

# INNOVATION

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Focus On: IAM (INNOVATION ACCESS METHOD), New Features, Questions & Answers, Hints & Recommendations

## IAM...THREE DECADES OF INNOVATION



IAM, one of Innovation's original products, still offers outstanding performance and reliability for VSAM-based applications. Despite all the hardware and software changes that have occurred in the last 33 years, IAM continues to outperform VSAM.

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.

IAM has evolved over the last 33 years, but as we speak to existing IAM customers we sometimes find that they are not utilizing some of the newer features or they have limited the use of IAM to just a few key files. Some of the newer IAM features that you should be considering are:

- ① IAM extended format files.
- ② Hardware compression.
- ③ IAM single system record level sharing (RLS) support.
- ④ IAM journal records.
- ⑤ Support for VSAM files with alternate indexes and RRDS support (part of IAM/AIX, cost option to IAM).

**All of these features are discussed in this newsletter.**

Many customers have benefited greatly by using IAM on just a few key files in their installation only to find further savings later when we demonstrated how many more files they had that could be converted to IAM. In this newsletter we explain the IAMSMFVS report and how it is used to identify the VSAM files that will most benefit by conversion to IAM. The IAMSMFVS program is a standard feature in IAM, and even if you are not an IAM customer it can be sent to you as a zip file.

## IAM VERSION 8.1 ENHANCEMENTS, AVAILABLE 3Q2005

### Enhanced Hardware Compression Support:

In V8.1, IAM will have the ability to generate a tailored dictionary for hardware compression as an IAM file is being loaded. This feature will make it much easier to utilize the z/Series Hardware Compression feature on IAM data sets. IAM will scan the first few megabytes of data written and use that data to build a hardware compression dictionary, which will be stored within the IAM dataset itself. The amount of compression achieved will vary on a file by file basis, as it is very data dependent. Previously, if the customer wanted a tailored dictionary to optimize compression of a given file, it was necessary to run a REXX EXEC, supplied by IBM, before the file was loaded. The intent of the enhanced support is to provide a decent amount of compression without the time-consuming effort of pre-building the dictionary with the EXEC. The option still exists to use a pre-built dictionary, which will likely achieve better compression ratios, if the customer chooses to incur the cost of building it.

The IAM software compression is still available, and as shipped will be the default compression technique. The software compression may even provide better compression for some data sets than the hardware compression technique. Through the IAM Global Options, customers can set hardware compression as their default compression technique if so desired.

*continued...*

### VISIT US AT:

*EMC Technology Summit: May 16 - May 18, New Orleans*

*IBM Conference: July 25 - July 27, New Orleans*

*SHARE Technology Exchange: Aug. 22 - Aug. 24, Boston*

*Storage Decisions: Sept. 28 - Sept. 30, New York City*



### REQUEST SHARE PRESENTATION:

Use the attached reply card or E-mail [sales@fdrinnovation.com](mailto:sales@fdrinnovation.com) for a copy of this 48 page technical presentation on how IAM can improve your VSAM performance.

# NEW VERSION ENHANCEMENTS

## WHEN THE LIGHTS GO OUT IAM OPENS ITS EYES...REDUCING NIGHT PROCESSING BY 50 - 80%



*IAM Version 8.1 Enhancements Available 3Q2005  
(continued)*

**Dynamic Data Space** is an enhancement to the IAM Dynamic Tabling (DYNCORE) function. The Dynamic Tabling feature of IAM offers a record caching feature in virtual storage for randomly accessed records that can significantly reduce physical I/O for some applications. Several customers have found this IAM feature to be very beneficial for their CICS regions. With Dynamic Data Space, the virtual storage for the records will come from a data space, so that customers with large CICS regions already using a lot of virtual storage can take advantage of this function. IAM has enhanced the storage management, record management, and search algorithms to further enhance this feature. Records are now aged out by a

true least recently used algorithm, large records are stored in segments to reduce the virtual storage requirements, and a new record search algorithm has been implemented. These enhancements will make it possible to efficiently handle a much larger volume of records in the Dynamic Data Space than was possible with DYNCORE, increasing the number of applications and data sets that can reduce I/O and improve response times by using this function.

**Prime Related Overflow (PRO)** is a new alternative overflow structure for IAM files that is being introduced with IAM V8.1. This new structure is designed with a view towards reducing overhead required for handling the overflow structure when IAM is enhanced in the future to provide Sysplex Record Level Sharing. When a record is placed in an overflow block, when using the PRO structure, it will be placed in an overflow block that already has records associated with the related prime block, as determined by the index. If there are no overflow blocks associated with the target prime block for the new record, then a new overflow block will be assigned. This differs from the existing overflow processing technique, which is still available, where records are placed in any overflow block, regardless of the other records already in the block.

The primary benefit of PRO is a significant reduction in the number of overflow index entries, which will be one per block rather than one per record. This will yield a reduction in storage requirements for the overflow index, and when Sysplex Record Level Sharing is offered, a significant reduction in the number of overflow index updates that have to be handled. Additionally batch applications performing mass inserts will likely see a reduction in I/O and CPU times. Files using the PRO overflow structure will also in many cases require less frequent reorganizations. The costs of using PRO are a likely increase in the amount of DASD space used for the overflow area and potentially an increase in I/O depending on the type of processing performed against the dataset.

**SuperC:** IAM V8.1 will also support the SuperC functions under ISPF option 3. These are primarily the file comparison and searching functions provided under ISPF.

**Large Format Dataset Support:** IAM V8.1 provides support for the new z/OS 1.7 Large Format Sequential Datasets. This support offers an alternative to using DFSMS Extended Format datasets for full utilization of large DASD devices (> 64K tracks per volume) by IAM. Additionally, the Large Format Datasets do not have to be on SMS managed volumes and eliminates the 32-byte suffix to each block.

# IAM USER EXPERIENCES


Below are recent comments on how IAM significantly improved performance of both batch and online transactions. In most cases these users took a considerable amount of time to tune VSAM before they looked at IAM. IAM required only a simple change to their JCL and they achieved substantial performance improvements!

- By converting 5 core jobs within the Vision Plus application, we saw a **30%** improvement in both CPU and elapsed time.
- We converted the VSAM files in our critical overnight batch run and the result was an elapsed time decrease of **75%**, EXCPs reduced by **43%** and CPU savings of **19%**.
- The IDCAMS REPRO function is used extensively within the bank. Converting these files to IAM resulted in a large reduction in CPU usage and EXCP counts. We used IAM software compression and the backup files were compressed.
- IAM reduced the monthly American Software Materials Management system run time to 40 minutes from over 8 hours just by making the Forecast Master file an IAM file!

IAM 8.0 introduced the first phase of IAM Record Level Sharing (RLS) support, which features single system record level sharing capabilities. Below are comments from users on the benefits they have seen when using the IAMRLS support.

- IAMRLS allows us to share files between CICS and Batch Jobs as well as Read Only IDMS transactions. We process over 300,000 transactions per day in our CICS Parts application which spans 20 3390-3 volumes.
- IAMRLS Dynamic Job Backout saves hours in Application Restart Time. Updates are backed out to the last checkpoint and Batch Jobs can just be restarted without research or data base restoration once the error has been corrected.
- Prior to IAMRLS quite a number of requests received from the business unit would need to wait until the online system shut down to be able to be processed. For example, a request to retrieve archived member information to allow claims to be paid would be satisfied by the next day. This need to wait slows down the processes occurring in our Group profit center. With the introduction of IAMRLS a request to retrieve archived member data is satisfied within 30 minutes by the running of a batch job which extracts the archived data and then loads the online files.

Another benefit for us of IAMRLS has been the ability to shrink our batch window. Certain batch processes have been moved into the timeframe when the onlines are up. This gives us a bigger time buffer in our batch window to deal with any problems which may arise.

 I am trying to find out what the size limitation is on an IAM file. I know that VSAM has a 4GB limit that can be bypassed with extended addressability. Do IAM files have such limitations?

IAM files do not have a 4GB limit. The maximum size of an IAM file is 201 gigabytes of compressed user data. In IAM V8.0, with the use of DFSMS extended format, the maximum IAM file size is 1,623 gigabytes on 3390-27, or up to 3,247 gigabytes on 3390-54.

For ESDS files, IAM can exceed the 4GB limit through use of the PSEUDORBA function, which can be used by most applications including those that run under CICS.

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 How can I use more than 65536 tracks on a 3390-9 or larger device?

If you want to use more than 64K tracks on one volume the IAM dataset must be defined as DFSMS Extended Format, with the following specific attributes:


1. The DATACLASS must have a "Dataset Name Type" of EXTENDED REQUIRED or EXTENDED PREFERRED, and COMPACTION must be set to NO or - - - -
2. The STORCLASS must have a "Sustained Data Rate" value of - - - or 0 (zero). Setting other values will cause the dataset to be STRIPED, which IAM does not support.

In addition you can use IAM hardware compression or IAM software compression, but you cannot use the DFSMS compression function.

**NOTE 1:** FDR/UPSTREAM incorporates the use of IAM for the 3 components of the database (the USTCATLG, USTFILEI and USTFILEC). Version 3.4.0 of FDR/UPSTREAM MVS now supports these files being DFSMS extended format datasets.

**NOTE 2:** IBM in z/OS 1.7 (available September 2005) will allow PS datasets to have more than 64K tracks on one volume even if they are non-SMS and not extended format. IAM 8.1 will support Large Format Sequential Datasets.

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 Are there any circumstances where you would not recommend creating an enhanced format file in IAM compressed format or where it would be inappropriate for an IAM file to be compressed?

As a general rule, we always recommend using IAM data compression. The only time we would suggest that a customer might want to run without it is when they are more concerned with CPU utilization than space savings, have fairly large record sizes (actual average of >1000 bytes, not necessarily the defined maximum), and have heavy update / insert activity. Data compression overhead is higher when compressing the records than when decompressing them. ***We have many customers who use IAM at outsourcing companies and experience significant cost savings from reducing the billable CPU time by running without compression.***

The actual average record length can be determined by loading the file without data compression and looking at the IAMINFO report for the file load, which will display the average and maximum record sizes encountered.

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 We use SMS compression via the DATACLASS definition on our large VSAM files. Would this have to be removed for IAM compression or can they work in conjunction with each other?

You can use an SMS DATACLASS with IAM files, but you would have to set the COMPACTION option in the SMS DATACLASS definition to NO.



We are using IAM RLS in production for a small number of low activity data sets. We will be placing several heavily accessed files under IAM RLS and I need to try and determine whether my IAM RLS parameter values will support the workload. These higher access files are our Deposit Master Files and critical to our business\*.

I am currently using

- MAXIOTASK= 128 (Default is 64)
- MAXJOBS=1024 (This is the default)
- MAXTRANS=1024 (Default is 512)
- MAXLOCKS=133103 (This is the default)

1. How can I estimate what values to use?
2. How can I monitor activity to see if values are adequate or if they need to be increased?
3. What resource considerations are involved?

Three of the parameters, **MAXJOBS**, **MAXLOCKS**, and **MAXTRANS**, basically set the size of an internal table to provide for fast retrieval, insertion, and removal of elements. An insufficient value can result in additional CPU overhead, which normally is not expected to be noticeable unless the values provided are extremely insufficient. Specifying larger values will increase the initial virtual storage for these tables; however the entry sizes are not very large so it is not a big impact.

As far as estimating values, **MAXTRANS** should be set to a value somewhat larger than the highest **MAXTASK** for the CICS regions that will be using files through IAM RLS. **MAXJOBS** should be set to a value somewhat larger than the maximum number of jobs (including CICS address spaces) that will be using IAM files through IAM RLS at any point in time.

**MAXLOCKS** is a more difficult estimate and is likely to be the most critical. In general, the default value is suitable for light workloads and a higher value should be specified for heavier workloads. Since your workload will be increasing substantially, we would recommend increasing the **MAXLOCKS** value, probably to about double the value that you are using.

**MAXIOTASK** if set too low it may cause some delay in processing I/O requests through IAM RLS. I/O tasks are created as needed up to the maximum value. Based on feedback from IAM customers, some of whom are heavy IAM RLS users, we haven't seen more than about 30 or so I/O tasks, so we think that your value of 128 is more than sufficient.

There is information provided by the IAM RLS interactive monitor, IAMBMON, to give you some idea as to whether your values are sufficient or not.

\* We followed up recently with this user and they report that the RLS support for the high activity files is running well.



## How can I benefit by using IAM Journaling and Recovery?

The purpose of Journaling is to reduce recovery times when software or hardware failures occur. In addition, you may be able to reduce the backup frequency for data sets that are journaled.

The decision as to which types of journal records to collect depends entirely upon the type of recoveries that you want to be able to perform. **BEFORE** images are used to back out updates from failed jobs and **AFTER** images are used to reapply updates to a restored data set. If you want the flexibility to perform either type of recovery, then you would use **BOTH** before and after images. The utility program IAMJREST is used to back out or reapply journaled updates. Some customers also use the journal files as input to their own applications to track or process records that have been updated.

# HINTS & RECOMMENDATIONS

## 4 STEPS TO MAKE SURE YOU ARE CURRENT WITH IAM

**STEP 1** Check this link for the current version of IAM and supported versions and any special considerations: <http://www.innovationdp.fdr.com/osreq.cfm>

	OS/390	z/OS	z/OS	
	2.4-2.10	1.1 - 1.5	1.6	
PRODUCT	Minimum	Minimum	Minimum	LATEST
<b>IAM</b>	<b>8.0/12</b>	<b>V8.0/12</b>	<b>V8.0/28</b>	<b>V8.0/30</b>

### **IAM Product Notes**

1. IAM V8.0 users who are using DFSMS Extended Format datasets as IAM files must install V8.0/14 or higher and may need to install this fix: P800145 (included in V8.0/16 and above).
2. Users who install z/OS 1.5 will need the following fix:  
IAM V8.0 Level 22 or lower, P800211 (included in V8.0/23 and above).
3. IAM 8.0/28 or higher is required if you plan to use the VSAM dynamic LPA function (z/OS 1.6 and higher).

**STEP 2** Sign up for the News via Email for IAM. This will get you technical bulletins and notification of HIPER fixes if any. We average about 2 emails a year.  
<http://www.innovationdp.fdr.com/newsviaemail/subscribe/list.cfm>

Your company number is on your address label and is a 6 digit value starting with a 0 or a 1.

**STEP 3** For supported versions, all of the current maintenance is put out on the web site weekly. Go to our web site with your access code to download the outstanding maintenance. Use this link to go to the FTP site with your access code:  
<http://www.innovationdp.fdr.com/ftp/ftp.cfm>

If you do not know your access code, click on the link above and then select:

### **Register for FTP Site Access**

**STEP 4** To request the latest release of IAM use the link below. You can have us mail you an installation tape, or you can request that the software be sent electronically.  
<http://www.innovationdp.fdr.com/upgrade/exform.cfm>

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## APPLYING MAINTENANCE

IAM modules come in two flavors, operating system intercept modules and runtime processing modules. When applying maintenance you can use the IAMZAP utility to apply the PTFs to the in-storage copy of the intercept modules, and must use AMASPZAP to apply the PTFs to the disk copy of both the runtime processing modules and the intercept modules. IAMZAP causes the maintenance to take effect immediately but it does not apply the maintenance permanently. You must still apply the PTF with AMASPZAP so it does not get lost over an IPL or recycle of VIF.

The runtime processing modules are loaded into a job's address space during the open process and remain present as long as there are any open IAM files in that address space. For jobs like CICS that stay active for long periods, it is necessary to recycle the CICS region to pick up any maintenance that has been applied to the runtime processing modules. It is not necessary to recycle CICS after applying maintenance to an intercept module with IAMZAP. For IAMRLS, there is a command F IAMRLS,APPLY,ptf dsname to apply the zaps to runtime modules in storage without the need to recycle IAMRLS.

The PTF will contain specific instructions on whether you have to use the IAMZAP program or the F IAMRLS command.

# HINTS & RECOMMENDATIONS

## IAM VENDOR INFORMATION DOCUMENT

Software vendors working with VSAM files who require more information regarding the structure of IAM datasets, may need to identify whether a file is IAM or may need to identify control block structures that are unique to IAM. Software vendors interested in this information should contact Innovation Data Processing and request the IAM Vendor Information Document. This information includes:

- Overview structure for Open IAM files • ACB and related VSAM Control Blocks for IAM files
- Identifying the dataset as an IAM dataset • IAM File Creation Work Area • Compatible Format File Work Area for older IAM file formats • Enhanced Format File Work Area for IAM files

IAM customers who feel that this information will be beneficial can also request this document.

## IAMINFO DD STATEMENT

Please consider adding an IAMINFO DD statement to each step where IAM files are used as the reports produced can be very helpful if there are future problems.

## MOST 3RD PARTY VENDOR PRODUCTS MAKE EXTENSIVE USE OF VSAM FILES

Below is a list of some 3rd Party Vendor Packages that IAM customers have successfully converted from VSAM to IAM. Applications like Banking, Human Resources, Hospital, Report Distribution, Insurance, Payroll, Accounts Receivable and Payable are excellent candidates for conversion.

VENDOR	PRODUCT	VENDOR	PRODUCT
American Management Systems	CUFS; Advantage Financial Mgmt.	Group1 Software	Code-1 Plus
ATOS Origin	Payroll and Personnel (IPAS); Cardlink	Hogan (CSC)	Card & Merchant System (CAMS)
American Software	Accounts Receivable	Horisonten AB	Financial Systems
ASG	TMON	IBM	RMDS; SMP/E
Automated Financial Systems	Commercial Loan	INFOUSA	White Pages
Beta Systems	BETA93	Integral Systems	General Ledger
Blue Cross of AK	FISS Medicare A Payor	LRS	PageCenter
BMC	Mainview for CICS Control-M	MACRO 4	Tracemaster
CGI	Commercial Line Systems (CLS)	Mckesson HBOC	Medipac
CERTEGY	Collection System (TCS); Base 2000 Credit Card Processing	Mobius	Viewdirect; Infopac
CHECKFREE	PEP+	MSI Business Solutions	Nadis Post
CommerceQuest	Business Event Publisher	Pitney Bowes	Finalist; Mailers Choice
Computer Associates	CA-7 and CA-11	SCT	SCT Plus
CSC	Cyberlife; Capsil	Shaw Systems	Collections
CYBORG	HRMS; Payroll	Siemens Medical Systems	Invision; Enterprise Access Directory (EAD); SIGNATURE
Fair Isaac	Triad	SSA Global	Walker Accounts Payable/Receivable
Fidelity Information Services	Systematics Banking Apps.	SunGard	Invest One (Investment Accounting); Accounting Budget and Cost (ABC)
First Data International	VisionPLUS	TriZetto	ClaimFacts; GroupFacts
FISERV	MortgageServ	VIPS	Medicare PartB; SuperOp Auto Adjudication
GEAC	Millenium Application		
Genesis	Payroll		

# IAMSMFVS DATASET ANALYSIS PROGRAM

## EXISTING IAM USERS:

Run the IAMSMFVS program to identify VSAM files that still exist and can be converted to IAM.

## NON-IAM USERS:

A substantial amount of the data in your files exist within VSAM data sets either with 3rd party products that use VSAM or your inhouse applications. See below for the typical analysis we can provide you with the output from the IAMSMFVS report.

The IAMSMFVS program is a special purpose SMF data analysis program that can be used to:

1. Identify VSAM clusters that are candidates for conversion to IAM.
2. Compare the results once the files are converted to IAM.
3. Monitor IAM data set usage, and activity.
4. Determine when IAM files need to be reorganized.

Below is an excerpt from a report we recently prepared. The company name and file names have been changed so as not to identify the company. The complete sample report for the XYZ COMPANY is available on request. You can run the IAMSMFVS program to collect data to send back to Innovation for us to analyze, and we will provide you with a detailed report on How IAM Can Benefit You. If you are not an IAM customer, you can have us send you a copy of the IAMSMFVS program by E-mail; you can mail or Fax the reply card on the back page, or you can E-mail your request to sales@fdinnovation.com

## IAMSMFVS Report Analysis for XYZ COMPANY

### Overview

XYZ COMPANY has provided an IAMSMFVS report for their installation. The report was produced using approximately eight days worth of SMF data, dated from September 30, 2004 through and including October 8, 2004. For this time period, IAMSMFVS calculated a total of 695 million DASD EXCPs, from the job step termination records, of which 250.8 million EXCPs, 36% of the total, were performed on VSAM data sets. This VSAM I/O activity provides an opportunity for XYZ COMPANY to better utilize the IAM Product to improve performance, not only for specific jobs and CICS regions, but also to have a beneficial impact on overall system performance.

The performance benefits provided by IAM include reductions in physical I/Os, EXCPs, and in CPU times, yielding reductions in CICS transaction response times and in elapsed times for batch jobs.

The VSAM datasets included in this report occupied some 198,784 cylinders on 3390 devices, or approximately 169 gigabytes of DASD space.

### Guidelines

Almost all VSAM files will benefit from being converted to IAM. Some exceptions are:

- IAM does not support Linear data sets (LDS).
- IAM does not support certain system-related data sets: catalogs, SMF data sets, and DFSMSHsm control data sets.



# IAMSMFVS DATASET ANALYSIS PROGRAM

As a strategy to get the greatest benefit from IAM as quickly as possible, we recommend that you start by converting the VSAM clusters with the highest I/O activity. The first two pages of the IAMSMFVS report typically have about the top 30 VSAM clusters for I/O usage, and these are the datasets from which the most significant performance benefits will most likely be obtained. The exact number of clusters on these pages will vary depending on the type of VSAM clusters, because of the report having a line for each cluster component. When evaluating VSAM datasets for conversion to IAM, consider the following guidelines:

- Eliminate from the list: linear data sets; catalogs; the system SMF datasets, which generally have names of SYS1.MAN\*\*; and DFSMSHsm control datasets.
- VSAM KSDS datasets with high numbers for index component I/O are outstanding candidates for conversion to IAM. IAM will eliminate the index component I/O because IAM keeps a compressed form of the index in virtual storage while processing a dataset.
- VSAM clusters with alternate indexes are also especially good candidates for conversion to IAM. Files with alternate indexes frequently have poor performance with VSAM, due to the difficulty in properly setting up buffering, and also due to high I/O. To read a record through the alternate index involves reading the index component of the alternate index, then the data component of the alternate index, then the index of the base cluster followed by the data component of the base cluster. So, the I/O savings provided by IAM can be quite substantial.
- Look for datasets that are processed by application software packages listed in Section 1.20 of the IAM manual or on Innovation's web page <http://www.innovationdp.fdr.com/products/iam/IAMvendor.cfm> for good candidates for conversion to IAM.

## Datasets from the VSAM EXCP Report

Listed below are the VSAM datasets from the IAMSMFVS VSAM EXCP Report with over a million EXCPs that are eligible for conversion to IAM. The datasets are presented in descending EXCP order, which is basically the order in which they appear in the IAMSMFVS EXCP Report.

These VSAM clusters account for approximately 79% of the total VSAM EXCPs. It is not possible to determine the full benefit of converting these datasets to IAM from the report. Presuming that IAM is given adequate buffering, reductions in I/O activity can be expected that may be substantial for many of these datasets. One thing that is certain, IAM will eliminate the index component I/O. For these datasets that amounts to approximately 120 million EXCPs, which is 61% of the EXCPs for the datasets included in this table, and a reduction of 48% of the total VSAM EXCPs as reported by the IAMSMFVS report program.

All of these datasets appear to be excellent candidates for conversion to IAM, and are expected to have performance benefits by doing so. There are 32 VSAM KSDS clusters shown below, of which eleven have associated alternate indexes. Any datasets with additional considerations or thoughts are commented on below the chart.

The columns of this chart are as follows:

- **DATASET NAME** the base cluster name.
- **EXCP** the total EXCPs for the cluster, including all of the components.
- **% VSAM** the percentage that the EXCPs for this cluster were of the total VSAM EXCPs in the report.
- **% INDEX** the percentage of the EXCPs for this cluster that were to the index component.
- **% DATA** the percentage of the EXCPs for this cluster that were to the data component.

# IAMSMFVS DATASET ANALYSIS PROGRAM

## Busiest VSAM Datasets

DATASET NAME	NOTES	EXCP	% VSAM	% INDEX	% DATA
VXYZA.TRF003.SUPPORT	①, ②	53,466,888	21.3%	51.5%	48.5%
COMMON.ABC.MEMBER	①	28,647,398	11.4%	73.5%	26.5%
VFXYZ.FEF003.SUPPORT	①, ②	24,998,493	10.0%	80.1%	19.9%
VTXYZ.GERE.DIGEST.TREATY.XREF	①	14,693,668	5.9%	98.2%	1.8%
VTXYZ.C1009.TRF003.SUPPORT	①	8,991,073	3.6%	51.3%	48.7%
VTXYZ.C1009.ERF003.SUPPORT	①	8,730,873	3.5%	51.0%	49.0%
VXYZA.ERF001.DIGEST		5,697,611	2.3%	27.8%	72.2%
VFXYZ.FEF001.DIGEST		4,575,776	1.8%	61.8%	38.2%
VFXYZ.FEF007.CLAIMS	②	4,405,551	1.8%	9.3%	90.7%
VTXYZ.ER.CLAIMS.XREF		4,311,037	1.7%	99.4%	0.6%
SYS6.\$AVRS.R51BM03.KSDS	③	3,399,524	1.4%	62.5%	37.5%
VTXYZ.C7821.ERIL001.DIGEST		3,035,696	1.2%	94.5%	5.5%
VXYZA.ERF007.CLAIMS	②	2,883,907	1.2%	5.7%	94.3%
VXYZA.ILF001.DIGEST		2,876,591	1.1%	42.7%	57.3%
VXYZP.F2RAAH.IRFP809		2,126,535	0.8%	65.2%	34.8%
VFXYZ.FEF006.RECPAY	②	2,062,060	0.8%	41.4%	58.6%
VXYZE.F2RCOL.IRRE603		2,055,275	0.8%	2.0%	98.0%
VFRTA.ARF003.SUPPORT	②	2,025,151	0.8%	73.0%	27.0%
VFXYZ.FEF008.CLMINDEX	②	1,885,017	0.8%	33.1%	67.5%
VXYZ.CDS.TBLG	②, ④	1,640,625	0.7%	50.8%	49.2%
VPICD.PICDADD.PICD110		1,476,210	0.6%	97.4%	2.6%
VTOAB.ABCTBL.ABGTMO8		1,466,435	0.6%	91.6%	8.4%
VXYZP.F2BHIS.IRFP002		1,448,104	0.6%	0.9%	99.1%
VXYZA.ERF008.CLMINDEX	②	1,244,737	0.5%	27.7%	72.3%
SYSB.NETVIEW.SA50.AAUVSPL	⑤	1,232,423	0.5%	8.3%	91.7%
COMMON.T3.TABLEF.TOCD999A		1,220,667	0.5%	98.9%	1.1%
VCRTA.CRF003.SUPPORT	②	1,218,513	0.5%	89.1%	10.9%
VPITA.PIF001.DIGEST		1,194,529	0.5%	15.3%	84.7%
VTXYZ.F2RCOL.IRRE603		1,037,239	0.4%	1.4%	98.6%
VIRUR.F2PBT0.IRUR804		1,023,877	0.4%	61.7%	38.3%
VXYZA.ERF006.RECPAY	②	1,014,756	0.4%	19.9%	80.1%
VXYZA.ERF017.NOTEPAD	⑥	1,003,834	0.4%	38.7%	61.3%
<b>TOTALS</b>		<b>197,090,073</b>	<b>78.6%</b>	<b>60.8%</b>	<b>39.2%</b>

## Notes

- ① These top 6 clusters for I/O activity, which include 2 with alternate indexes, account for 56% of the total VSAM I/O. They each have greater than 50% of their I/O to the index components, which will be completely eliminated by IAM. **That means that IAM will reduce I/O for these clusters by at least 92 million EXCPs, or 37% of the total VSAM I/O, with additional I/O reductions expected for the data components.**
- ② These 11 clusters have alternate indexes, and combined account for 38.8% of the total VSAM EXCPs. **With just the I/O savings from the index components, this will reduce the total VSAM EXCPs by approximately 54 million, or 20% of the total VSAM I/O.** All of these datasets look like outstanding candidates for IAM.
- ③ This appears to be a \$AVRS main KSDS dataset. We have had a customer convert the \$AVRS datasets to IAM with good success, and I believe that they had much higher activity. The customer's two suggestions are to turn off IAM data compression for \$AVRS datasets, and to set the INDEXSPACE=ALL global option. \$AVRS also has RRDS datasets; while they did not make it to the above table, some did appear within the top 100 in the IAMSMFVS EXCP Report. As long as these datasets are not being shared across multiple systems/LPARs, they are excellent candidates for IAM.
- ④ This dataset has an insert count that is almost eight times the maximum number of records. This is unusual, because at any given time, records inserted minus records deleted should be less than the total number of records (records inserted do not include records originally loaded).

One way this could happen is if the cluster is being reloaded on a daily basis; the records inserted shown by IAMSMFVS is the sum for all uses of the cluster, while the maximum number of records shown by IAMSMFVS is the highest value for total records at any one time. Another possibility is that the statistics for this dataset in the VVDS/Catalog are corrupt; in that case we cannot tell whether the cluster really has very high insert activity. If this cluster does have very high insert activity, and it is converted to IAM, it may need to be reorganized daily, if that is not already being done. With reorganization, this cluster will be an excellent candidate for conversion to IAM.

# IAMSMFVS DATASET ANALYSIS PROGRAM

- 5 From the name of this dataset, it appears to be a NETVIEW control dataset. From the IAMSMFVS report, it does appear to be a good candidate for conversion to IAM. However, since the IAMSMFVS report indicates high insert activity, weekly reorganizations would be recommended.
- 6 This dataset has a large record size in excess of the half-track block size on a 3390. Therefore, I recommend specifying the SPANNED attribute for this dataset when converting it to IAM, to avoid using a block size that can waste space on disk. No application changes will be necessary for this change, and it will not affect performance as it appears that there are very few, if any, records that are even close to the maximum size.

## Alternate Index and RRDS

With eleven clusters with alternate indexes in the top 32 VSAM datasets listed above, plus many additional AIX's and RRDS's in the subsequent pages of the VSAM EXCP report, there appears to be a great opportunity for achieving significant benefit from the IAM AIX/RRDS option. As stated above in note 2, IAM will provide these datasets with significant benefits particularly with I/O reduction and the resulting elapsed time and response time improvements. ***This is certainly a circumstance where IAM/AIX will be of very substantial benefit.***

## Summary and Conclusions

With 36% of the total DASD I/O captured by SMF being done to VSAM datasets, there is excellent opportunity to utilize IAM to obtain significant I/O reductions and other performance benefits for many of these datasets. With the above mentioned 32 datasets accounting for 79% of the total VSAM I/O, there still remain other opportunities for IAM to help with performance improvements. Additional opportunities can be found by looking at the subsequent pages in the EXCP Reports, and using the above guidelines and techniques for selecting datasets for conversion. Running the IAMSMFVS reports for a longer time period, such as a month or more, may identify additional high I/O datasets for conversion to IAM.

Our suggestion is to start by converting to IAM the top six datasets in the table above. Those datasets are expected to provide a significant performance benefit not only for the datasets themselves, but also for overall system performance. Then expand the conversion to other datasets from the EXCP report, and see how you are doing. For most of the above datasets, you are quite likely going to need to increase MAXBUFNO values, particularly for CICS, as many of them do appear to be highly buffered with VSAM.



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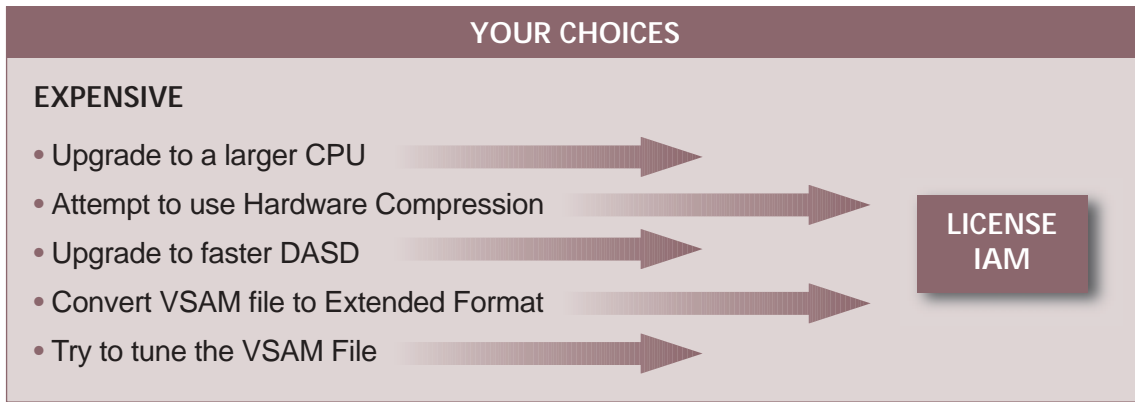
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