

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 NOV '15

Take 30% to 80% Off Your VSAM Processing Time!



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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)		-
ADD → OWNER(\$IAM))		-
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](#)

New Release Level IAM Version 9.2 Spin Level 5 (Available Jan. 2016)

This includes the following enhancements:

- Enhanced Real Time Tuning Memory Management
- Space reuse enhancement
- IAMCMON ...

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Recent Enhancements IAM Version 9.2

- Automatic z/HPF I/O
- IAM/RLS Enhancements
- 64-bit Virtual Storage I/O Buffers
- IAMSMFVS Report Enhancements

[Learn More](#)

Enhancements Planned For 3Q 2016 IAM Version 9.3 Now Available!

- LOG REPLICATION Supporting IBM's GDPS Active-Active
- 64-Bit Virtual Storage Improvements ...

[Learn More](#)

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](#)

Do I have enough VSAM Usage to Benefit From IAM?

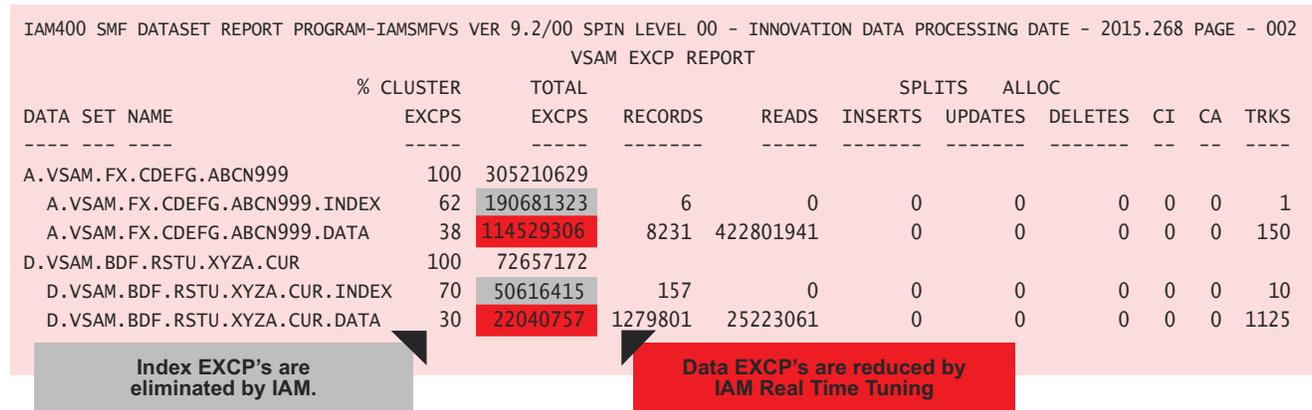
Innovation provides an SMF reporting tool that enables you to find out how much processing is being done on VSAM data sets, how many VSAM data sets you have, and how much VSAM data you have. On the first page of the report are key indicators that will help you determine whether or not IAM has the potential 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 obtain the most benefit from IAM and have information available to see the IAM results.

- Activate collection of the IAM SMF records. Collecting the IAM SMF records enables IAMINFO reports to be generated from the SMF data using the program IAMSMF. These can be very useful in understanding how the application is using the IAM file and to understand the performance with IAM. It will also provide a way to get summary information of IAM utilization through the IAMSMFVS program, and allow user programs access to IAM statistical information.
- Use the IAMSMF program to create a CSV (Comma Separated Values) file that you can use as input data for a spreadsheet. Each row will have the complete data from the IAMINFO report. From that point it is easy to quickly analyze how your IAM files are being processed. For example you can find all of the files that received the IAM368 messages indicating that more buffers would provide better performance. Or you could find all of the files that need reorganization by looking for files that received an IAM373 message. You can look at the IAM File Format column to find IAM files that are using the old compatible file format which will benefit by converting them to the IAM Enhanced file format. You can even send the CSV file or the reports to Innovation and request their analysis for tuning recommendations.
- Many users have found significant performance advantages under CICS by using the IAM Dynamic Data Space function. This function keeps most frequently requested records in data space storage as a cache that can be used to quickly retrieve the record without any I/O. The best candidates for this function can be found from the spreadsheet created with the CSV file from IAMSMF. Sort the data by the GET_RAND column in descending order. The files that end up at the top that have a lot of GET_RAND requests (random reads) with very low PUT_UPDATE and ERASE requests are ideal candidates to use for the IAM Dynamic Data Space function. This is easy to implement with an IAM ACCESS Override of DYNDNS=nnnn specifying the amount of megabytes up to 2048 to use for the cache.
- Use DSNTYPE=LARGE for IAM data sets. While IAM does support the use of non-striped SMS Extended Format sequential data sets for IAM files, they may not perform as well and may require more DASD space. Extended format adds a 32-byte suffix to each data block that causes IAM data blocks to be 32 bytes smaller, and for certain functions IAM needs to use BSAM rather than EXCP due to SMS restrictions.
- Always delete / define multi-volume IAM data sets prior to reorgs, reloads, or as the 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.
- For IAM files that have (or will have) a million or more records in the overflow area, define those files with the Prime Related Overflow (PRO). Using PRO for these files will reduce the size of the overflow index as it is indexed by block instead of by record. An additional benefit of PRO for such files is that they will perform better overall with this high amount of overflow usage, 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.

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General IAM Best Practices *(continued)*

- Many of our users have data sets that are being updated or added to by CICS, and then read by batch jobs while CICS still has the file open, or the opposite that are updated by batch jobs and read under CICS. Depending on the timing, sometimes these processes don't always work as expected. That circumstance and other similar situations can be easily resolved by using the IAMRLS feature that enables files to be shared between address spaces, such as batch jobs and CICS, with full data integrity. IAMRLS also helps to keep data sets available online for longer periods of time, even 24x7. In fact some users have found that they can use IAMRLS in place of a CICS File Owning Region for their IAM data sets. Users that want to do the same level of sharing across LPARs can utilize the optional IAMPLEX feature of IAM.
- Always do a LISTCAT ALL after defining an IAM file. Having LISTCAT data for newly defined and newly loaded IAM files is beneficial, particularly if some problem subsequently occurs with the data set. It can often be helpful to have it available.
- Install the IAM ISPF panels. The IAM ISPF panels offer several different utility functions including defining, renaming, deleting, copying and moving IAM or VSAM data sets. Other functions include building alternate indexes, displaying the IAM Global Options, and invoking the IAM data set diagnostic and recovery program. They also have the capability to monitor IAM files under CICS or IAMRLS.
- New in IAM 9.2 Spin 05 is 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.
- Under CICS, if all of your high activity data sets are IAM, then it is highly recommended that the CICS SIT option of CILOCK=YES be set. IAM does not do CI level locking, so setting that parameter eliminates the overhead caused by CILOCK=NO, which seeks to prevent CI locking problems that occur with VSAM.
- 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.

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Best IAM Global Option Settings *(continued)*

- 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 avoid excess storage use, 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 of at least 2 gigabytes will be necessary if that is done.
- Setting **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.
- Set **ENABLE=LARGE** to cause IAM files to default to Large Sequential Format. Large Format data sets are identical to basic format but can exceed the 64K track per volume limitation. Another reason is to help avoid the use of SMS Extended Format data sets, which while supported are not recommended.
- If using IAM Data Compression with ESDS files 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.
- 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 set **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** in order to help 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 2015](#)
- 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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