENT HIGH-USED RBA IS NOT EQUAL TO CA SIZE
 - IDC11728I DATA FOUND IN EMPTY CI (note: this error in no way affects the functioning or integrity of the data set, but some customers would prefer not to see it).
- Benefit / Value
 - Recovery is not needed because the errors are corrected.
- Usage/Invocation
 - This feature is invoked by running an EXAMINE and VERIFY RECOVER in the same step.



Overview, Usage & Invocation

IDCAMS VERIFY RECOVER Enhancements – cont.

New Messages:

- IDC11994I: This message is shown after IDC11996I or IDC11997I to recommend users to rerun IDCAMS EXAMINE to verify if the preceding error messages found by IDCAMS EXAMINE are now fixed.
- IDC11995I: At least one error in the data set has been found which can be addressed by issuing IDCAMS EXAMINE and IDCAMS VERIFY RECOVER in the same job step.
- IDC11997I: An attempt has been made to repair the preceding IDC117xxI errors.
- IDC11998I: IDCAMS VERIFY RECOVER does not attempt to repair the preceding messages(s) because of concurrent access on the data set.
- IDC11999I: IDCAMS VERIFY RECOVER attempted to repair the preceding IDC117xxI message but failed.



Overview, Usage & Invocation

IDCAMS VERIFY RECOVER Enhancements - cont.

Sample JCL:

```
//STEP10 EXEC PGM=IDCAMS
//SYSUDUMP DD SYSOUT=*
//SYSPRINT DD SYSOUT=*
//SYSABEND DD SYSOUT=*
//SYSIN DD *
        EXAMINE NAME(SYSplex.CARVSM28.KSDS01) DATATEST INDEXTEST
        VERIFY DATASET(SYSplex.CARVSM28.KSDS01) RECOVER
```



Overview, Usage & Invocation

IDCAMS VERIFY RECOVER Enhancements – cont.

Sample output:

```

EXAMINE NAME(SYSplex.VSMEVR03.KSDS01) DATATEST NOINDEXTEST          04870042
IDC01701I DATATEST BEGINS
IDC11728I DATA FOUND IN EMPTY CI
IDC01713I DATA CONTROL INTERVAL DISPLAY AT RBA 419 FOLLOWS
000000 C1C2C3C4 C5C6C7C8 C9D1F0F0 F0F0F2F5 F1F8D2D3 D4D5D6D7 D8D9E2E3 E4E5E6E7 *ABCDEFGHJIJ00002518KLMNOPQRSTUVWXYZ*
000020 E8E98182 83848586 87888991 92939495 96979899 A2A3A4A5 A6A7A8A9 C1C2C3C4 *YZ.....ABCD*
000040 C5C6C7C8 C9D1D2D3 D4D5D6D7 D8D9E2E3 E4E5E6E7 E8E98182 83848586 87888991 *EFGHIJKLMNOPQRSTUVWXYZ.....*
000060 92939495 96979899 A2A3A4A5 A6A7A8A9 C1C2C3C4 C5C6C7C8 C9D1D2D3 D4D5D6D7 *.....ABCDEFGHIJKLMN*
000080 D8D9E2E3 E4E5E6E7 E8E98182 83848586 87888991 92939495 96979899 A2A3A4A5 *QRSTUVWXYZ.....*
```

...lines removed to fit example on page...

```

000760 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
000780 00000000 00000000 00F70701 13F60701 1200AF5 070111F4 07011000 0AF30701 *.....7...6....5...4....3..*
0007A0 0FF20701 0E000BF1 F106020D F1F00602 03000A07 0004F807 0105000A F7070106 *.2....11...10.....8.....7...*
0007C0 F6070107 000AF507 0108F407 0109000A F307010A F207010B 000CF5F0 F105030C *6....5...4....3...2.....501...*
0007E0 06000200 0FF0F0F0 F0F2F4F8 000701F0 F0F0F0F2 F4F70007 000007F9 07F90000 *.....0000248...0000247....9.9..*
```

```

IDC01714I ERROR LOCATED AT OFFSET 00000018
IDC21702I MINOR ERRORS FOUND BY DATATEST
IDC01708I 749 CONTROL INTERVALS ENCOUNTERED
IDC01710I DATA COMPONENT CONTAINS 749 RECORDS
IDC01711I DATA COMPONENT CONTAINS 0 DELETED CONTROL INTERVALS
IDC01712I MAXIMUM LENGTH DATA RECORD CONTAINS 2000 BYTES
IDC01722I 99 PERCENT FREE SPACE
IDC11995I RECOMMENDATION: ISSUE IDCAMS EXAMINE AND VERIFY RECOVERY TO ATTEMPT TO REPAIR THE PRECEDING ERROR
IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 4
```

```

VERIFY DATASET(SYSplex.VSMEVR03.KSDS01) RECOVER
IDC11997I THE PRECEDING IDC11728I ERROR HAS BEEN ADDRESSED.
IDC11994I RECOMMENDATION: RERUN IDCAMS EXAMINE.
IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0
```



Overview, Usage & Invocation

VSAM RAS Enhancement – Feedback code message on all auto dumps

- Problem Statement
 - VSAM has auto dumping for specific VSAM error codes that should not occur. However, if for any reason a dump is not taken, the user does not know what the condition was for the dump.
- Solution
 - A new message will be written out for any auto dump to display the VSAM RPL feedback code that initiated the dump as well as the SDUMP return code that explains why the dump was not captured.
- Benefit / Value
 - Allows information about the error to be externalized even though the dump was not captured.
- Usage/Invocation
 - This enhanced feature is in the product and no action on the part of the user is necessary.



Overview, Usage & Invocation

VSAM RAS Enhancement – continued

Example:

- IDA9999I VSAM AUTO DUMP FAILED TO TAKE A DUMP FOR RPL FEEDBACK
CODE `rpl_feedback_code` DUE TO SDUMPX RSN/RC
`sdump_reason/return_codes` FOR JOB `jobname`



Overview, Usage & Invocation

VSAM RAS Enhancement – Improved recovery for EOVS with non-SMS managed data sets

- Problem Statement
 - An EOVS failure for non-SMS managed data sets does not clean up after itself.
- Solution
 - An EOVS failure will remove VTOC and VVR entries before returning.
- Benefit / Value
 - This will allow subsequent extents to not be impacted from “garbage” left over from the previous fail extent.
- Usage/Invocation
 - This enhanced feature is in the product and no action on the part of the user is necessary. Note: SMS managed data sets already had this recovery.



Overview, Usage & Invocation

VSAM RAS Enhancement – DBA – Dynamic Buffer Addition

- Problem Statement

- Currently if an LSR pool does not have enough buffers to satisfy the VSAM request, a logic error of “no buffers” is return. The user can redrive the request after other requests have finished, but this can be a problem in the case of alternate indexes because there may not enough buffers to back out the updates to the alternate index and leaves the index in an inconsistent state.

- Solution

- VSAM will attempt to dynamically add buffers. If successful, the request will continue, if not the request will still return with the “no buffers” error.

- Benefit / Value

- Helps prevent redrives and recovery (rebuilds) of alternate indexes.

- Usage/Invocation

- This enhanced feature is in the product and no action on the part of the user is necessary.



Overview, Usage & Invocation

VSAM RAS Enhancement – DBA Dynamic Buffer Addition – continued

Example:

IDA9990I VSAM DBA ADDED xxxx DATA|INDEX BUFFERS BUFFERS of yyyy BYTES EACH TO SHRPOOL zzz BECAUSE THE SHARED POOL WAS TOO SMALL FOR PROCESSING.

RECOMMENDATION: FOR PERFORMANCE, REBUILD THE SHARED POOL WITH AN INCREASE IN SIZE.



Overview, Usage & Invocation

VSAM RAS Enhancement – LISTCAT Statistics for Catalogs.

- Problem Statement

- Prior to this support, catalogs were not typically closed and so there was no way to accurately collect statistic on a catalog. Information like how many CA's were reused could only be viewed from the CATSTATX command which only collected information since the last IPL.

- Solution

- Prior to a CAS restart or when the F CATALOG,CLOSE command is issued, catalogs will now be closed and their statistics information updated in the VVR.

- Benefit / Value

- Statistics will be available from a LISTCAT just like it is for other KSDS VSAM data sets.

- Usage/Invocation

- This enhanced feature is in the product and no action on the part of the user is necessary.



Installation

- All enhancements come in the release and no set up or configuration of any kind is needed.
- These enhancements will not affect, in any way, the function of VSAM on a lower release system in the plex.



Presentation Summary

- These VSAM enhancements will improve the reliability, availability and performance of VSAM.



Appendix

Reference:

- SC23-6855-00 DFSMS Using Data Sets
- SC23-6863-00 DFSMSdfp Diagnosis
- SA38-0673-01 z/OS MVS System Messages, Vol 6 (GOS-IEA): This publication will be updated with the proposed new messages in section 3.9.
- SC23-6846-01 DFSMS Access Method Services Commands: This publication will be updated with the new functionality of EXAMINE/VERIFY RECOVER.

