

It's about Time...

Convert your VSAM files to IAM and you will see significant reduction in batch run time and online response time.



ENHANCEMENTS TO BASE IAM & IAM/AIX

IAM Version 9.2 GA first Quarter 2015

Now Available!

IAM Version 9.2 is a reliable disk file manager, designed as a transparent high performance alternative to VSAM for application programs that execute under IBM's z/OS operating system. IAM base product and IAM/AIX, IAM/RLS as well as IAM/PLEX enhancements are included in IAM Version 9.2.

Automatic z/HPF I/O

IAM Version 9.2 will utilize z/HPF I/O architecture I/O instructions on IAM Enhanced format files with benefits of increased channel capacity and reduction in connect & elapsed time.

[Read MORE](#)

64-Bit Virtual Storage I/O Buffers

Version 9.2 can optionally use 64-bit virtual storage for I/O buffers, without any need to change application programs, which will enable you to have more files open concurrently.

[Read MORE](#)

IAM/RLS and IAM/PLEX

IAM Version 9.2 has an additional exit for CICS that along with other internal coding changes will enable IAM/RLS and IAM/PLEX to handle most of the VSAM RLS only file control options/operands.

[Read MORE](#)

IAMSMFVS Report Enhancements

IAMSMFVS has been enhanced to use 64-bit numbers for various statistics, enabling better reporting for datasets and facilitating easy analysis with spreadsheets.

[Read MORE](#)

Read the full summary of modifications in IAM Version 9.2.

[Click HERE](#)

PERFORMANCE BENCHMARKS

IAM Version 9.2 Performance Testing

In recently conducted benchmark performance testing, IAM Version 9.2 continues to demonstrate significant performance benefits over VSAM, even when the VSAM files were SMS Extended Format using System Managed Buffering (SMB).

- 36% to 64% CPU Time savings
- 48% to 75% Clock Time savings
- 69% to 94% EXCP's savings

The benchmark consisted of five jobs running consecutively, each with 15 steps performing a variety of VSAM I/O processing—sequential, random, updates (inserts, updates, deletes), file reorganizations—on various record lengths. Actual results will vary based on the amount of VSAM activity for the application and the level of VSAM tuning that has been done. The intent of this benchmark data is to provide some expectation of the overall performance of IAM across a range of different datasets and processing.

PERFORMANCE BENCHMARKS

The real VSAM files used the System Managed Buffering, while IAM used its own Real Time Tuning to obtain the excellent performance. For the “tuned” VSAM runs, two of the steps were modified with the VSAM AMP parameter to achieve better results. The tests were run on a Z114-2818M05 system, in an LPAR with 2 gigabytes of real storage running zOS 2.1. The z/HPF function was active and the DASD devices were on an IBM DS8700-941 that supported z/HPF.

Results shown below are in chart format.

[View in TABLE Format](#)

IAM vs VSAM comparisons

Chart 1: CPU Time (seconds) 36% to 64% Savings.

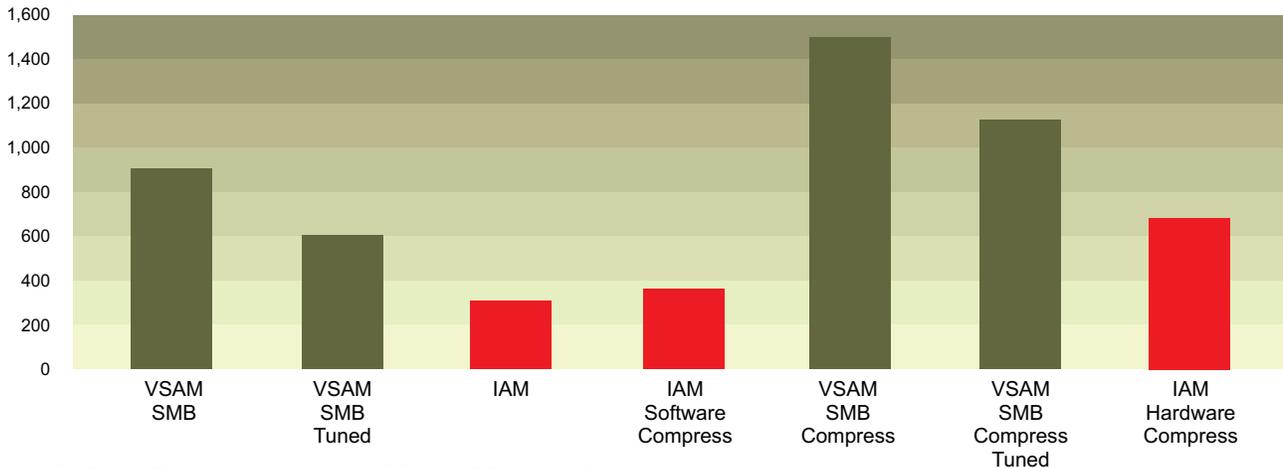


Chart 2: Run Time (minutes) 48% to 75% Savings.

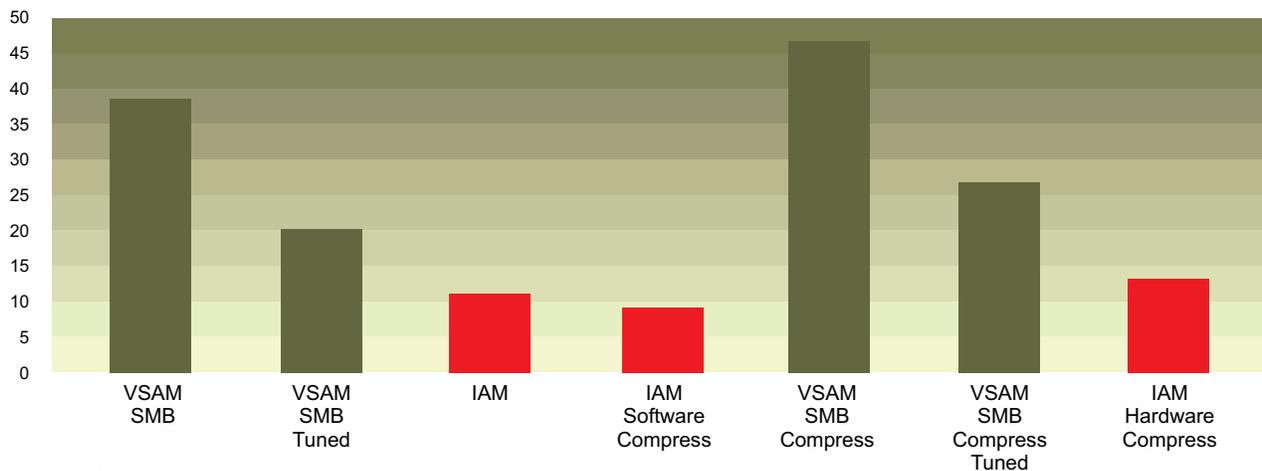
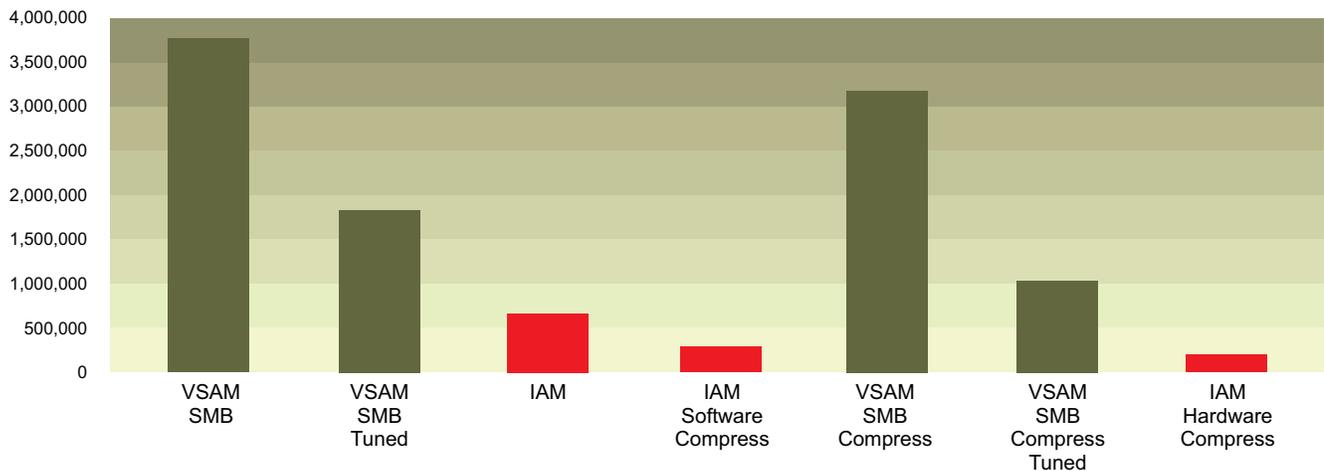


Chart 3: EXCP's (disk) 69% to 94% Savings.



Q *What versions of IAM are required to support CICS TS Version 5.1 and Version 5.2?*

A Support for CICS TS V5.1 requires IAM 9.1.

Support for CICS TS V5.2 requires IAM 9.1/01 Spin Level 08 (Released August 22, 2014) or apply ZAP P91.0087 to IAM Version 9.1.

Q *Does the VSAM CA Reclaim function apply to IAM?*

A IAM always has done space reclaim in the extended overflow area of the file at the record level and with IAM PRO (Prime Related Overflow) at the block level. This function requires no additional I/O and no need for any specification, it is an automatic function of the IAM access method. As IAM does not use the Control Area concept that VSAM has, the CA RECLAIM function is not applicable.

Users can specify the RECLAIMCA / NORECLAIMCA parameters or have it specified in the Data Class for IAM files, however the setting is ignored for IAM files as IAM already has a normal space reclaim function inherent in the IAM software.

Q *Does IAM support EAV volumes?*

A Yes, IAM Version 9.0 and above supports IAM files on Extended Addressable Volumes (EAV). For z/OS 1.12 and above the IAM datasets on EAV volumes can be Large Format Sequential or Basic Sequential format. EAV eligibility is set by defining the file with a DFSMS Data Class that specifies the EATTR(OPT) attribute, or is defined with the IDCAMS DEFINE parameter EATTR(OPT). IAM files on EAV's cannot be accessed with prior versions of IAM. IAM Version 9.0 and above supports up to 1 TB EAV Volumes.

Q *What datasets are candidates for IAMRLS or IAM/PLEX processing?*

A Any IAM dataset that will be shared for update between multiple address spaces, which can include CICS, batch jobs, TSO, and other long running address spaces are candidates. Also, IAMRLS or IAM/PLEX should be used whenever a read only process is using a dataset that is being updated by another address space in order to guarantee data integrity.

Q *Do I need to use IAM/PLEX or IAMRLS?*

A If datasets are being concurrently shared by multiple LPAR's or systems then IAM/PLEX is required. If shared datasets are being updated within a single LPAR, then IAMRLS is all that is needed. IAMRLS is a part of the base IAM product. IAM/PLEX is a cost option to IAM.

Q *How does IAMRLS or IAM/PLEX know which datasets it should process?*

A The most common method is through the use of a table that specifies the dataset name(s) and the IAMRLS or IAM/PLEX identifier (RLSID) that will manage the dataset. An alternative method is to assign an RLSID identifier when the dataset is defined.

Q *Is IAMRLS or IAM/PLEX journaling of record changes necessary?*

A That depends on your requirements. If you are going to be using the Record Lock Recovery function to restore record locks held at the time of a planned or unplanned outage then a minimum of before-image journal records are required. If you plan to use IAMRLS or IAM/PLEX recovery functions, either to backout after a failed job, or to perform forward recoveries if somehow a dataset is damaged due to hardware or software malfunctions, then journaling is necessary. Some users also utilize the journal records for auditing or tracking purposes to monitor changes that were made to selected datasets.

The IAM Enhanced File Structure.

The IAM Enhanced File Structure has been available since 1996. Yet we have some customers that are still using Compatible files.

The advantages of the Enhanced File Structure over the Compatible File structure include:

- Ability to take secondary extents after the file is loaded. The size and management of the overflow and prime extension areas are dynamically managed by IAM.
- Variable Overflow that manages space within overflow blocks as containing true variable length records. This is unlike the Compatible file format which only stores in each overflow block the number of maximum length records that will fit.
- Significantly larger number of buffers per file can be allocated, offering greater I/O savings.
- Sysplex Record Level Sharing Support
- Single System Record Level Sharing Support
- Support of IBM hardware compression instruction
- Support of large devices (greater than 64K tracks per volume), which includes allowing up to 123 extents per volume
- Support for EAV volumes (greater than 64k cylinders per volume)
- Support for Parallel Access Volumes (PAV)

You can use either IAMINFO or the IAMSMFVS program to identify IAM files that are still using the Compatible format.

To change from using Compatible format IAM files to Enhanced format IAM files you can change the Global Options table for IAM by using the ZAP ENABLE=ENHANCED keyword in IAMZAPOP which will cause all files defined to IAM after the change to become Enhanced format files. Or you can use an IAM override when the file is defined with the CREATE DSN=xxx.yyy.zzz,ENHANCED

The IAMSMFVS program and how it can help you identify VSAM files that can be converted to IAM.

Mainframe budgets are under pressure, yet performance and response time is critical to meet service commitments. Despite the universal acceptance of DB2, a significant amount of data in your files exist within VSAM-based legacy applications. In most cases your business application makes extensive use of VSAM files. The historical solutions of upgrading to a faster CPU or the newer DASD are prohibitively expensive and in most cases only a temporary solution.

Innovation provides a program called IAMSMFVS that is a special purpose SMF data analysis program which can be used to identify VSAM clusters that are good candidates for conversion to IAM. If you run the IAMSMFVS program against a weeks worth of SMF data and send us the data, Innovation will provide you a detailed report of the VSAM clusters that would be good candidates to convert to IAM. These will show a significant improvement in elapsed time and system resources, ie. CPU time and DISK EXCPs.

Request a sample report.

[Click HERE](#)

RECOMMENDATIONS

Prime Related Overflow (PRO)

An ideal format for VSAM or IAM files that have a lot of records being inserted is the IAM Prime Related Overflow structure. Available with IAM Version 9.0 and above, PRO is an alternative structure for the Extended Overflow area in an IAM Enhanced Format file. PRO is designed for datasets that have a very high volume of insert activity generally approaching a million or more records between file REORGs.

The advantages of the PRO format for such files include:

- Reduced frequency of file reorganizations
- Reduced I/O and time to open files with large volumes of inserted records
- Potential for better sequential read performance
- Reduced virtual storage requirements for the index

Q *How does IAM PRO format achieve these benefits?*

A The PRO format achieves these benefits by having only those records that are related to a particular prime block within the extended overflow area block(s) required to hold them. With this structure, IAM requires only one key per block to index the data, rather than one key per record in extended overflow area.

Q *If a PRO block becomes empty due to record deletion, is the block available to be reused?*

A Yes, the block is immediately reusable.

Q *How is use of the PRO format requested?*

A It is requested via an IAM CREATE override keyword of PRO, for example when defining the IAM file add the following to the JCL:

```
//IAMOVRID DD *  
CREATE DSN=datasetname,PRO=YES  
/*
```

Q *Can PRO format be used on all IAM files?*

A It is recommended that PRO only be used on files that are going to have close to or exceed one million overflow records. Using PRO on files with lesser amounts of overflow records can result in increased physical I/O activity compared to using the basic IAM Extended Format overflow structure. The standard Extended Format overflow structure provides excellent performance for most IAM files, except those with high volumes of overflow records.

Q *Are there any restrictions on the use of PRO?*

A PRO format cannot be used for datasets defined as having SPANNED records.

Q *What criteria can be used to determine when files needs to be reorganized?*

A Recommend that PRO files be reorganized when the storage required for the index exceeds an installation determined amount of storage, such as 64 megabytes. The installation determined amount is set by the new Global option IAMW22LIM. This is calculated by multiplying the number of extended overflow blocks by key length plus 4.

Real Time Tuning

Real Time Tuning is a concept that IAM uses to dynamically manage the buffering for IAM files in response to the processing requirements as they occur. This capability allows IAM to adjust the number of buffers being used for any particular file, along with dynamically selecting appropriate buffer management and I/O techniques. This buffering technique has proven itself to provide extraordinary improvements in elapsed time to process batch jobs, as well as reductions in online transaction response times. Even with a lot of manual tuning for VSAM, it is difficult or impossible to reach the reduction in I/O and CPU time that IAM achieves with little if any manual effort. The only tuning that may be needed for IAM is to increase the maximum buffers for a few files. IAM will even tell you the files that could use more buffers on the IAMINFO report with the IAM368 message.

Run the IAMSMFVS report and send us the results to assist in determining what additional VSAM files can be converted to IAM.

IAM/AIX

IAM/AIX enables VSAM clusters with alternate indexes to take advantage of the IAM performance benefits. The benefits include CPU time reductions, physical I/O reductions, and elapsed time reductions. Real Time tuning really works well with alternate index processing. With VSAM, the same type of buffering needs to be used for both the base cluster and the alternate index. So for example if NSR might be best for the alternate index and LSR for the base cluster, the user needs to choose which way to go. This is not an issue with IAM, which will use whatever works best for the base and independently for the alternate index. The buffering technique can be different for each component.

IAM/RLS

The most common problem that technical support deals with is a record not found after it was updated or inserted by another address space. Many times it is where a record was added or updated by a batch job, and the record couldn't be subsequently accessed by a CICS region or some similar scenario. The primary cause is generally an indexing issue, or sometimes it could be a buffering issue.

The resolution to this type of problem is IAM/RLS. IAM/RLS is much easier to use and implement than VSAM/RLS, and doesn't have all of the restrictions. There are no changes required to CICS application programs, and generally no changes required for batch applications. For batch programs that update a substantial number of records depending on the recovery needs there may be some need for implementing a syncpoint call and possibly special restart processing, or scheduling those jobs when no concurrent updating is occurring.

IAM/RLS is included in the base IAM product. It has been in use for over 10 years by many IAM users for many different types of applications. The IAM/RLS function facilitates concurrent sharing for update of IAM files on a single system image. IAM/RLS is used for data integrity with concurrent shared updating, as an alternative to a CICS file owning region for IAM files, to help achieve near 24x7 availability and for auditing data on key files that use IAM/RLS journals to track what is being changed. Some IAM/RLS users have it running with hundreds of files for several months without having any outages.

IAM/PLEX

When there is a need to expand the concurrent sharing beyond a single system, then the IAM/PLEX product is a solution. IAM/PLEX is a cost option to IAM that expands the IAM/RLS single system capabilities to a SYSPLEX environment with multiple LPARs and systems. IAM/PLEX is designed and intended to provide concurrent IAM dataset updating across multiple systems in a SYSPLEX. For example, one LPAR could be running CICS applications, and while another LPAR could have CICS region or batch applications using and updating the same files. IAM/PLEX is ideal for use when the processing of a set of files needs to be expanded to multiple systems. Any IAM dataset and programs that are being used with IAM/RLS can use IAM/PLEX.

The IAM/PLEX implementation of dataset sharing is different than VSAM/RLS. IAM/PLEX uses a client-server concept, where one IAM/PLEX address space is acting as a file server for the specified datasets across the SYSPLEX. IAM/PLEX uses the SYSPLEX XCF communications function to send I/O requests and responses to the appropriate IAM/PLEX file server address space.

RECOMMENDATIONS

Considerations for Defining an IAM Dataset

IAM datasets are stored as z/OS non-VSAM type of datasets. They are stored in a DSORG=PS type of file, and can be basic dataset, a Large Format Sequential dataset, or an SMS Extended Format dataset. The latter two types are necessary if the file will need to use more than 64K (65,535) tracks on any single volume. ***Except when absolutely necessary, Innovation does not recommend the use of SMS Extended Format datasets because they have a 32-byte suffix on each block which reduces the maximum amount of data stored per track, and requires that IAM use BSAM rather than EXCP for certain processes which can result in less efficient I/O. To avoid the use of SMS Extended Format datasets, Innovation recommends setting the IAM Global Option ENABLE=LARGE, which will cause IAM to define all IAM datasets as DSNTYPE=LARGE. Use of the IAM CREATE override keyword DSNTYPE will override the default when specified.***

To make use of EAVs, IAM datasets must either specify the EATTR(OPT) parameter on the DEFINE CLUSTER, or be assigned to a Data Class with the EATTR(OPT) parameter specified.

NOTE: If your IAM datasets are DSORG=DA, we recommend that you convert them to either DSORG=PS or to a Large Format Sequential dataset.

PRODUCT ENHANCEMENT FUTURES

Reward for Your Feedback

The IAM Development Team need your feedback on what features you need or changes that you would like to see implemented for future IAM releases to make it more valuable in your data center.

All IAM users who submit product enhancement requests will be eligible to win an iPad in a random drawing in January 2015. One winner will be chosen per major geographical region.

[Click HERE](#)

Beta Test/Early Support Sites

If you are interested in being a beta test site or early support site for IAM version 9.2.

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IAM RESOURCES

Request a No-Obligation Trial.

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Request the IAM White Paper or Concepts and Facilities Guide.

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IAM BENCHMARK: From 1972 to today...organizations are still seeing the performance of IAM compared to VSAM.

[Read MORE](#)



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