

The Best Practices Newsletter focus is on an individual Innovation product. The goal of this and future Newsletters is to provide the latest information on a specific product.

## In this issue

# Focus on IAM...

**Providing you with up-to-date information to allow you to boost the performance of your VSAM applications, which will allow you to meet your service level agreements (SLA) and lower your mainframe cost and reduce your MSU usage.**

IAM provides enhanced performance for VSAM applications with no program or JCL changes necessary. Significant improvements have been made to IAM over the last few years, with more enhancements in progress. We hope that this document will inspire you to review your current VSAM usage and see if you can take advantage of these new features and the enhanced performance provided by IAM. Simply by running our analysis program IAMSMFVS, you can find out just how much VSAM processing is done, and identify VSAM files that can use IAM to achieve improved performance. For both new and existing customers, this newsletter will be a good resource to take advantage of the best practices that have been learned over the years.

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Focus on: FATSCOPY

Focus on: IAM

## Questions?

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**Take 30% to 80%  
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ANY VSAM FILE

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## What is IAM?

IAM is a high performance access method that provides compatibility for programs that use VSAM KSDS, ESDS, RRDS, and Alternate Indexes. IAM can be used by programs that utilize VSAM files, without changes to the program and to the JCL being used. The performance benefits include:

- CPU time reduction up to 65%
- Elapsed time reductions up to 80%
- EXCP reduction up to 95%

**Learn More**

## How IAM Works

IAM provides an interface that is identical to the VSAM interface, which enables IAM data sets to be used in place of VSAM data sets transparently, with no application program changes, and no JCL changes required. The most commonly used method to “IAM” a data set is to add the parameter OWNER(\$IAM) to the IDCAMS control statements when defining the file (see below); IAM will then handle the processing for that data set instead of VSAM. That is all that is needed for your VSAM applications to take advantage of the IAM performance and space saving benefits.

How to Convert a VSAM Data Set to IAM		
Example of IDCAMS DEFINE		
	DEFINE CLUSTER(NAME(my.vsam.ksds)	-
	VOLUME(*) CYL(10 1)	-
<b>ADD →</b>	<b>OWNER(\$IAM) )</b>	-
	DATA(NAME(my.vsam.ksds.data)	-
	RECORDSIZE(200 256) KEYS(16 0)	-
	CISIZE(4096) FREESPACE(10 10))	-
	INDEX(NAME(my.vsam.ksds.index)	-
	CISIZE(1024))	-

[Learn More](#)

## Recent Enhancements IAM Version 9.2 and Version 9.3

This includes the following enhancements:

- Enhanced Real Time Tuning Memory Management
- IAMCMON ...
- 64-bit Virtual Storage I/O Buffers
- IAMSMFVS Report Enhancements
- 64-Bit Virtual Storage Improvements ...
- Space reuse enhancement
- Automatic z/HPF I/O
- IAM/RLS Enhancements
- LOG REPLICATION Supporting IBM's GDPS Active-Active

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## Future Enhancements Data Set Level Encryption

Support for Data Set Level Encryption – IAM will be enhanced to provide support for data set level encryption. It is Innovation's intent that it will be fully compatible with the support and process for data set level encryption that IBM has announced for z/OS 2.3 and above. IAM is planning on implementing encryption support utilizing SMS Extended Format linear data sets with the Media Manager I/O driver to provide compatibility and uniformity with IBM's implementation of data set level encryption. Innovation expects this support to be available in 2018. As development progresses we'll be able to provide a more definite estimate for the availability of this new feature.

## How Much Benefit Does IAM Provide

As stated above, IAM provides within ranges savings in CPU time, savings in elapsed time and savings in physical I/O, which together can provide more processing capability on your existing processor. Click on the buttons below to find information on our recent benchmarks and some real user experiences.

[User Story 1](#)[User Story 2](#)[User Story 3](#)

## IAM Enhanced Dataset Reorganization

### Dynamic REORG of IAM Files

- Provides significantly increased data availability for IAM datasets by allowing them to be OPEN in CICS for update while performing the IAM reorg process.

### Reduce Unavailability to a Few Seconds

- Files are unavailable to CICS for usually only a few seconds once the reorg is complete. Any Updates, Inserts or Deletes that occur during this short outage will automatically be applied once the file is available.

### Concurrently REORG up to 16 IAM Files in a Single JOBSTEP

- The Dynamic Reorg Function has been enhanced with the ability to concurrently reorganize multiple IAM data sets under either the same or different CICS address spaces. Each REORG is performed under a separate subtask in the JOBSTEP.

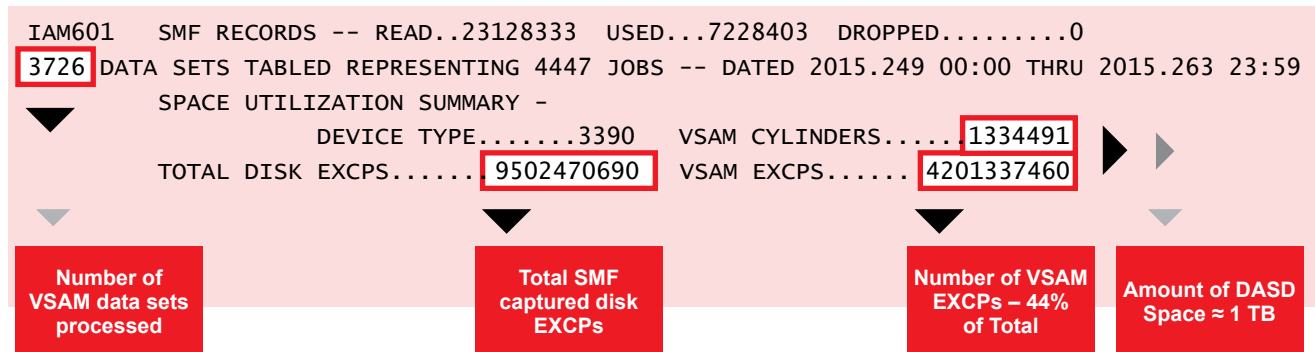
### REORGs are Automatically Bypassed if not Needed

- User modifiable controls have been added to bypass the reorg process if a selected file will not benefit from being reorganized.

[Learn More](#)

## Do I have enough VSAM Usage to Benefit From IAM?

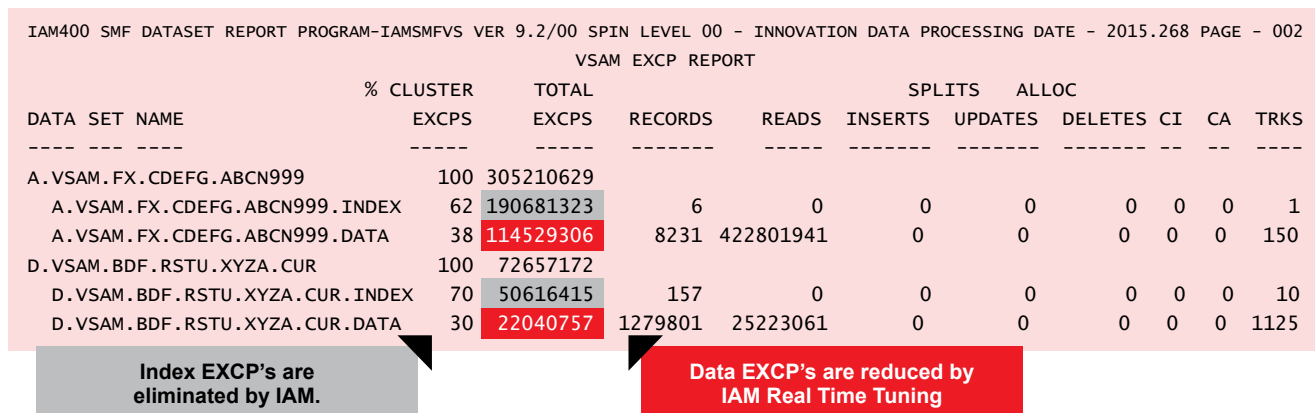
Innovation provides an SMF reporting tool that enables you to find out how much processing is being done on VSAM data sets, how many VSAM data sets you have, and how much VSAM data you have. On the first page of the report are key indicators that will help you determine whether or not IAM has the potential to provide benefits to your installation. This includes information on how much physical I/O is being done to VSAM data sets (EXCP Counts), how much DASD space is being used by those data sets, and how many VSAM data sets were being used during the time span that the SMF records were generated. Innovation recommends that at least one week of SMF data be processed by this analysis program. Many users discover that they have a lot more VSAM activity than they realized.



After reviewing that first page, if there is significant VSAM processing occurring, then you would proceed to the next step. In the above example report, we see that the total VSAM I/O for the reporting interval of 2 weeks was 44% of the total SMF captured disk I/O indicating that there is substantial I/O being performed to VSAM data sets. Based on the above report, there are opportunities for IAM to help improve performance to the extent that it will have a positive impact on the overall system performance.

## Finding the VSAM datasets that will benefit most with IAM.

For this step you can send your IAMSMFVS report and CSV file to Innovation for further free analysis. One of the IAM developers will review the IAMSMFVS reports, and provide to you a report with a list of the data sets that can take advantage of IAM and provide the significant performance benefits IAM offers. These benefits include reducing physical I/O activity, reducing CPU time, reducing elapsed time, and reducing the amount of DASD space being used by your VSAM data sets.



[Click Here](#) – To Request the IAMSMFVS Program

## General IAM Best Practices

While none of these practices are mandatory, they are highly recommended to enhance performance and avoid disruptions.

- Use of 64-bit virtual buffers under CICS typically provides more buffers for very active IAM data sets, taking advantage of the large amounts of memory now available. Users have reported excellent response time improvements by taking advantage of this capability.
- Use Dynamic Reorg to keep IAM data sets optimized for performance with minimal disruption. Rather than waiting to schedule several hours to reorganize, with Dynamic Reorg they can be reorganized while open under CICS with only a few seconds of down time to swap in the reorganized data set.
- Use the IAM Prime Related Overflow (PRO) feature on data sets that have or will have a million or more records in overflow. Using PRO for these files will reduce the size of the overflow index, offer better performance, and need less frequent reorganizations. Use the IAM CREATE override of PRO or PRO=YES to implement this on the files that are candidates for this overflow area format.
- Use IAMRLS (or IAMPLEX) for circumstances such as when CICS reads IAM data sets that are updated by batch jobs or when they are updated in CICS and used in batch. This will maintain the data integrity and always achieve the desired results of the data set sharing. IAMRLS also is an excellent alternative to using a CICS File Owning region for IAM data sets because it does provide better performance.
- Create and use the IAM SMF records. The IAMSMF program can produce the IAMINFO reports from the SMF data, and can also create a CSV (Comma Separated Values) file for easy analysis use with a spreadsheet. The IAMSMFVS program provides a way to get summary information of IAM data set use.
- Use of DSNTYPE=LARGE for IAM data sets provides better capabilities, performance and reliability than SMS Extended Format of basic sequential data sets.
- If most or all of the data sets used under CICS are IAM, then it is recommended that the CICS SIT option of CILOCK=YES be set. CILOCK=NO has overhead that is not necessary for IAM data sets. This is particularly beneficial when the data sets are used under IAM/RLS or IAM/PLEX.
- Consider using the IAM DEFERWRITE=YES for data sets that are heavily updated under CICS. Eligible data sets are those without critical data, or those that there is an alternate recovery for the records such as from a journal of the updated (after) images. This can have a significant benefit on transaction response times. Use of this process is described in Section 10.45 of the IAM Manual, along with the use of the IAM provided program that will periodically write out data buffers on files with the DEFERWRITE=YES enabled.
- Install and use the IAM ISPF panels. The IAM ISPF panels offer several different utility functions including defining, renaming, deleting, copying or moving IAM or VSAM data sets. Additional functions include building alternate indexes, displaying the IAM Global Options, and invoking the IAM data set diagnostic and recovery program. It also has the capability to monitor IAM data set activity under CICS or IAMRLS address spaces.
- The IAMCMON program that enables users to periodically take a snap shot of the storage being used by IAM in long running tasks such as CICS and IAMRLS. This monitor provides information on the use of storage within the region, data space storage, and 64-bit virtual storage.

*continued...*

## General IAM Best Practices *(continued)*

- Always delete / define multi-volume IAM data sets prior to reorgs, reload, or as target of data set copy functions. There can be problems when copying or restoring multi-volume IAM data sets using a previously allocated data set. Additionally sometimes the space usage on the multiple volumes may not make the best use of the available space, particularly after a reorganization type of process.
- Always do a LISTCAT ALL after defining an IAM data set for verification that it was defined as expected.
- Add the IAMINFO DD to batch jobs. This is less important if you are collecting the IAM SMF records, but even so it is sometimes handy to have the IAMINFO report statistics and data set information readily available if something happens with the job that may be causing problems.

## Best IAM Global Option Settings

Except as recommended here or elsewhere in the manual, such as Section 90.10, Innovation highly recommends that users keep the default values. If there is a desire to change beyond what is recommended, please contact technical support for advice. A couple of default values are in the list because we have seen users change them and encounter possible issues by so doing.

- Keep **DSORG=PS** set. Use of DSORG=DA has caused problems with various data set management utilities and is therefore not recommended. Support is provided by FDREPORT to find IAM datasets on your DASD volumes.
- Keep **BELOWPOOL=YES** set. It has been used for several years now without problems, and is essential, particularly for keeping below the line storage at a minimum under CICS.
- Keep the **ENHANCED** option enabled. IAM Enhanced format files offer significant advantages over the original COMPATIBLE format files, including ability to take extents and increase the size of the overflow area as the file grows, buffering enhancements including significantly more buffers, use of data space or 64-bit virtual for index to name a few.
- Do *not* reduce the default values for **BUFSP** or **CICSBUFSP** except on recommendation of or consultation with technical support. In fact with the changes to real time tuning to not use up all of the available storage, one may be able to increase the **CICSBUFSP** value. One of our users recently did that in small increments over time and had excellent results. You may also want to consider using 64-bit virtual storage for the buffers particularly for CICS and IAMRLS. An increase in the MEMLIMIT value will be necessary if that is done of at least 2 gigabytes.
- Set **SMF=YES** and **RECTYPE=nnn** (such as 201) or another number if that one is in use, is highly recommended. This enables collection of the IAM SMF records so that IAMINFO reports can be produced from the SMF data if needed without having to include an IAMINFO DD card in your JCL.
- If using ESDS files with IAM Data Compression that will be updated, Innovation recommends providing some free space in case an updated compressed record increases in size. This is done by setting the IAM Global Option **ESDSINT=n**. Suggested values are 1 thru 5.
- Setting either **ENABLE=XESDS** or **ENABLE=PSEUDO** is recommended if you are using ESDS files to avoid the 4 gigabyte limit on the amount of data in an ESDS caused by using the standard 4-byte RBA value.

*continued...*

## Best IAM Global Option Settings *(continued)*

- Set **ENABLE=EAV** if you have EAV (Extended Attribute Volumes – the super large volumes). This will cause them to be automatically eligible for EAV use without having to code EATTR(OPT) on the DEFINE CLUSTER.
- If you prefer to use the IBM Hardware Compression instruction over the IAM software compression, then change set the **COMPRESSTYPE=HW** as your default.
- To maximize CPU time savings, you can turn off automatic IAM data compression by setting the **DATACOMPRESS=99999999** (eight 9's).
- Keep **INDEXSPACE=64BIT** helps prevent all address spaces from running out of storage due to the size of the indexes for the IAM files being processed.
- To use 64-bit buffering as the default, set **ENABLE=BUF64** and **CRBUFOPT=64BIT**. At this time (as of z/OS 2.2) there is some increase in CPU time caused by the page fix process of 64-bit virtual storage. If your use of IAM is primarily for reducing CPU time then we do not recommend setting those values. You may want to use the 64-bit buffering for address spaces such as CICS FOR's or IAM/RLS or IAM/PLEX which can be done via the IAM Overrides.
- Keep **DATASPACE=2048** set to avoid problems that some users have encountered with smaller values on running out of space when trying to load very large datasets.
- Using **RLS=(OPTIONAL, TABLE)** is recommended instead of (REQUIRED, TABLE). which will require that the IAM/RLS or IAM/PLEX dataset name tables be loaded by starting either an IAMRLS or IAMPLEX address space before any IAM file can be opened, even if they do not require IAMRLS or IAMPLEX.

## Sample Vendor Products

Many z/OS application vendors make extensive use of VSAM; see the most commonly used applications that have been successfully converted from VSAM to IAM.

[Learn More](#)

## IAM Resources

- Download the [IAM User Manual](#)
- Download the [IAM White Paper](#)
- Download the [SHARE Presentation](#)
- View the [IAM product page](#) on the web
- View the [Latest Product Release](#) for the most current product versions.

Users are constantly looking for ways to make their VSAM Applications run faster and take less I/O and CPU time.

**IAM not only does this, but it also adjusts its buffering algorithm based on what it sees the application program doing in Real Time.**



**Even compared to enhancements like VSAM SMB, VSAM LSR, hardware compression and extended format files, the IAM structure provides better performance and takes less CPU time and EXCPs than VSAM.**

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