

IAM V8.1 Enhancements Further Improve VSAM Application Performance

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August 14, 2006
Session 3047

IAM V8.1 Overview



- What is IAM?
- Unique Features of IAM
- IAM V8.1 Enhancements
- IAM V8.1 Performance
- Future Plans
- Summary

What is IAM?

- High Performance Access Method
 - Well established for over 30 years
 - Continuously evolving to be responsive to customer requirements
- An alternative to VSAM
 - Plug compatible VSAM Interface
 - Supports KSDS, ESDS, RRDS and AIX type datasets
 - Provides CPU time and I/O savings
 - Hardware or Software data compression techniques
 - Minimizes manual tuning
 - Does not replace VSAM
 - Selected for use at dataset level

Unique Features of IAM

- ESDS Over 4 Gigabytes
 - PSEUDORBA Feature
 - Allows use by programs limited to 4-byte RBA
 - Can be used for ESDS datasets under CICS
 - RBA value is relative record number
 - Does not require SMS Extended Format data sets
 - XESDS for 8-byte RBA support
- No CI Lockout / Exclusive Control
 - IAM internally locks at record level
 - No CI or block level lockouts
 - Improved performance for online updates
 - Allows for larger block sizes than VSAM CI Size

Unique Features of IAM

- Data Compression
 - Software or z/OS Hardware compression
 - Supported on all IAM datasets: KSDS, ESDS, RRDS, AIX
- Real Time Tuning
 - Dynamic Buffer Management
 - Minimizes need for manual tuning
- IAM Record Level Sharing
 - Single system
 - Sysplex in development
- Index in Virtual Storage
 - No Index Component I/O or Buffers

IAM V8.1 Enhancements



- Dynamic Data Space
- Hardware Compression Enhancements
- Turbo Buffering Mode
- Prime Related Overflow
- Additional Enhancements
 - Large Format Sequential Data Sets
 - Multiple IAMRLS Address Spaces
 - Prime Related Overflow
 - Plus more....

IAM V8.1 Enhancement

Dynamic Data Space



- Cache for randomly accessed records
- Enhancement based on DYNCORE feature
- Up to 2 gigabyte size per open IAM file
- Least Recently Used managed removal of old records
- Improved memory management
- Improved search algorithm
- Specified by IAM ACCESS Override of DYNDS=nnnn (meg)
- Benefit is I/O reductions

IAM V8.1 Enhancement Hardware Compression



- Automatic Dictionary Build during File Load
- Objectives:
 - Build dictionary with minimal CPU time
 - Amount of compression generally comparable with SMS-VSAM hardware and IAM software compression
 - Can be set as default compression algorithm
- Uses up to first 8 megabytes of data written
- Dictionary is stored within IAM dataset
- Alternatively use dictionaries created by CSRBDICT

IAM V8.1 Enhancement

Turbo Mode Buffering



- Turbo Mode Enhances IAM's Real Time Tuning
 - Is the default as IAM V8.1 is shipped, but can be turned off
- Basic Real Time Tuning
 - Dynamic adjustment of number of buffers within a range
 - Dynamic management of buffers based on access patterns
- Turbo Mode Objectives:
 - Improve performance with better I/O and buffer management
 - Provide additional I/O reductions
 - Improve sequential update processing
 - Reduce or eliminate manual tuning
 - Greater responsiveness to application I/O demands
 - Allow larger number of buffers to be used

IAM V8.1 Enhancement Turbo Mode Buffering



- Aggressively increase number of buffers
 - For first I/Os after open or during heavy I/O periods
 - Compensates for VSAM with large numbers of buffers
 - Increased frequency of buffer evaluation until at 80% of MAXBUFNO
 - Eliminate wait for buffer availability if not at maximum buffers
 - Obtain multiple buffers at a time
 - Reduces CPU time for MVS storage management
- Increase default maximum buffer space
 - BUFSP=65536 (K) up from 875K
 - CICSBUFSP=1024 (K) up from 256K
- Increased maximum number of buffers from 2048 to 8192

IAM V8.1 Enhancement

Turbo Mode Buffering



- Revised initial buffer quantity obtained when opened
 - Batch: Enough buffers for up to 16 tracks
 - Online: Enough buffers for up to 1 cylinder (15 tracks)
 - Improved Open performance for large datasets
- Write multiple non-contiguous blocks per EXCP
- Write multiple blocks per EXCP to Extended Areas
- New Override of BUFSPACE
 - Specifies maximum amount of storage to use for buffers
 - Specified on a dataset basis
 - Specification is not sensitive to block size being used

IAM V8.1 Enhancement Prime Related Overflow



- New Optional Overflow Structure
- Records in an Overflow Block will be Related to Same Prime Block
- Reduces Overflow Index Size
 - Indexed at block level rather than record level
- Use with IAMRLS or Share Option 1 ONLY!
- Will Use More DASD Space

Additional IAM V8.1 Enhancements



- Support for Large Format Sequential Datasets
 - Requires z/OS 1.7 or above
 - Supports > 64k tracks per volume
 - Does not need to be on an SMS managed volume
- Support for Multiple IAMRLS address spaces per LPAR
 - Identified and selected by RLSID parameter
- Initial use of 64-bit Virtual Storage
 - Used as cache for extended overflow blocks
 - May improve performance of sequential processing
 - Be aware of potential paging impact

Additional IAM V8.1 Enhancements

- Performance Improvement for AIX under IAMRLS
 - I/O at sphere level passed to IAM RLS, rather than dataset level
- Reduce Dynamic Allocations with AIX and IAMRLS
 - Only allocate a dataset once, not for each concurrent use
- Support for SuperC functions under ISPF on IAM files
- Identification of IAM files by DFSMS ACS Routines
 - Look for DDNAME=@#\$IAM

IAM V8.1 Performance



- Tested against VSAM with System Managed Buffering
- Objectives:
 - Demonstrate IAM V8.1 Turbo Buffering Performance
 - Answer question: Is IAM better performer than VSAM SMB?
 - Approximate user experience converting from VSAM
 - Minimize manual tuning performed
 - Set up to allow maximum automatic buffers
 - REGION=0M for VSAM SMB resulted in 100+ megabytes for buffers
 - IAM Global Option BUFSP set to 128 Megabytes maximum
 - Tested with and without Hardware Data Compression
- Benchmark based on user specifications

IAM V8.1 Performance Benchmark Description



- Files contained 2,000,000 records each
- CI Size of 8192
- Key Length of 8
- Five Tests with different fixed record lengths:
 - 125 bytes
 - 250 bytes
 - 500 bytes
 - 750 bytes
 - 1,000 bytes

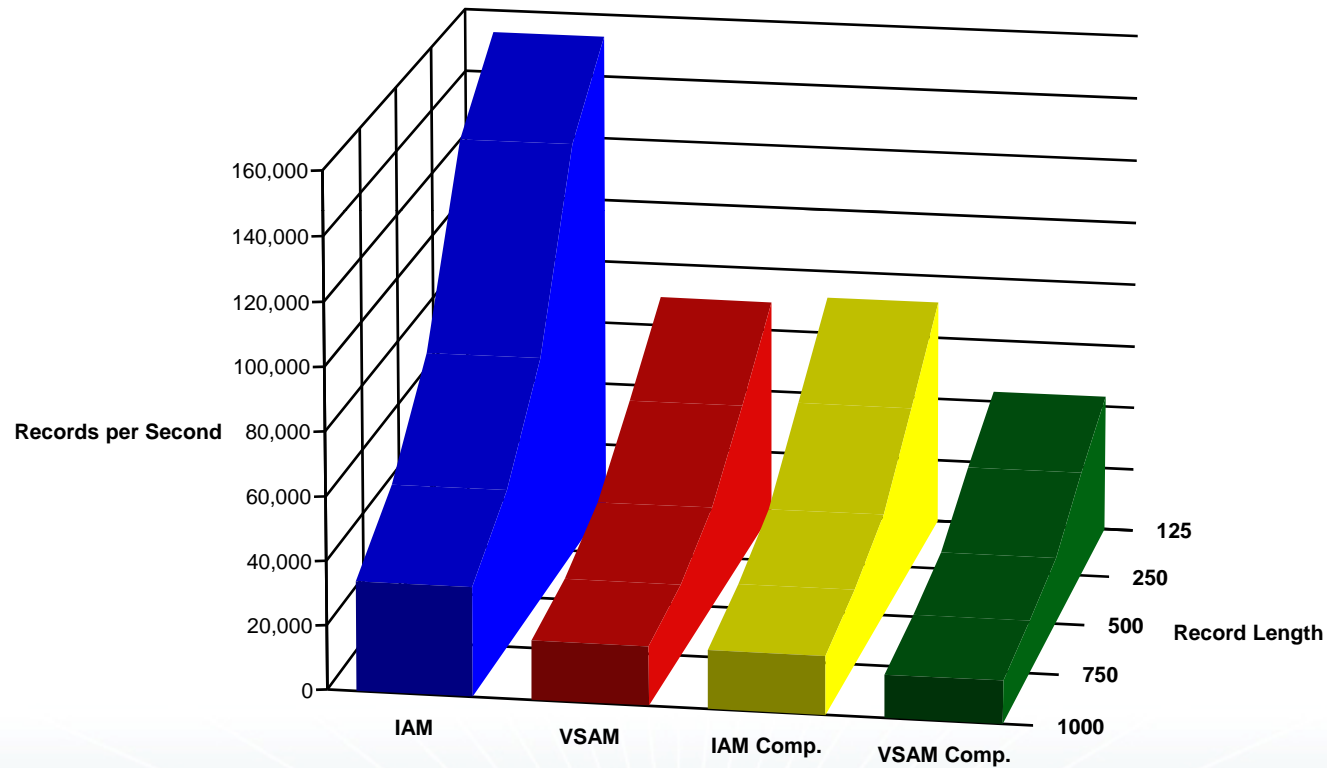
IAM V8.1 vs. VSAM

File Load Performance



- Test Description:
 - Load file with 2,000,000 Records
- Results without Compression
 - IAM used 39% to 41% less CPU time
 - IAM ran in 46% to 62% less elapsed time
 - IAM used 85% less EXCP's
 - IAM used 8% to 17% less DASD space
- Results with Compression
 - IAM used 1% to 35% less CPU time
 - IAM ran in 27% to 40% less elapsed time
 - IAM used 87% to 91% less EXCP's
 - IAM used 25% to 45% less DASD space

IAM V8.1 vs. VSAM File Load Performance



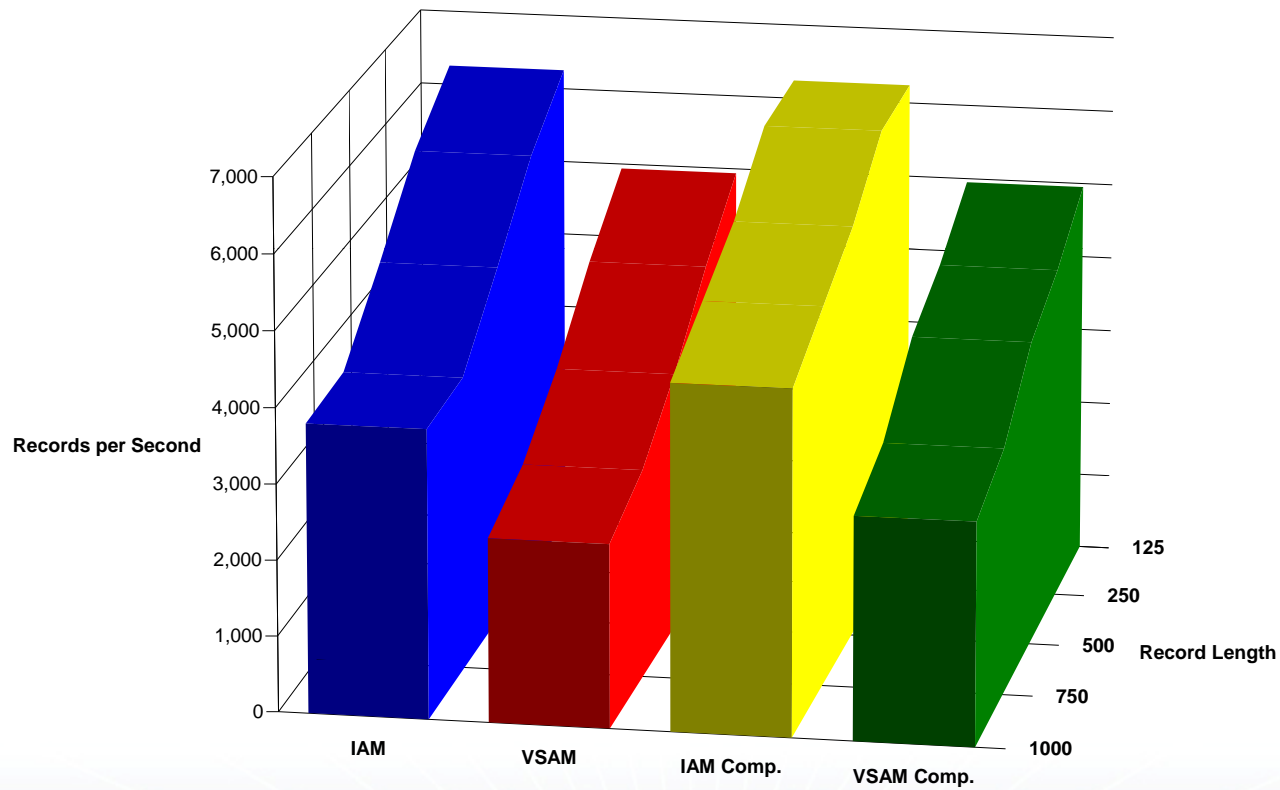
IAM V8.1 vs. VSAM

Random Read Performance



- Test Description
 - 200,000 Random Reads
 - Spread throughout 10% of file
 - Both IAM and VSAM required additional buffers for large record sizes
- IAM used 20% to 27% less CPU time
- IAM used 21% to 36% less elapsed time
- IAM used 39% to 61% less EXCP's

IAM V8.1 vs. VSAM Random Read Performance



IAM V8.1 vs. VSAM

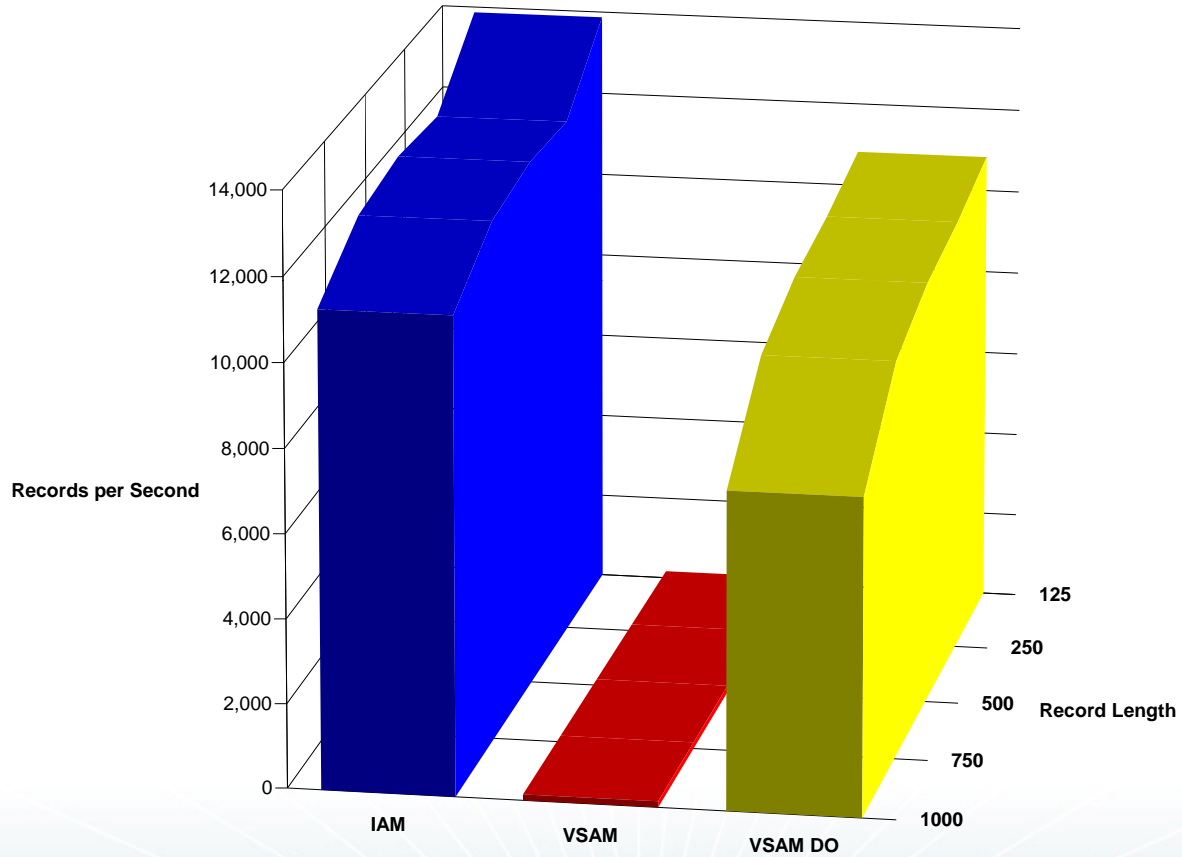
Access is Dynamic Performance



- Test Description
 - 100,000 Random Reads
 - Covered 1% of the file (20,000 records)
- IAM vs. VSAM
 - IAM used 92% to 93% LESS CPU Time
 - IAM ran in 99% LESS Elapsed Time
 - IAM required 99.9% LESS EXCP's
- IAM vs. VSAM w/ACCBIAS=DO
 - IAM used 22% to 25% less CPU time
 - IAM used 40% to 53% less EXCP's
 - IAM ran in 16% to 33% less elapsed time

IAM V8.1 vs. VSAM

Access is Dynamic Performance



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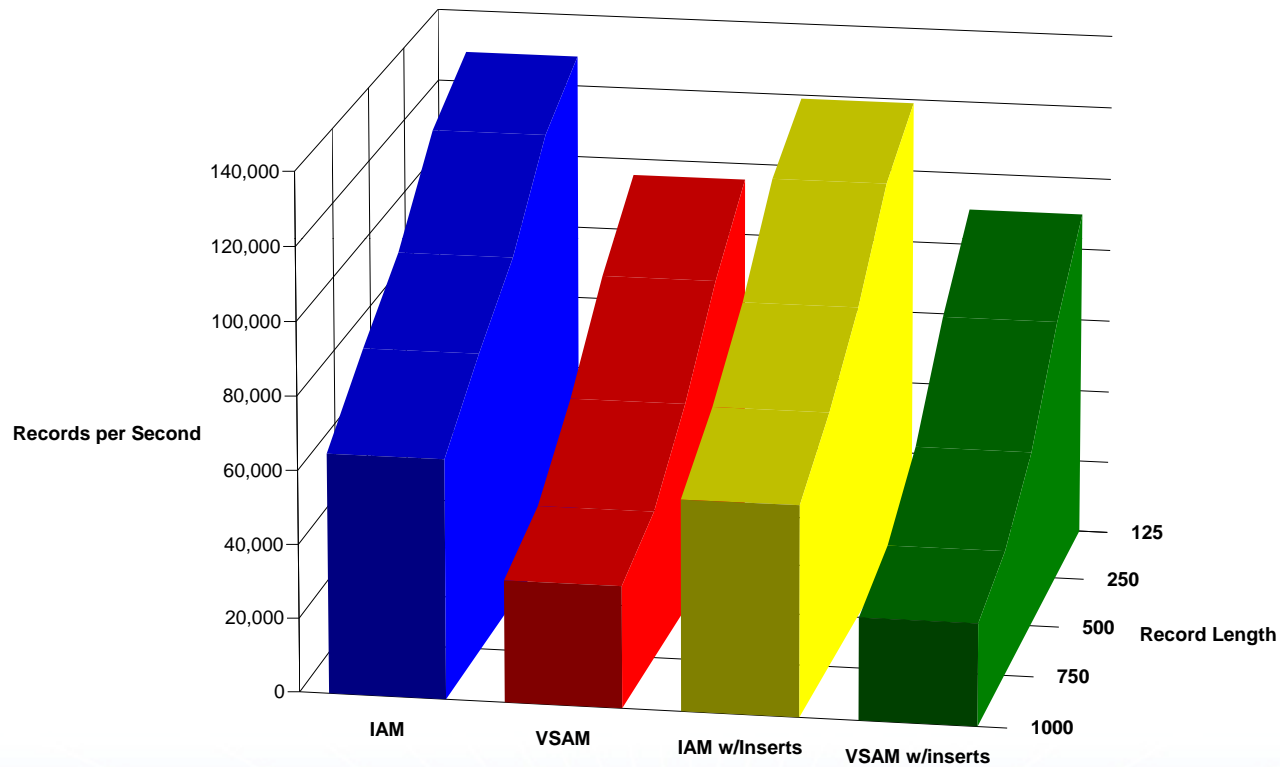
IAM V8.1 vs. VSAM

Sequential Read Performance



- Test Description
 - Sequentially Read Entire File (2,000,000 Records)
 - Tests With and Without Inserted Records
- IAM used 14% to 20% less CPU time
- IAM ran in 25% to 51% less elapsed time
- IAM used 67% to 79% less EXCP's

IAM V8.1 vs. VSAM Sequential Read Performance



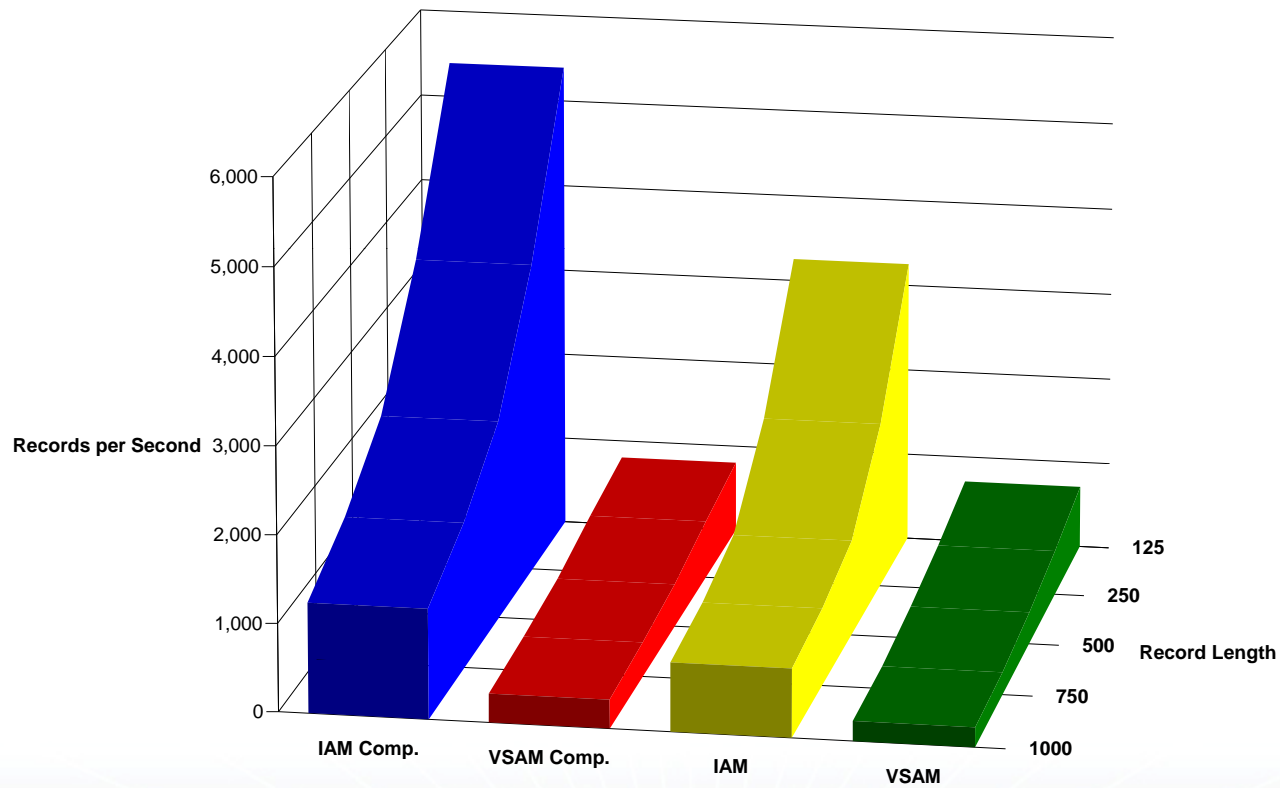
IAM V8.1 vs. VSAM

Random Insert Performance



- Test Description:
 - Randomly Inserted 38,003 Records
 - Within a key range of 400,000 Records
 - 9.5 % Inserted Records Within Above Range
 - Files defined with 10% CI Free Space
- IAM used 66% to 72% less CPU time
- IAM ran in 67% to 85% less elapsed time
- IAM used 72% to 92% less EXCP's
- For uncompressed data, IAM used 26% to 32% less space

IAM V8.1 vs. VSAM Random Insert Performance



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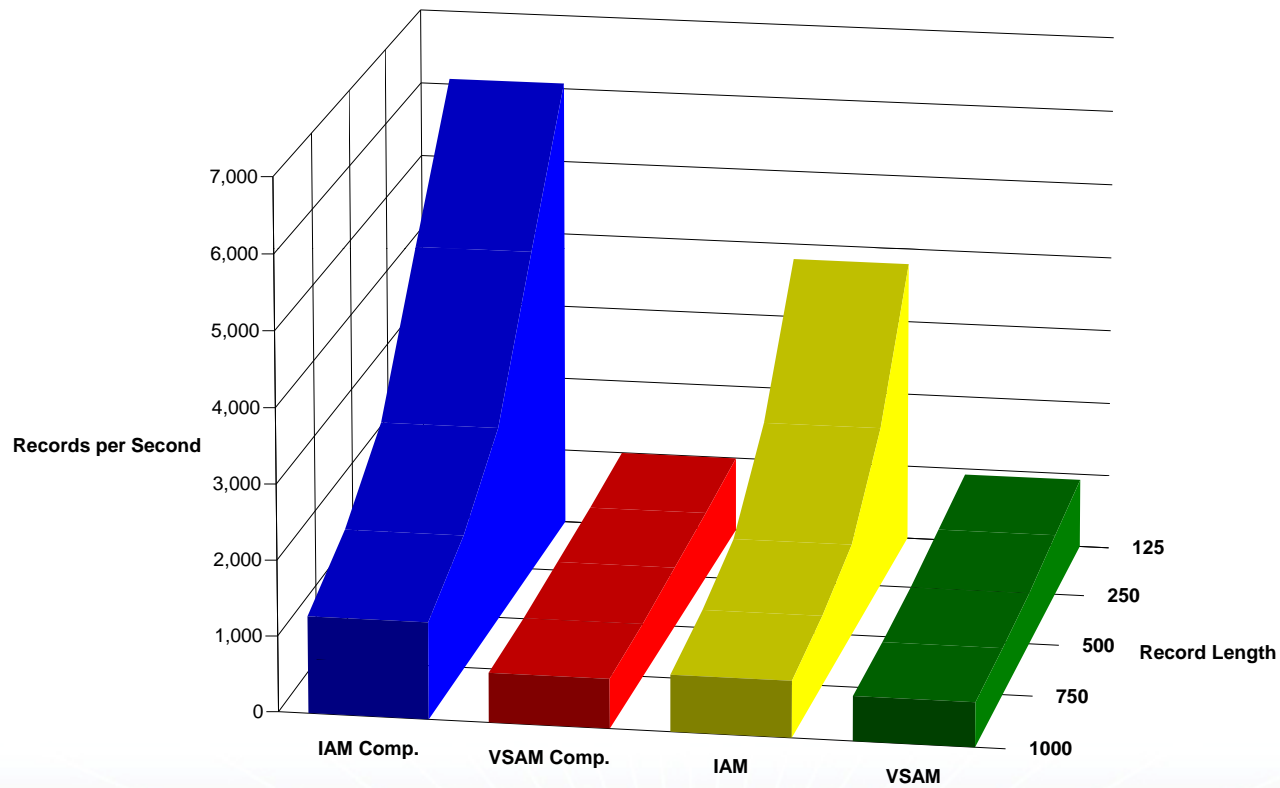
IAM V8.1 vs. VSAM

Random Delete Performance



- Test Description:
 - Performed 40,000 Random Reads
 - Deleted 38,003 Records
 - Within key range of 400,000 Records
 - Received 1,997 Records Not Found
- IAM used 32% to 65% less CPU time
- IAM ran in 21% to 84% less elapsed time
- IAM used 31% to 92% less EXCP's

IAM V8.1 vs. VSAM Random Delete Performance



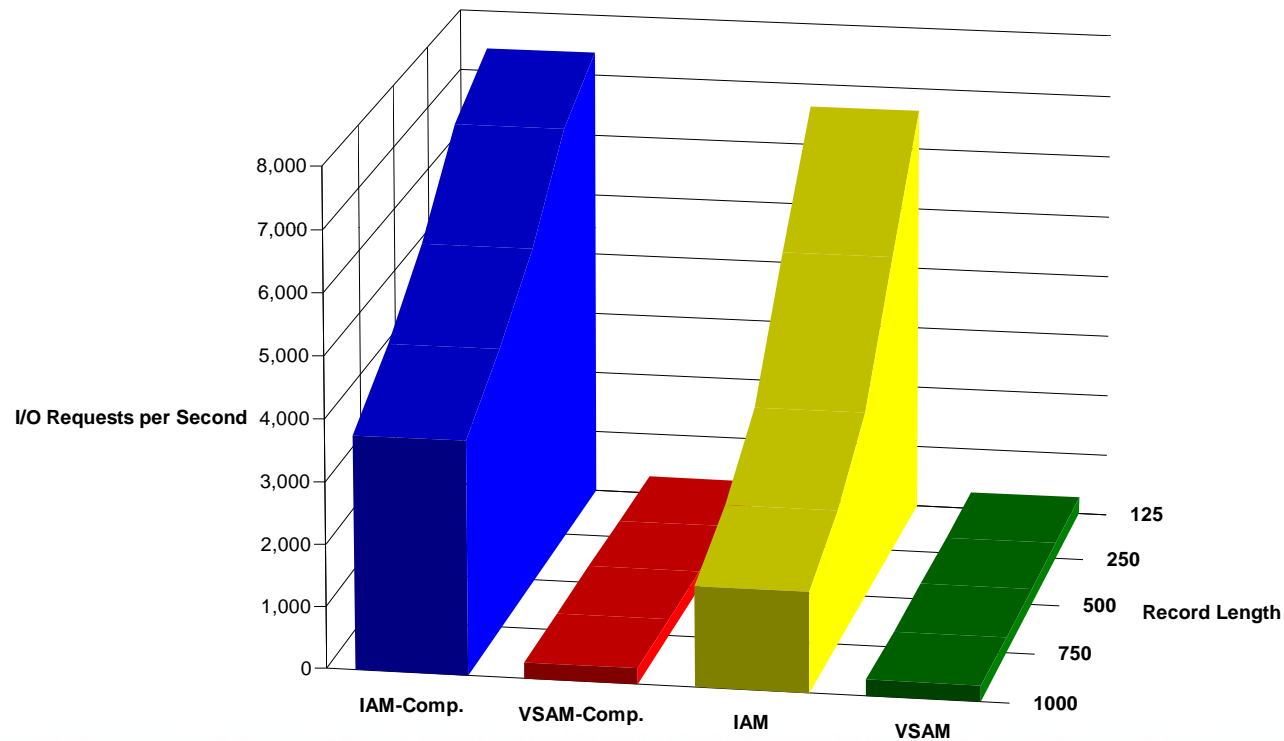
IAM V8.1 vs. VSAM

AIX Processing Performance



- Test Description:
 - 256,000, Random Read
 - 160,000 Updates, 1/2 of which required an update to the other alternate index.
 - 80,000 Inserts
 - 16,000 Deletes.
 - 16,001 Points (Start browses) with 80,000 sequential reads. (5 records read per start browse).
- IAM used 75% to 85% less CPU time
- IAM ran in 84% to 96% less elapsed time
- IAM used 92% to 99% less EXCP's

IAM V8.1 vs. VSAM AIX Processing Performance



IAM V8.1 vs. VSAM

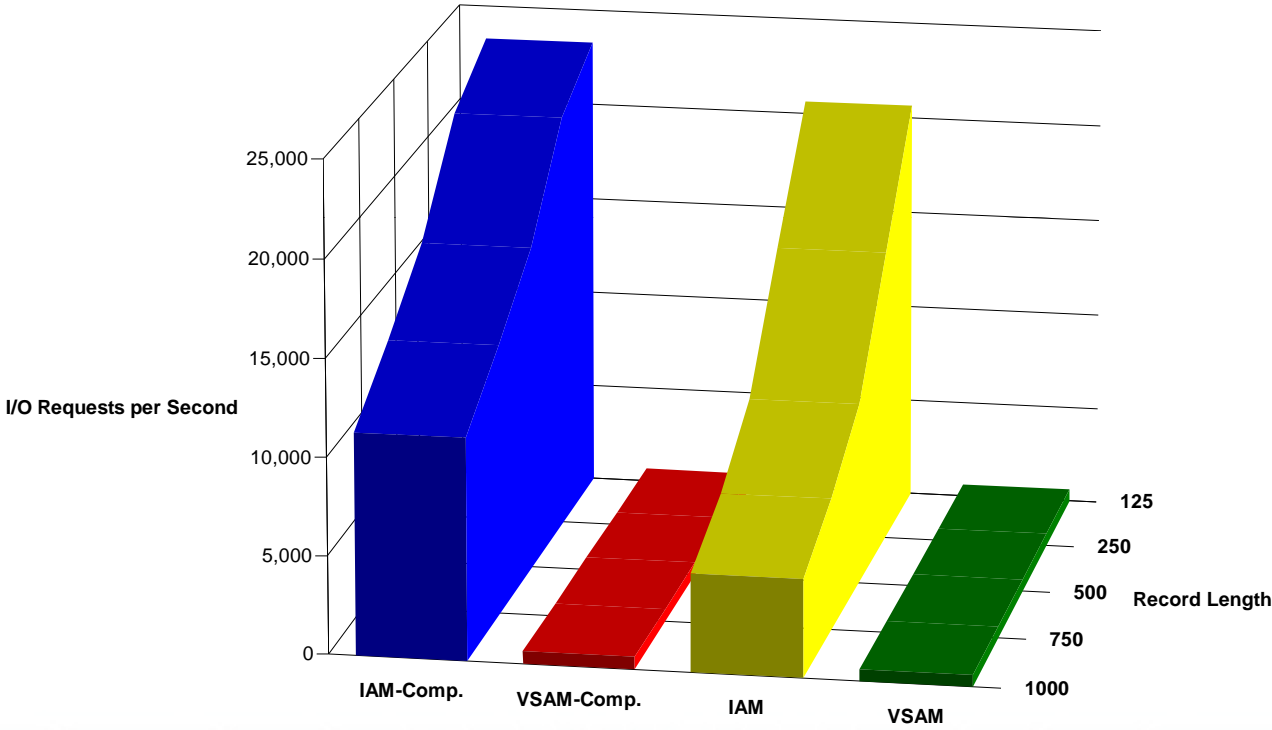
AIX Non-Unique Key Sequential Performance



- Test Description:
 - Sequentially read entire file through non-unique key AIX
 - Ideal VSAM buffering would be NSR for AIX and LSR for Base
 - VSAM must use same buffering technique for both components
 - SMB always uses NSR buffering for AIX Spheres
 - IAM's Real Time Tuning automatically handles this
- IAM used 80% to 86% less CPU time
- IAM ran in 88% to 97% less elapsed time
- IAM used 93% to 99% less EXCP's

IAM V8.1 vs. VSAM

AIX Non-Unique Key Sequential Performance



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IAM V8.1 vs. VSAM

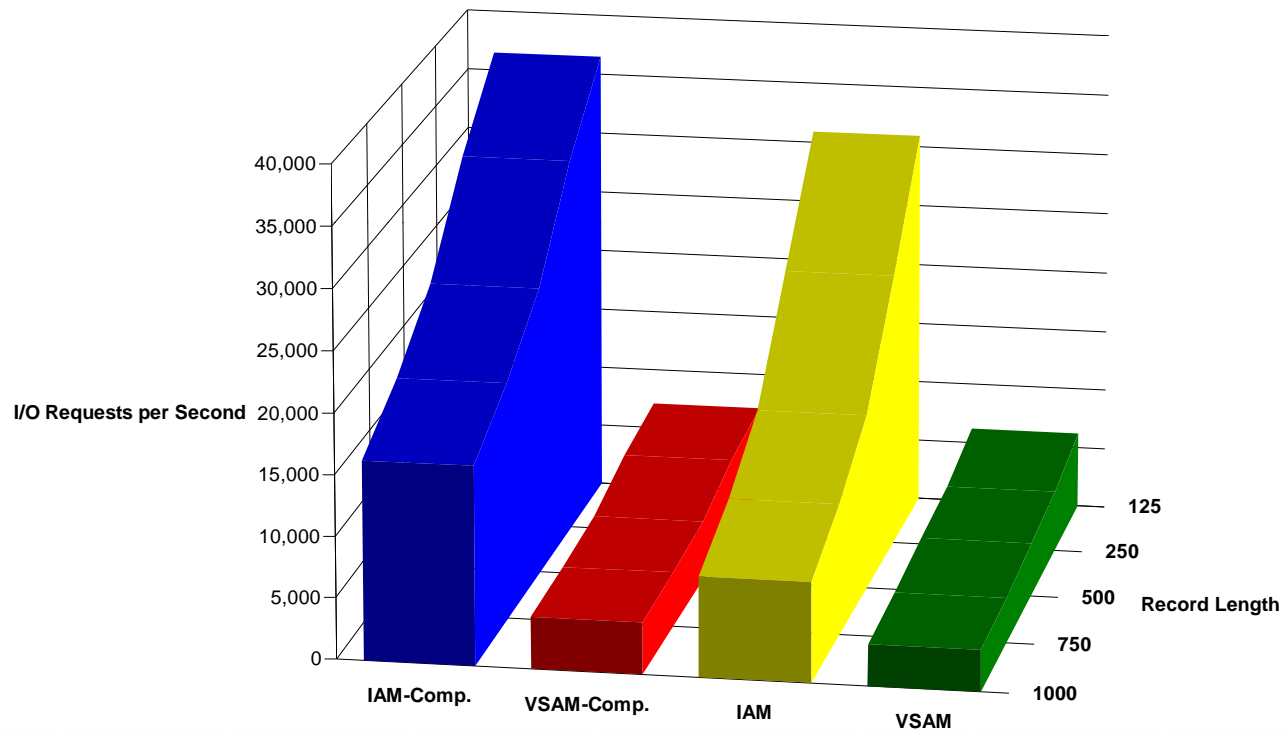
AIX Unique Key Sequential Performance



- Test Description:
 - Sequentially read entire file through unique key AIX
 - VSAM improved over prior test due to sequence for AIX and Base generally being identical
 - IAM's Real Time Tuning still clear winner
- IAM used 48% to 61% less CPU time
- IAM ran in 59% to 81% less elapsed time
- IAM used 72% to 96% less EXCP's

IAM V8.1 vs. VSAM

AIX Unique Key Sequential Performance



IAM V8.1 vs. VSAM Summary



- IAM V8.1 consistently outperforms VSAM SMB
- IAM V8.1 significantly reduces manual tuning
 - Exceptional file load performance
 - IAM easily handles COBOL ACCESS IS DYNAMIC
 - Outstanding performance with AIX
 - Significantly reduces CI lock outs in normal update processing
- IAM reduces application computing costs
 - CPU time
 - EXCP's
 - Elapsed Time
 - DASD space

IAM z/OS 1.8 Support



- Available Now
- V8.0/33 or higher
- V8.1/04 or higher
 - Required for Large Format Sequential Data Set Support

IAM in the Future



- IAM SYSPLEX Record Level Sharing
 - Initially use XCF services
 - Ease of use
 - Less development time
 - Reduced complexity brings greater reliability
- Increased use of 64-bit virtual
 - Index to files
 - Buffers

IAM V8.1 Summary



- Provides substantial value
 - Proven technology
 - Great Performance
 - Easy to use
- IAM Improves VSAM application performance
 - Reduces CPU time, I/O, Elapsed time
 - Little or no tuning required
- IAM ongoing development provides future value
 - SYSPLEX Record Level Sharing
 - Increased use of 64-bit virtual storage



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