VSI OpenVMS Alpha Release V8.4-2L2

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EMEA VSI Professional Services Alliance Partner

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What is VSI Announcing?

- New VSI OpenVMS Alpha & Layered Products release(s)

  o OpenVMS V8.4-2L1 and OpenVMS V8.4-2L2

  o Layered Products limited to suite available on Integrity

- OS released in February 2017 and August 2017

- LP release in April 2017

- Support Levels

  o Bronze

  o Gold

  o Platinum

- Initial hardware platforms supported

  o DS10, DS15, DS20, DS20E, DS25, ES40, ES45, ES47, GS80

Benefits

- Provides Updated OS version Support

- Provides Updated LP Support

- Provides Updated Open Source Product Support

- Updated Security – SSL1

- 179 New Features Since V7.3-2

- 475 Additional Defect Repairs

  o More Stable

- Updated TCPIP Stack

  o Coming Soon

- Most Alpha platforms Supported

Servers Supported

Workgroup Class	Departmental Class	Enterprise Class
AlphaServer 200	AlphaServer 2100	ES80
AlphaServer 300	AlphaServer 4000	GS1280
AlphaServer 400	AlphaServer 4100	AlphaServer 8000
AlphaServer 500	ES40 *	GS Series
AlphaServer 600	ES45 *	
AlphaServer 800	ES47 *	
AlphaServer 1000		
AlphaServer 1000A		
AlphaServer 1200		
AlphaServer 2000A		
DS10 *		
DS15 *		
DS20 *		
DS20E *		
DWP Workstation		
XP Workstation		

* Initial list of supported servers

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Support Tiers

Bronze (9X5)	Silver 24X7	Platinum (Proactive 24X7)
• Standard support phone number provided	• Standard support phone number provided	• Dedicated phone number provided on sign-up
• Right to new minor releases of a VSI product	• Right to new minor releases of a VSI product	• Right to new minor releases of a VSI product
• Access to all software updates/patches provided between numbered releases	• Access to all software updates/patches provided between numbered releases	• Access to all software updates/patches provided between numbered releases
• Technical Support 9 hours a day, during 5 business days a week, not including VMS Software holidays	• Technical Support 24 hours a day, 7 days a week	• Technical Support 24 hours a day, 7 days a week
• Provided periodic VSI updates	• Provided periodic VSI updates	• Assigned a remote Technical Account Manager (TAM)
• 4 hour response from initial customer contact. This assumes that the customer uses the standard support phone line provided to the customer by VSI.	• 2 hour response from initial customer contact. This assumes that the customer uses the standard support phone line provided to the customer by VSI.	• Quarterly VSI software patch analysis
		Quarterly VSI software system health checks
		Provided periodic VSI updates

RTNV = Right to Major version plus Right to Minor version releases with direct VSI support contract

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How is VSI OpenVMS Alpha Sold?

- Licensing simplification

  o 3 Tiers

    ▪ Workgroup

    ▪ Departmental

    ▪ Enterprise

- All OpenVMS & LP licenses included in Tiers

  o 2 License PAKs

    ▪ Alpha-System

    ▪ Alpha-LP

- Sold as support agreement with licenses included

Bridge to X86

X86

Alpha

- Includes RTNV* for upgrading to X86 and Integrity

- Support based license model

  o 3 year term

    • 1 year term available for government customers

RTNV = Right To Major Version plus Right To minor Version releases

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LP Release – April 26, 2017

VSI Product Name	Version
VSI ACMS Dev	5.2
VSI ACMS RT	5.2
VSI ACMS Remote	5.2
VSI ACMS Remote	5.2
VSI Availability Manager	3.2
VSI BASIC	1.8
VSI C	7.4-01
VSI C++	7.4-6
VSI CIFS (SAMBA)	1.2ECO1C
VSI COBOL	3.1-7-1
VSI CSWS	2.4-3D
VSI CSWS	2.2-1C
VSI CSWS_JAVA (TOMCAT)	6.0-47A
VSI Distributed Computing Environment (DCE)	3.2A
VSI DECprint Supervisor (DCPS)	2.8
VSI DECdfs,	2.5
VSI DECforms Dev	4.2
VSI DECforms RT	4.2

LP Release – April 26, 2017

VSI Product Name	Version
VSI DECset (Includes CMS, DTM, ENVMGR, LSE, MMS, PCA, SCA)	12.0-1
VSI Disk File Optimizer	5.7
VSI Distributed Queuing System (DQS)	3.3
VSI Datatrieve (DTR)	7.4
VSI Forms Management System Dev (FMS)	2.6
VSI Forms Management System RT (FMS-RT)	2.6
VSI Media Robot Utility (MRU)	1.9
VSI FORTRAN	8.3-2-1
VSI Pascal	6.2
VSI Save Set manager (SSM)	1.9-1
VSI SSL1	1.02k
VSI T4	4.4
VSI Terminal Data Management System Dev (TDMS)	2.1-1
VSI Terminal Data Management System RT (TDMS-RT)	2.1-1
VSI VSII18N	8.4-2

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For more information, please contact us at:

Sales@vmssoftware.com

VMS Software, Inc. • 580 Main Street • Bolton MA 01740 • +1 978 451 0110

or in EMEA
Rob@bg-software.nl or Gerrit@bg-software.nl
we can help you with your VMS-ecosystem:
latest VSI-software, incl. support on software **and** hardware,
(customized) training, etc.

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What is a Performance Build?

It is a rebuild of OpenVMS Alpha with compiler switches that optimize code for EV6/EV7 architecture

What Systems Are Supported?

Model		Code name	CPU
DS10	6/466	WebBrick	EV6
	67/600		EV67
DS10L	6/466	Slate	EV6
	6/600		EV67
DS15	68/1000	HyperBrick	EV68CB
DS25	68/1000	Granite	EV68CB
DS20	6/500	Goldrush	21264 (EV6)
DS20E	6/500	Goldrack	EV6
	6/667		EV67
	68/833		EV68AL
DS20L	68/833	Shark	EV68AL

Model		Code name	CPU
ES40	6/500	Clipper	EV6
	6/667		EV67
	68/833		EV68AL
ES45	68/1000	Privateer	21364 (EV7)
	68/1250		
ES47	7/1000	Marvel	21364 (EV7)
	7/1150		

Model		Code name	CPU
GS80	731	Wildfire	21264A (EV67) 21264C (EV68CB)
	1001		
	1224		
GS160	731	Wildfire	21264A (EV67) 21264C (EV68CB)
	1001		
	1224		
GS320	731	Wildfire	21264A (EV67) 21264C (EV68CB)
	1001		
	1224		
ES80	1000	Marvel 4x2P	21364 (EV7)
	1150		
GS1280	1150	Marvel 8P	21364 (EV7)
	1300		

The Performance build (V8.4-2L2) will only run on EV6/EV7 based systems.

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Why a Alpha Performance Build?

Leveraging Alpha hardware instructions

- Byte-Word Extensions (BWX)

- Motion Video Instructions (MVI) (No Compiler Support)

- Floating-point Extensions (FIX)

- Count Extension (CIX) (No Compiler Support)

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Why a Alpha Performance Build?

Leveraging Alpha hardware instructions

- Byte-Word Extensions (BWX)

    LDBU, LDWU, SEXTB, SEXTW, STB, STW

- Floating-point Extensions (FIX)

    FTOIS, FTOIT, ITOFF, ITOFS, ITOFT, SQRTF, SQRTG, SQRTS, SQRTT

Resulting in fewer executed instructions, better cache efficiency, better compiler optimization options

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Why a Alpha Performance Build?

Modules Utilizing 21264 instructions w/Compiler switch /Architecture=EV6

- Byte-Word Extensions (BWX) – 10,027 out of 16,150 Modules

- **Floating-point Extensions (FIX) – 994 out of 16,150 Modules**

Compiler Generating code sequences to support:

- Leveraging hints for Out of Order Execution

- Leveraging Load Hit / Miss Prediction – Speculative Execution Pipeline

- Leveraging 32 in-flight and loads and stores

- Cache Management – 64K byte, two-way set-associative instruction cache

- Fully-Pipelined integer multiply unit, population count, floating point square-root, moving directly between floating point and integer registers

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Why a Alpha Performance Build?

Specifics for "C" Language Only – Optimizations (CIX)

- Available as Intrinsic – No automatic detection – inclusion

- SQRT – Qualifiers Specific – No "errno" update

Optimizations (MVI)

- Compiler never taught to utilize these instructions, only used in specialized drivers and Built-ins for optimizing application code.

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How Many OpenVMS Modules Are Affected?

Resd:

Total: 10273
Arch: 9390
NoArch: 8

Message:	213	Fortran:	37	Bliss-32:	79
CDU:	81	Pascal:	11	Bliss-64:	43
C++:	95	Basic:	1	UIL:	2
Macro-64:	0	DCLdiet:	112	Unknown:	0
AMacro:	0	SDL:	70		
Ada:	139				

Errors: 0

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How Many OpenVMS Modules Are Affected?

EV6 Optimized System Modules

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How Many OpenVMS Modules Are Affected?

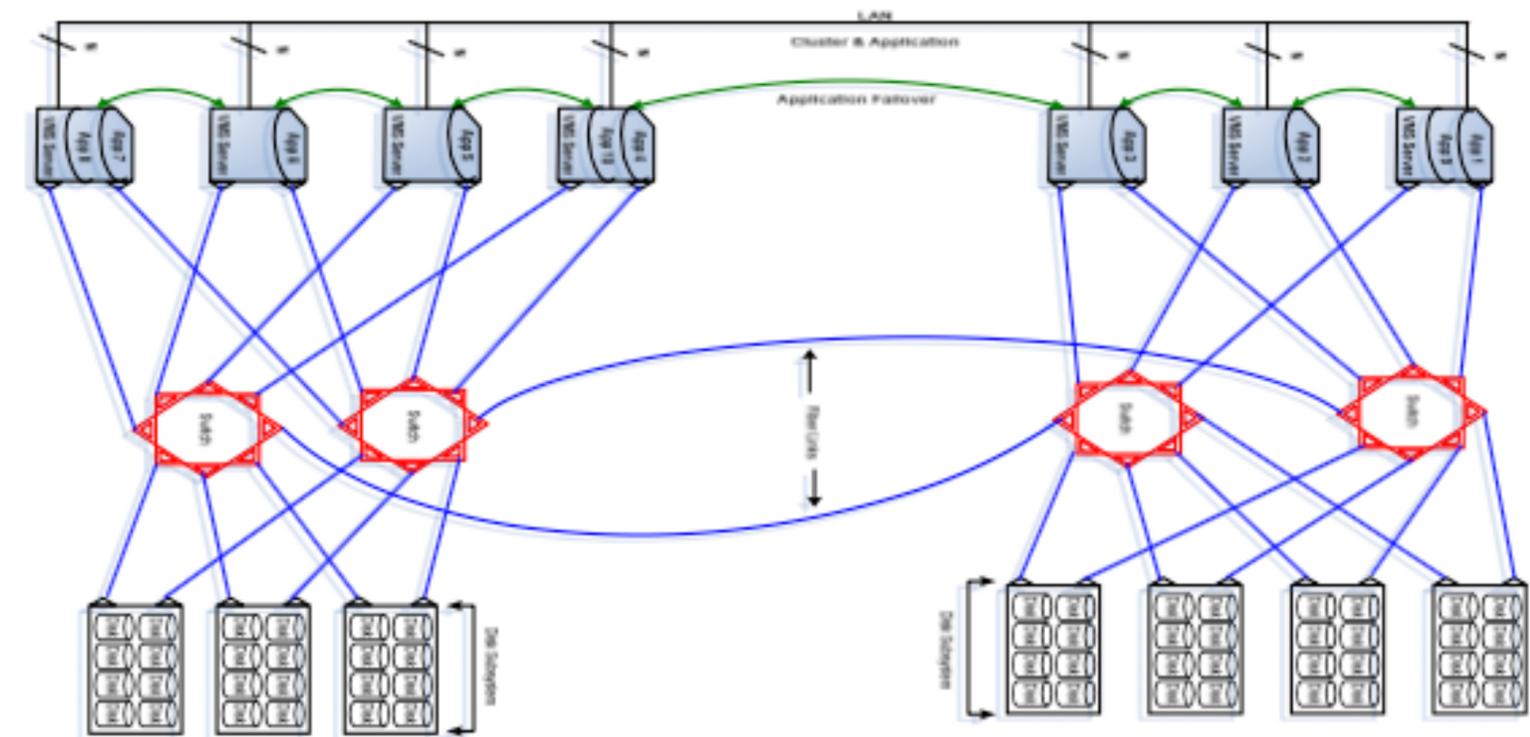EV6 Optimized System Modules

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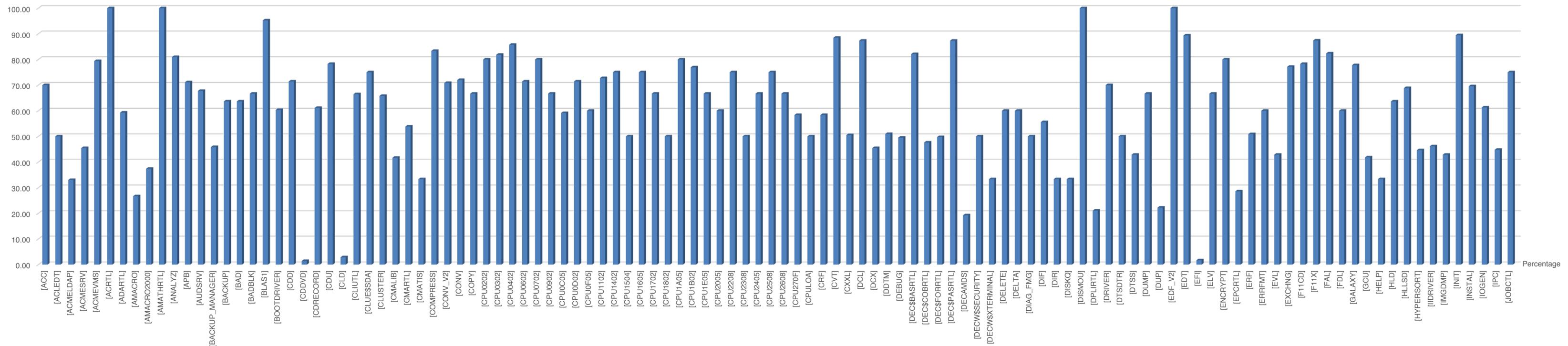
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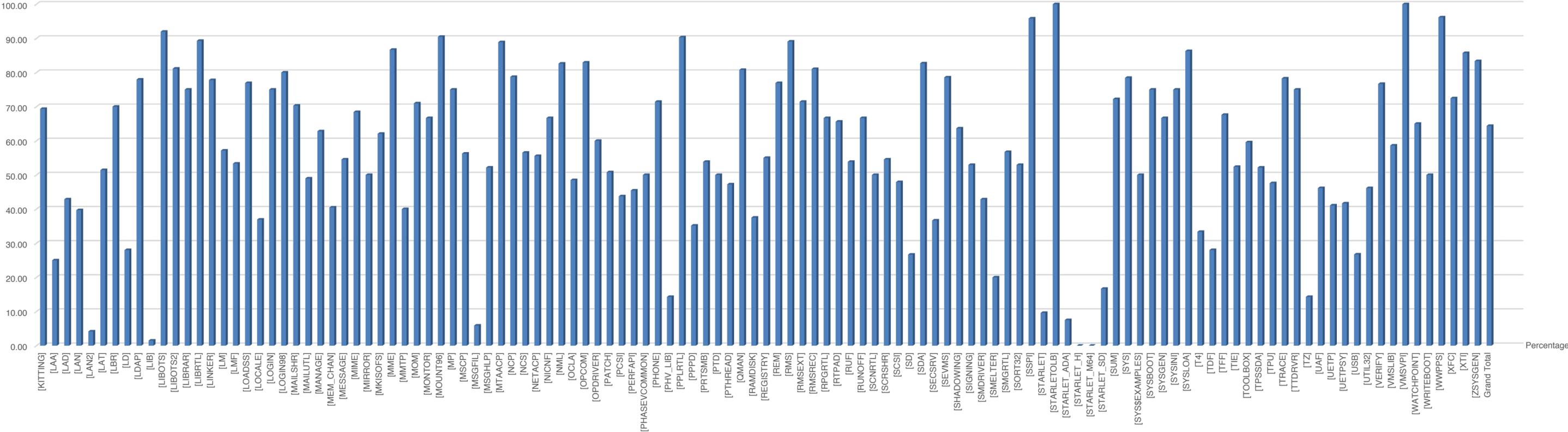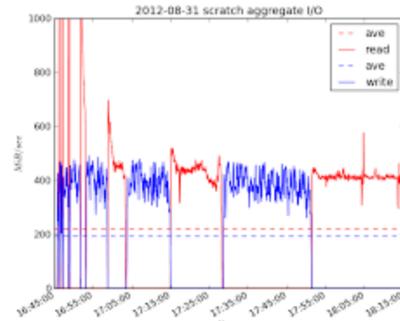
Show me the Numbers!

Test Environment

- Pure Storage Array – 22 SSDs

- EVA Storage Array – 24 300GB Disks (15K RPM)

- MSA P2000 Storage Array – 12 300GB disks
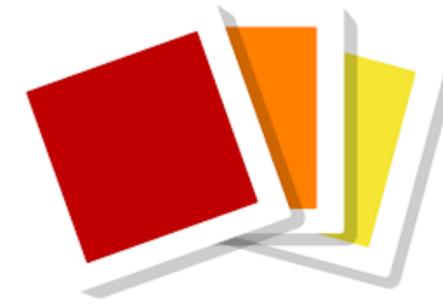
- 2Gb FC HBA (Emulex)

- 8Gb B Series HPE FC Switch
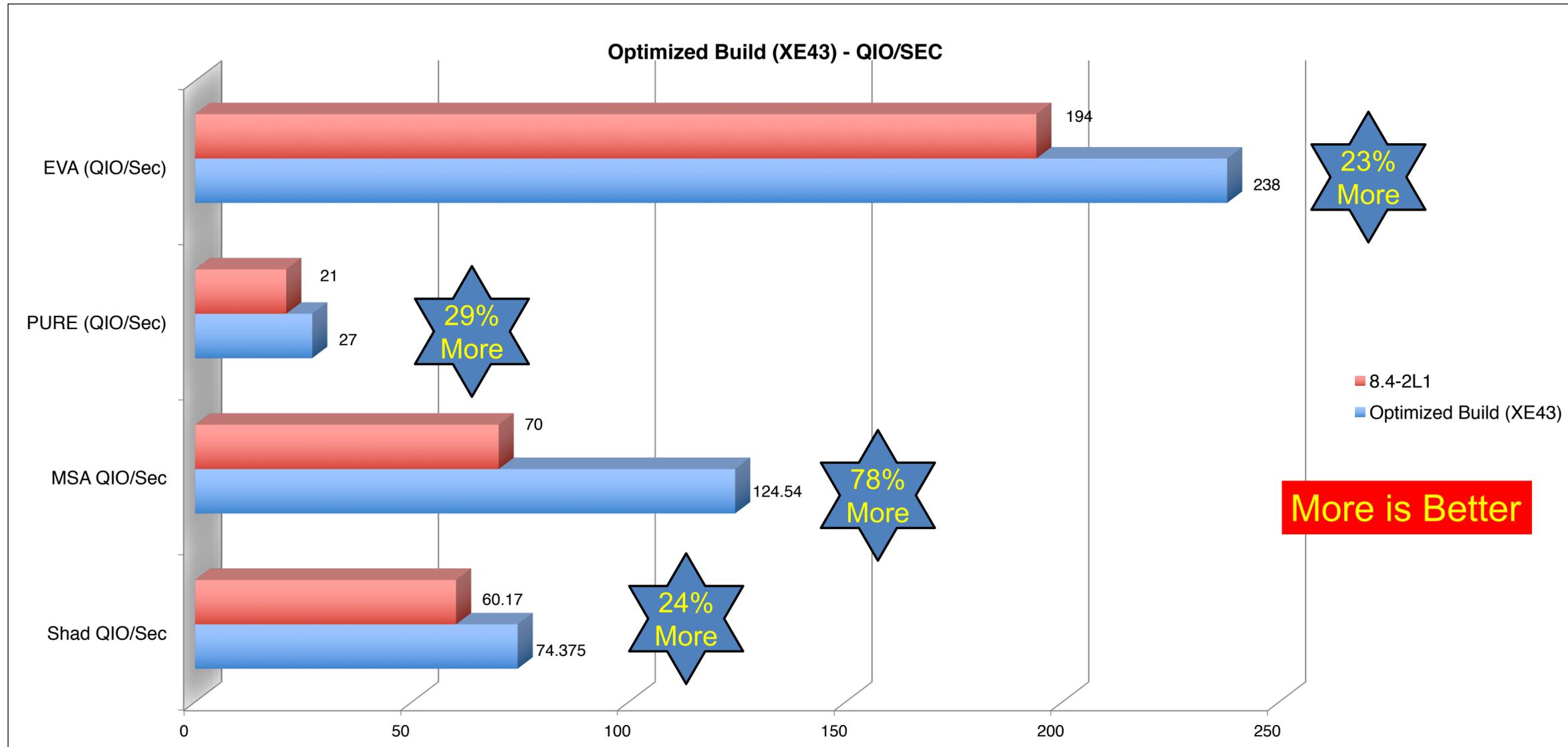
- ES47 AlphaServer

First Test Run

- I/O HAMMER
- 512 byte blocks, file size 126 Blocks
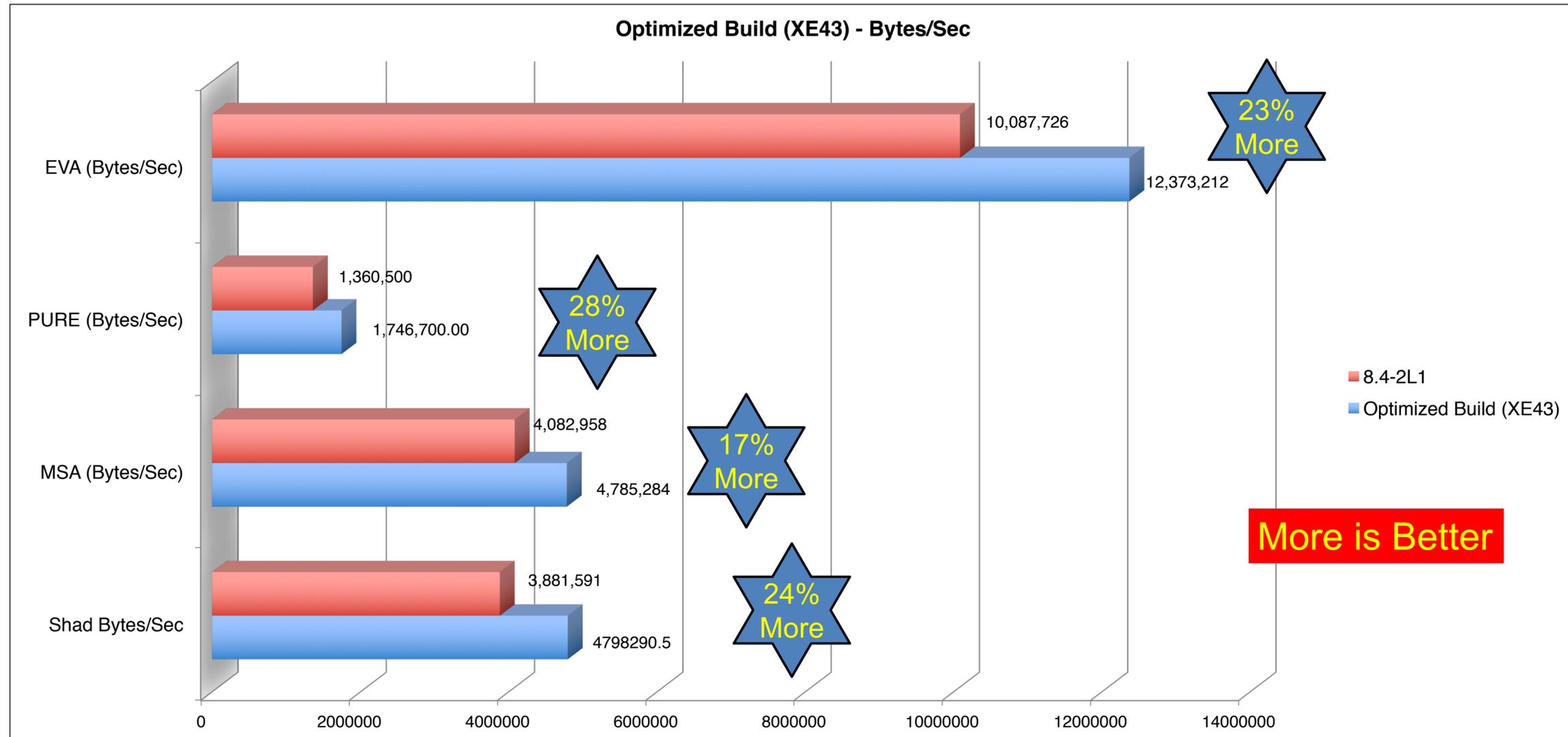
- FileX
- 1 file @ 20000 Bytes

First Test Results – QIO/Sec

(Using XQP/RMS)

Optimized Build (XE43) - QIO/SEC

Legend:
- 8.4-2L1 (red)
- Optimized Build (XE43) (blue)

More is Better

Data:
- EVA (QIO/Sec): 194, 238 — 23% More
- PURE (QIO/Sec): 21, 27 — 29% More
- MSA QIO/Sec: 70, 124.54 — 78% More
- Shad QIO/Sec: 60.17, 74.375 — 24% More

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First Test Results – Bytes/Sec

(Using XQP/RMS)

Optimized Build (XE43) - Bytes/Sec

- EVA (Bytes/Sec): 10,087,726 / 12,373,212 — **23% More**
- PURE (Bytes/Sec): 1,360,500 / 1,746,700.00 — **28% More**
- MSA (Bytes/Sec): 4,082,958 / 4,785,284 — **17% More**
- Shad Bytes/Sec: 3,881,591 / 4798290.5 — **24% More**

Legend:
- 8.4-2L1
- Optimized Build (XE43)

More is Better

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Second Test Run

2012-08-31 scratch aggregate I/O

- I/O HAMMER
- 512 byte blocks, file size 126 Blocks

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Second Test Results – QIO/Sec

(Using XQP/RMS)

QIO/Sec

- MSA (QIO/Sec): 155.695 / 154.196 — **-1% Less**
- EVA (QIO/Sec): 11.539 / 15.555 — **35% More**
- Pure (QIO/Sec): 12.832 / 17.58 — **37% More**
- Shad (QIO/Sec): 42.262 / 92.881 — **120% More**

Legend:
- 8.4-2L1
- Optimized Build (XE43)

More is Better

Second Test Results – Bytes/Sec

(Using XQP/RMS)

Bytes/Sec

MSA (Bytes/Sec): 11,052.26 / 11,635.67 — **5% More**

EVA (Bytes/Sec): 3,338.11 / 3,307.19 — **-1% Less**

Pure (Bytes/Sec): 1,669.63 / 2,400.66 — **30% More**

Shad (Bytes/Sec): 9,713.94 / 13,680.82 — **29% More**

Legend:
- 8.4-2L1
- Optimized Build (XE43)

More is Better

Thousands

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Third Test Run - MFLOPS

- No appreciable difference in LINPACK performance between the standard Alpha Release (V8.4-2L1) and the Optimized Alpha Build (V8.4-2L2)

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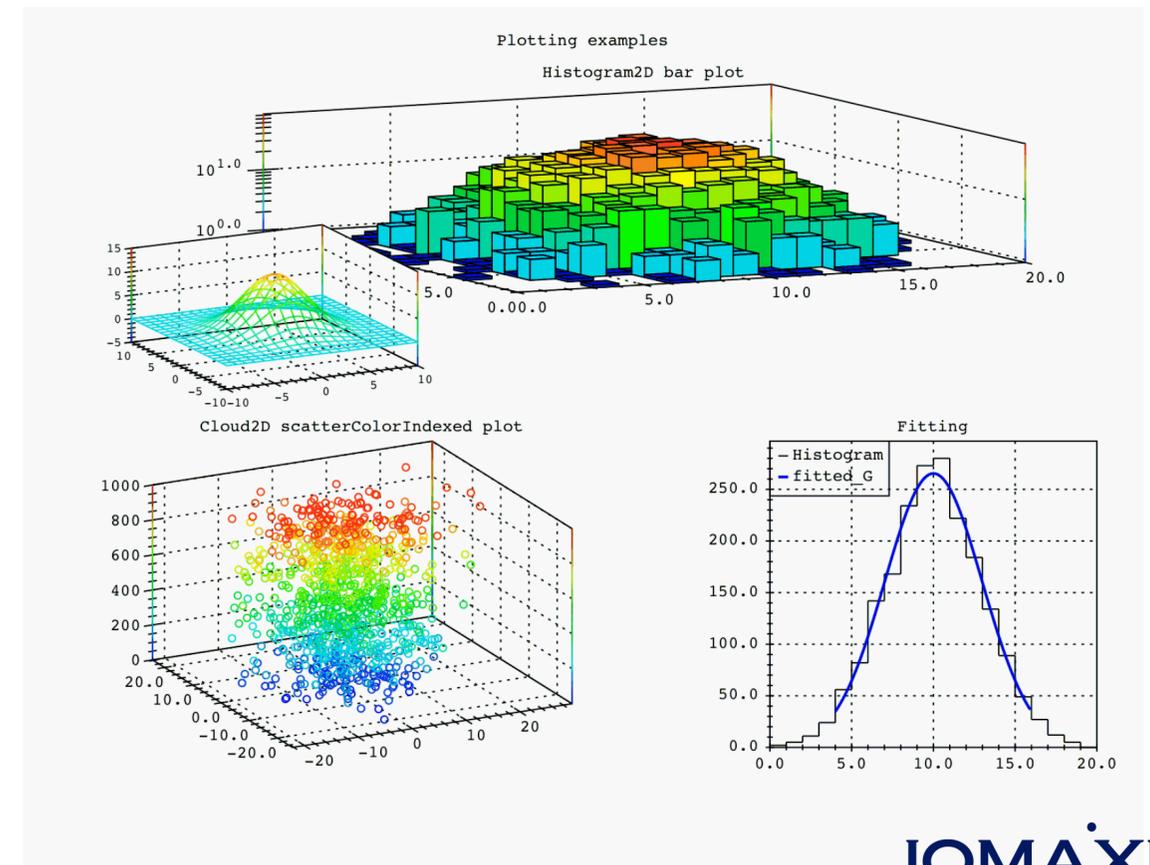
Third Test Run - MFLOPS

ES47 7/1150 running V8.4-2L2 (Optimized Alpha Build)
LINPACK benchmark, double precision
Machine precision: 15 digits
Array sixe 600x600

Reps	Time(s)	DGEFA	DGESL	OVERHEAD	KFLOPS
16	1.00	91.00%	0.00%	9.00%	639,296.703
32	1.98	93.43%	1.52%	5.05%	618,893.617
64	3.97	93.45%	0.76%	5.79%	622,203.209
128	7.94	92.95%	0.88%	6.17%	624,708.725
256	15.89	92.95%	1.20%	5.85%	622,203.209

GE = General Matrix
FA = Compute LU Factorization
SL = Apply Results of FA To Solve Problem

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Third Test Run - MFLOPS

ES47 7/1150 running OpenVMS Alpha V8.4-2L1
LINPACK benchmark, double precision
Machine precision: 15 digits
Array sixe 600x600

Reps	Time(s)	DGEFA	DGESL	OVERHEAD	KFLOPS
16	0.99	91.92%	0.00%	8.08%	639,296.703
32	1.99	93.47%	0.00%	6.53%	625,548.387
64	3.97	92.95%	1.26%	5.79%	622,203.209
128	7.94	93.20%	1.13%	5.67%	621,372.497
256	15.88	92.82%	1.26%	5.92%	623,036.145

GE = General Matrix
FA = Compute LU Factorization
SL = Apply Results of FA To Solve Problem

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Third Test Run - MFLOPS

MFLOPS

Legend:
- ■ (8.4-2L1) KFLOPS
- ■ (XE43) KFLOPS

Reps	(8.4-2L1) KFLOPS	(XE43) KFLOPS
256.00	623.04	622.20
128.00	621.37	624.71
64.00	622.20	622.20
32.00	625.55	618.89
16.00	639.30	639.30

X-axis: 605.00, 610.00, 615.00, 620.00, 625.00, 630.00, 635.00, 640.00

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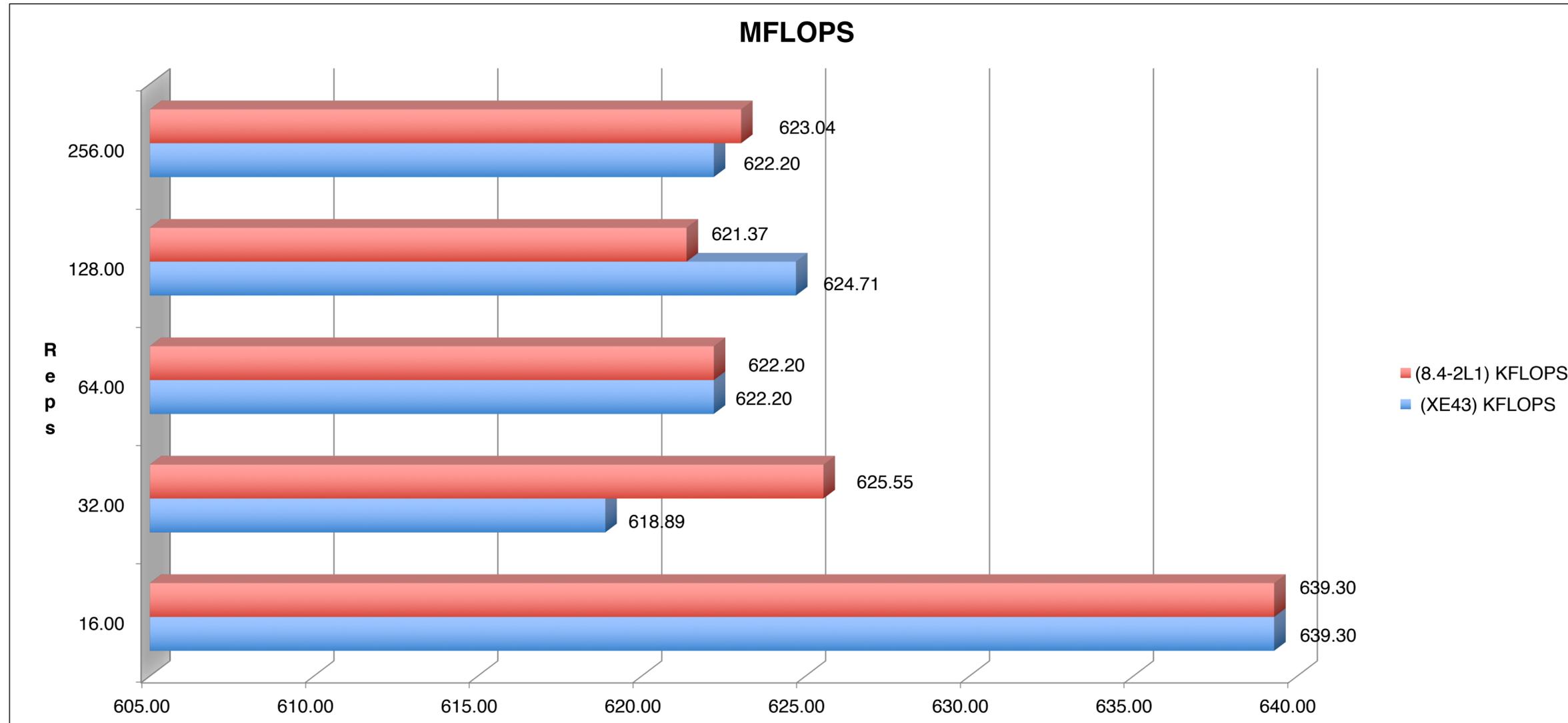
Fourth Test Run - IOF

- IO with Foreign volumes
  - A disk is mounted foreign
  - I/O are issued to the disk
    - bypasses XQP and RMS (no file system on the device)
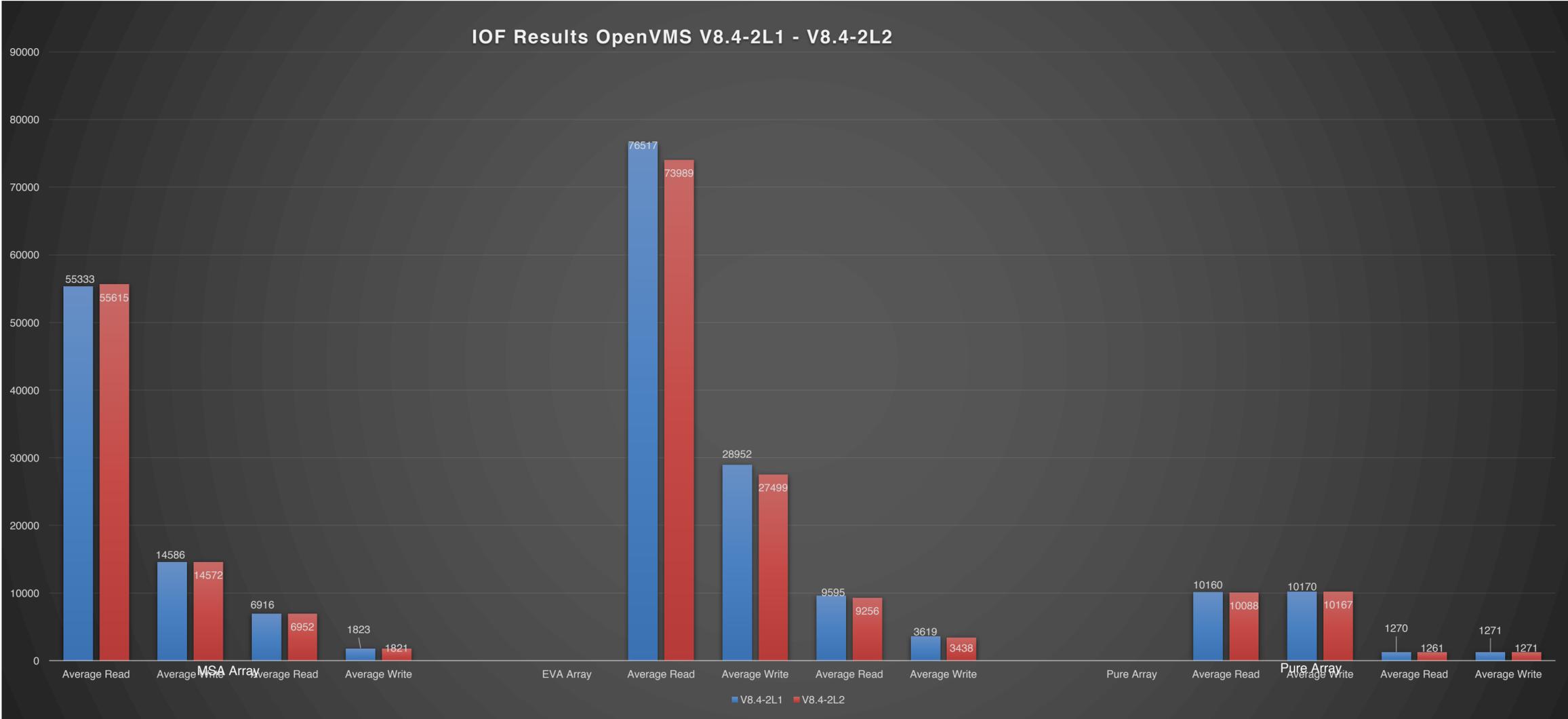- No appreciable difference in performance
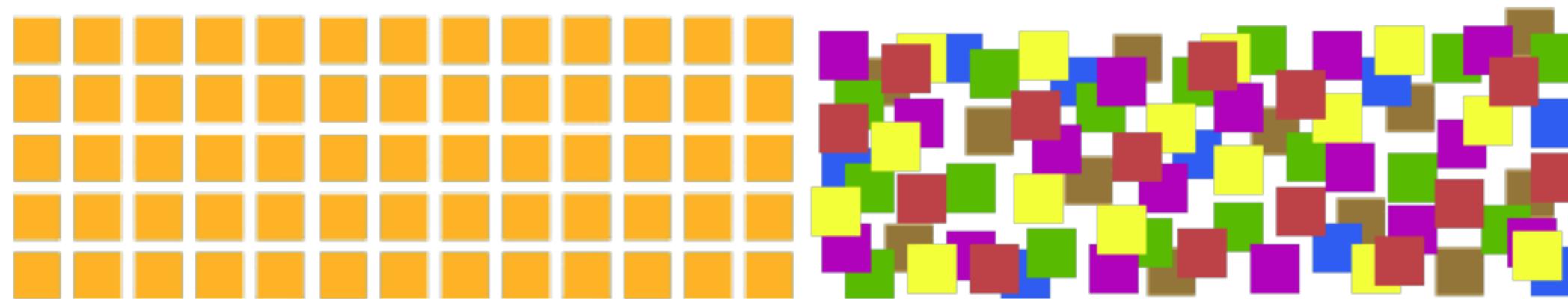
Structured Data vs. **Unstructured Data**

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Fourth Test Run - IOF

IOF Test			
MSA Array	**V8.4-2L1**	**V8.4-2L2 Build**	
Average Read	55333	55615	Xfer/sec
Average Write	14586	14572	Xfer/sec
Average Read	6916	6952	MB/sec
Average Write	1823	1821	MB/sec
EVA Array			
Average Read	76517	73989	Xfer/sec
Average Write	28952	27499	Xfer/sec
Average Read	9595	9256	MB/sec
Average Write	3619	3438	MB/sec
Pure Array			
Average Read	10160	10088	Xfer/Sec
Average Write	10170	10167	Xfer/Sec
Average Read	1270	1261	MB/Sec
Average Write	1271	1271	MB/Sec

Used 256 Byte Blocks with a Queue Depth of 4

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Fourth Test Run - IOF

IOF Results OpenVMS V8.4-2L1 - V8.4-2L2

MSA Array — Average Read 55333 / 55615, Average Write 14586 / 14572, Average Read 6916 / 6952, Average Write 1823 / 1821

EVA Array — Average Read 76517 / 73989, Average Write 28952 / 27499, Average Read 9595 / 9256, Average Write 3619 / 3438

Pure Array — Average Read 10160 / 10088, Average Write 10170 / 10167, Average Read 1270 / 1261, Average Write 1271 / 1271

Legend: V8.4-2L1 (blue), V8.4-2L2 (red)

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Conclusions

- VSI's tests that involve I/O to a volume with an OpenVMS X11 file system show an increase in I/O performance with the optimized OpenVMS Alpha Build (V8.4-2L2) compared to the standard OpenVMS Alpha release (V8.4-2L1)
  - Due to changes in XQP and RMS modules
- VSI tests that involve I/O to a volume with a foreign file system do not show any performance improvements running V8.4-2L2
- VSI's Memory and CPU tests did not show any difference in performance running V8.4-2L2 (VSI believes this is a test issue)
- LINPACK tests did not show any performance difference running V8.4-2L2

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Network IO Performance

10 Gigabit Uni-Processor

Packet Rate / CPU Percentage / Vendor Comparison

Legend: RX4640, GS1280, CPU RX4640, CPU 1280

10 Gigabit Multi-Processor

Packet Rate / CPU Percentage / Vendor Comparison

Legend: RX4640, GS1280, CPU RX4640, CPU 1280

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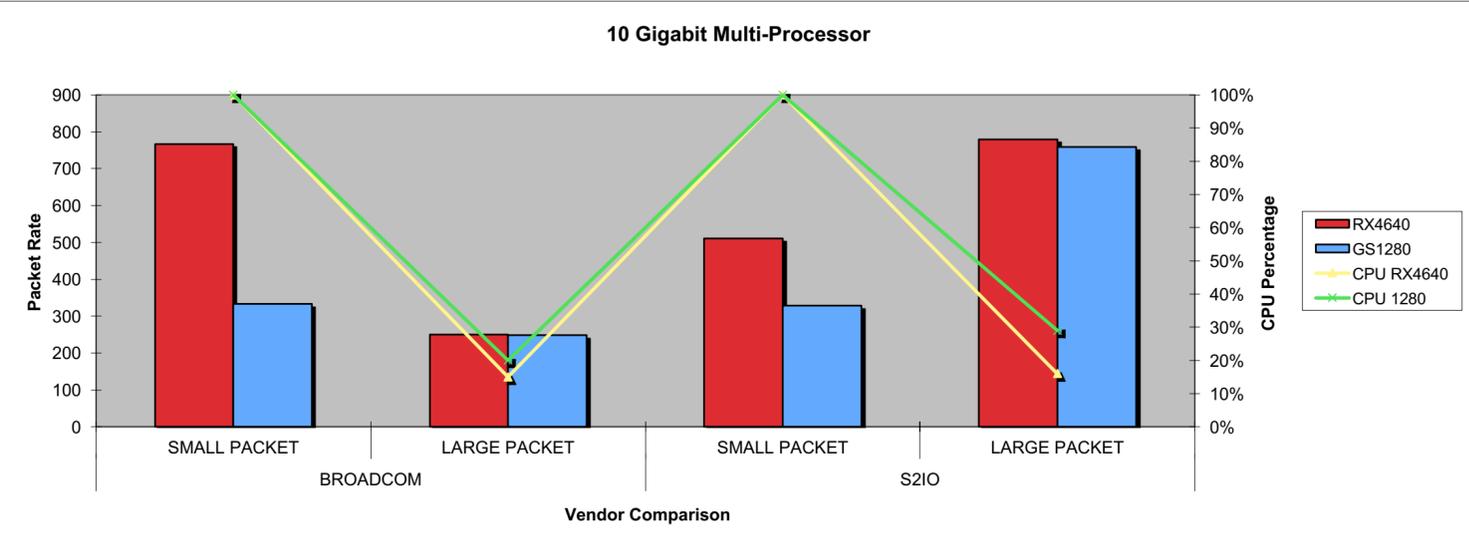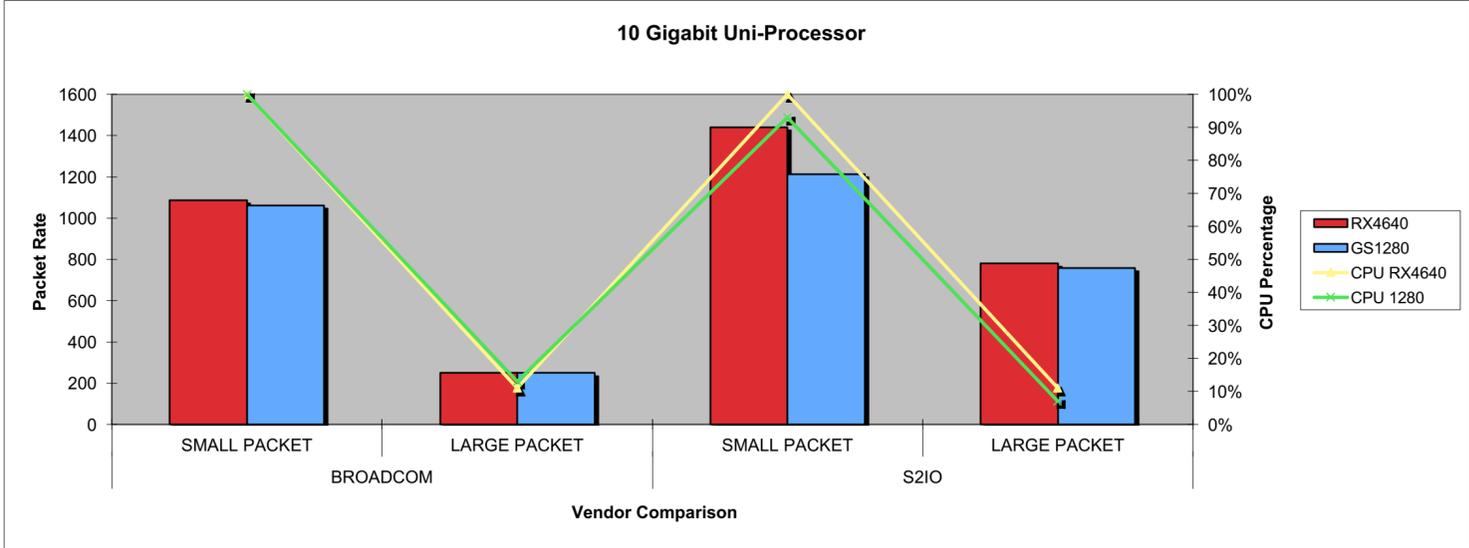
Conclusions

- Your mileage may vary!

OK, So it's faster...

What else can I do to get more productivity?
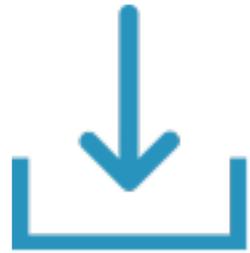
How about Tuning?
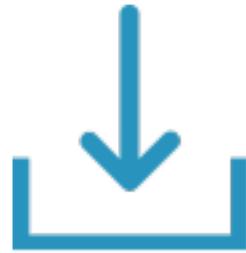
Use all the memory you have.

- Increase RMS_* caching
- Increase ACP_* caching
- Increase PFN_COLOR_COUNT, ZERO_LIST_HI
- Is WSMAX big enough?
- MAXBUF should be 65535

Monitor is your friend

- CPU Modes
- IO Activity
- Paging / MPW Lists

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More Performance - VSI OpenVMS will help...

RAMdisk is Included

- Got MEMORY?
- RAMdisk instead of magnetic disk or SSD.
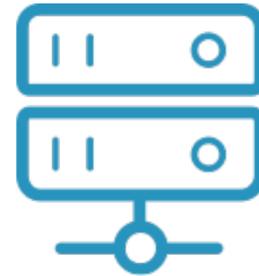
10 Gb Ethernet

- Yes, VSI supports XFRAME 10 Gb NIC cards for PCI-X 1.2, CKO

SSD Replacements

- Obtain maximum performance from your existing controllers
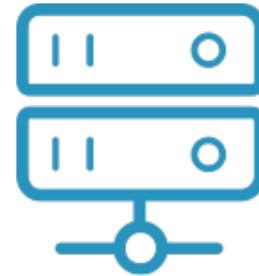
Performance / Capacity

- Use TDC API to collect, analyze, and store your data.

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More Performance - VSI OpenVMS will help…
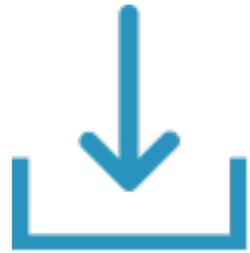
Enhanced File System

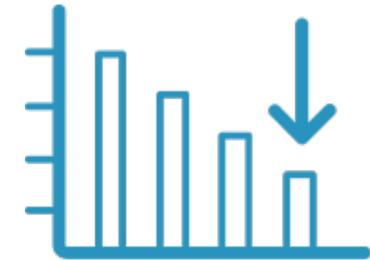- Larger Disk Volumes
- Four Member Shadow-sets

Pedriver Enhancements

- Removal of inline trace code
- Corrections to multi-rail algorithms

Focus on math routines

- Evaluating / optimization of BLAS and $MTH_{32}RTLs$

Performance / Capacity

- Updates to AMDS client support

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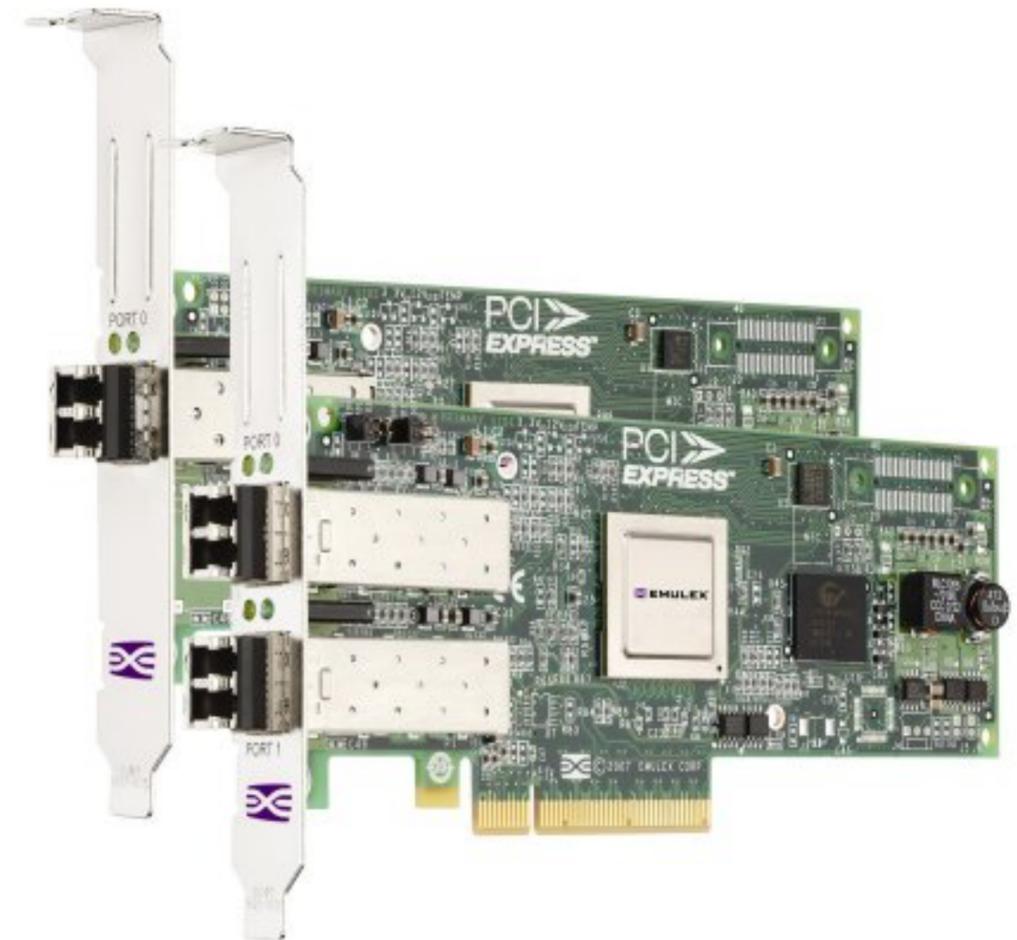
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New I/O Hardware

Ethernet Adapters?

Nemonix 10Gb Ethernet

PCI-X Version 1.2 (133Mhz Maximum Rate)

Xframe II - Neterion – Supports CKO

Maximum Data Rates (720 MB/sec)

Driver Support already on the Alpha Distribution

Support for LAVc Multi-Rail Clustering

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Fibre Channel HBAs?

4 Gb/s Fibre Channel HBA
PCI-X (133 MHz)

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Hardware Support

Refurbished Hardware

Refurbished Hardware Components?

NEMONIX™ Engineering, Inc.

- Original equipment manufacturer of hardware components and upgrades.

- System refreshes for legacy business critical systems that have reached or passed their End-of-Life dates.

- Service VAX, AlphaServer, IBM, Sun, etc., including depot-level repair of power supplies, motherboards, storage towers, etc.

Contact:

http://www.nemonix.com

Phone: 508.393.7700

or in EMEA
Rob@bg-software.nl or Gerrit@bg-software.nl

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Conclusion

Can
- Upgrade OpenVMS and LPs to current versions

Can connect AlphaServers to higher speed:
- Networks
- Storage

Can:
- Buy refurbished systems
- Get components refurbished

- Can obtain hardware support

Enhance Performance and Extend the life of AlphaServer environments

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For more information, please contact us at:

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or in EMEA
Rob@bg-software.nl or Gerrit@bg-software.nl
we can help you with your VMS-ecosystem:
latest VSI-software, incl. support on software **and** hardware,
(customized) training, etc.