



Modernizing Your Alpha Systems

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Historical Transition for OpenVMS O/S

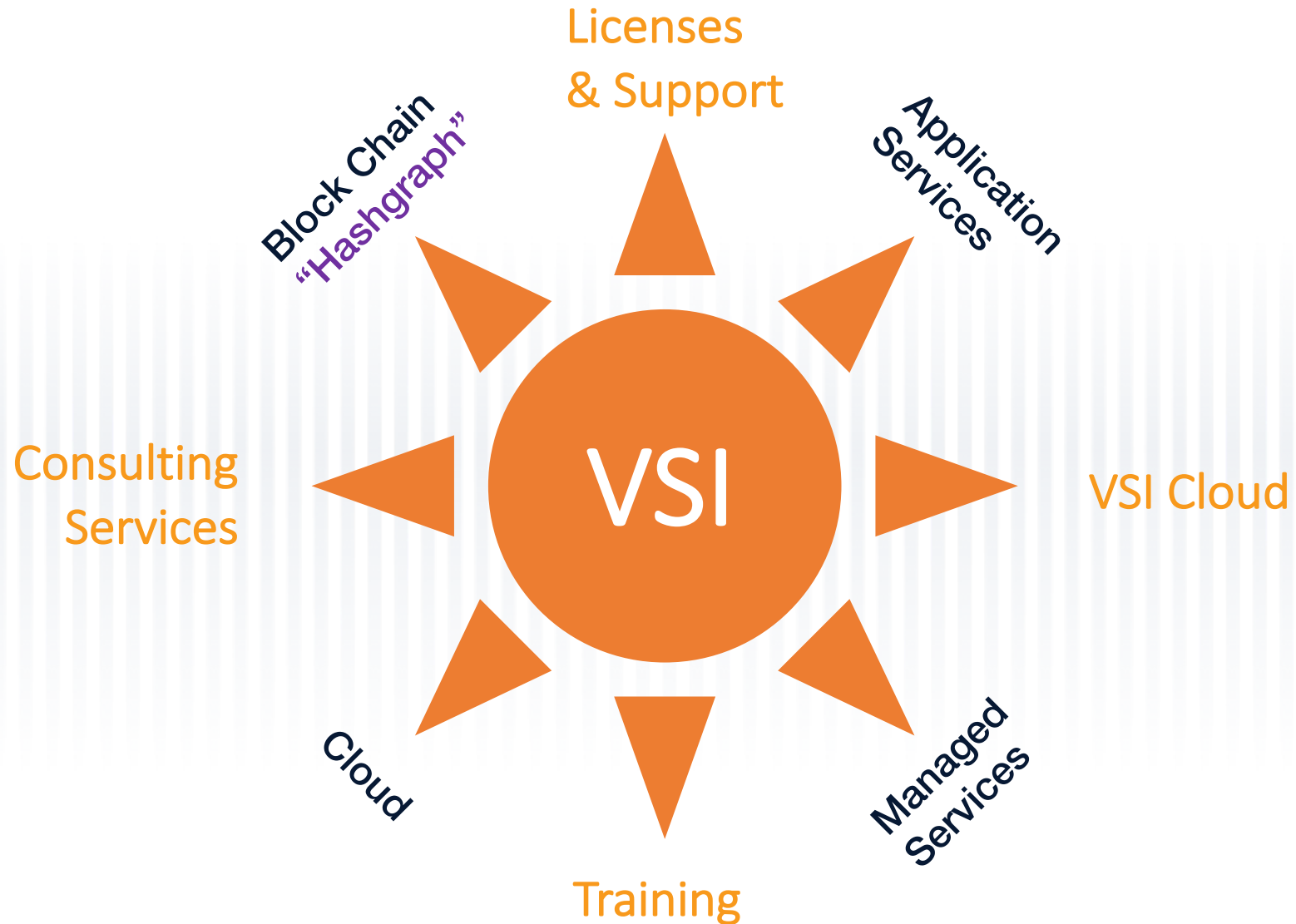
- After HP announces end of support for OpenVMS in 2013, VSI purchases the Rights to OpenVMS in 2014.
- VSI has the Exclusive rights to develop new versions of OpenVMS
- VSI has the Perpetual Worldwide License
- VSI has the Right to use the OpenVMS trademark
- VSI has the Right to release OpenVMS on any hardware (including the mainstream Intel x86 platform)
- VSI / HPE have fundamental agreement to transition customers to VSI (HPE gains new HW business / VSI gains new OpenVMS SW business)

Who is VSI?

- VMS Software, Inc. was created as a result of its parent company Teracloud, Ltd (European corporation) purchasing from HP in 2014, all Rights to the OpenVMS O/S.
- VSI is headquartered in Bolton, Massachusetts USA just 15 minutes from the original Digital Equipment Corporation (DEC) headquarters.
- VSI has approx. 85 employees with the majority in Bolton, but other locations as well.
 - Offices in Malmo, Sweden
 - Locations in The Netherlands, France, Germany, and elsewhere in North America
- The majority of VSI's employees are developers and engineers working on new products and services with the main emphasis on a OpenVMS x86 products due available in 2020.



OpenVMS Clearinghouse



Alpha Users are not alone!

(Major Organizations use OpenVMS Today)

- **Financial Services**
- **Manufacturing**
- **Healthcare**
- **Military**
- **Retail**
- **Distribution**
- **Energy**
- **Public Transit**
- **Automotive**
- **Aerospace**
- **Education**
- **Gov't Classified**
- **..... & More**

VSI Licenses:

- VSI is the exclusive company to develop new OpenVMS products since 2014.
- VSI is the only company who offers VAX, Alpha, and Integrity users a way to migrate to the x86 platform.
- VSI is the only company who can offer The Rights To New Versions at no extra cost provided you are on VSI Support.



VSI Support Offerings

Bronze 9X5 Support

- Standard support phone number provided
- ¹ Right to New Versions (RTNV) of a VSI product
- Access to all software updates/patches provided between numbered releases
- Technical Support 9 hours a day, during 5 business days a week
- Provided periodic VSI updates
- 4 hour response from initial customer contact. This assumes that the customer uses the standard support phone line provided to the customer by VSI.

Silver 24X7 Support

- Standard support phone number provided
- ¹ Right to New Versions (RTNV) of a VSI product
- Access to all software updates/patches provided between numbered releases
- Technical Support 24 hours a day, 7 days a week
- Provided periodic VSI updates
- 2 hour response from initial customer contact. This assumes that the customer uses the standard support phone line provided to the customer by VSI.

Gold 24X7 Support

- Standard support phone number provided
- ¹ Right to New Versions (RTNV) of a VSI product
- Access to all software updates/patches provided between numbered releases
- Technical Support 24 hours a day, 7 days a week
- Assigned a remote Technical Account Manager (TAM)
- VSI software patch analysis
- VSI software system health checks
- Provided periodic VSI updates
- 1 hour response from initial customer contact. This assumes that the customer uses the standard support phone line provided to the customer by VSI.

Platinum 24x7 Support

- Dedicated phone number provided on sign-up
- ¹ Right to New Versions (RTNV) of a VSI product
- Access to all software updates/patches provided between numbered releases
- Technical Support 24 hours a day, 7 days a week
- Assigned a remote Technical Account Manager (TAM)
- Quarterly VSI software patch analysis
- Quarterly VSI software system health checks
- Provided periodic VSI updates
- Immediate response from initial customer contact. This assumes that the customer uses the dedicated phone line provided to the customer by VSI.



These roadmaps contain forward looking statements and are provided solely for your convenience. While the information in this roadmap is based on our current best estimates, such information is subject to change without notice.

How is VSI doing?

- Business nearly doubled from previous year.
 - FY2018 looks very strong.
 - Customer transition well underway.
- 2018 - Stronger VSI Marketing and Partner Outreach.
- Many worldwide organizations run VSI OpenVMS today.
- Make a Commercial Case to Customers
 - VSI is the only company who can offer OpenVMS V9.0 and higher including a clear x86 path for OpenVMS users. (RTNV, etc..) This includes Alpha and Integrity V9.2.
 - VSI is the only company who can offer Rights to New License Versions when customer buys VSI Support.
 - This includes Alpha, Integrity, and x86.



Why Modernize Your Alphas?

- O/S Highly Available
- Secure Design
- Your Trust It!
- Financial Issues (TCO may be less expensive than running Linux)
- Costs of Other Options are Expensive (Migration, etc..)
- VSI realized there is a large viable Alpha installed customer base with needs and we desire to support Alpha customers fully
- VSI offers Tools for Modernization



VSI Tools to Modernization

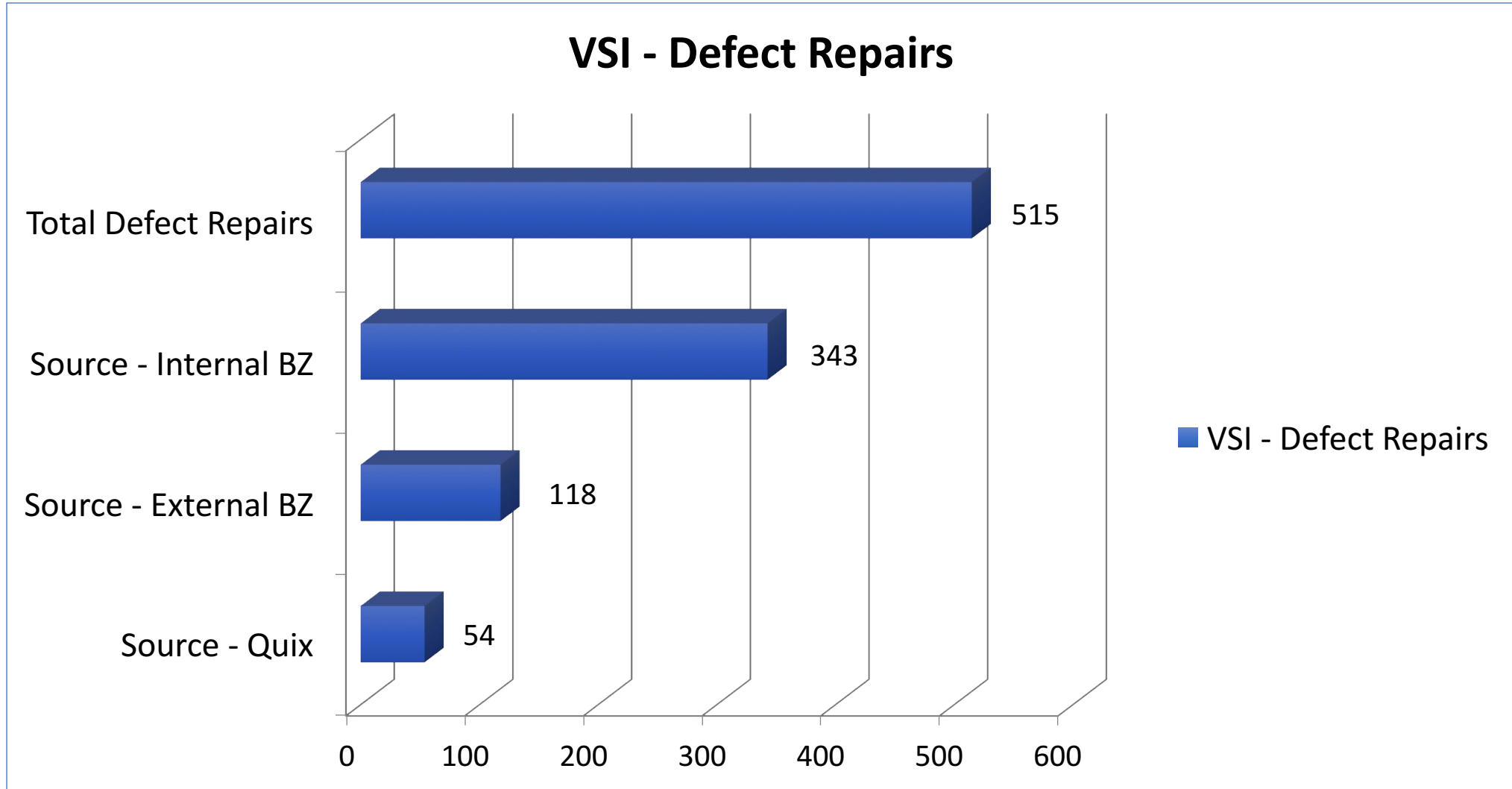
VSI Tools to Modernization

- VSI Offers L1 / L2 Support for older HPE OpenVMS versions
 - Stuck on HPE V8.4 and Prior
 - Consulting Available
- VSI Upgraded Licenses and Full Support
- VSI Cloud Solutions
- VSI Products and Support on x86 for the Bare Metal and the Virtual World



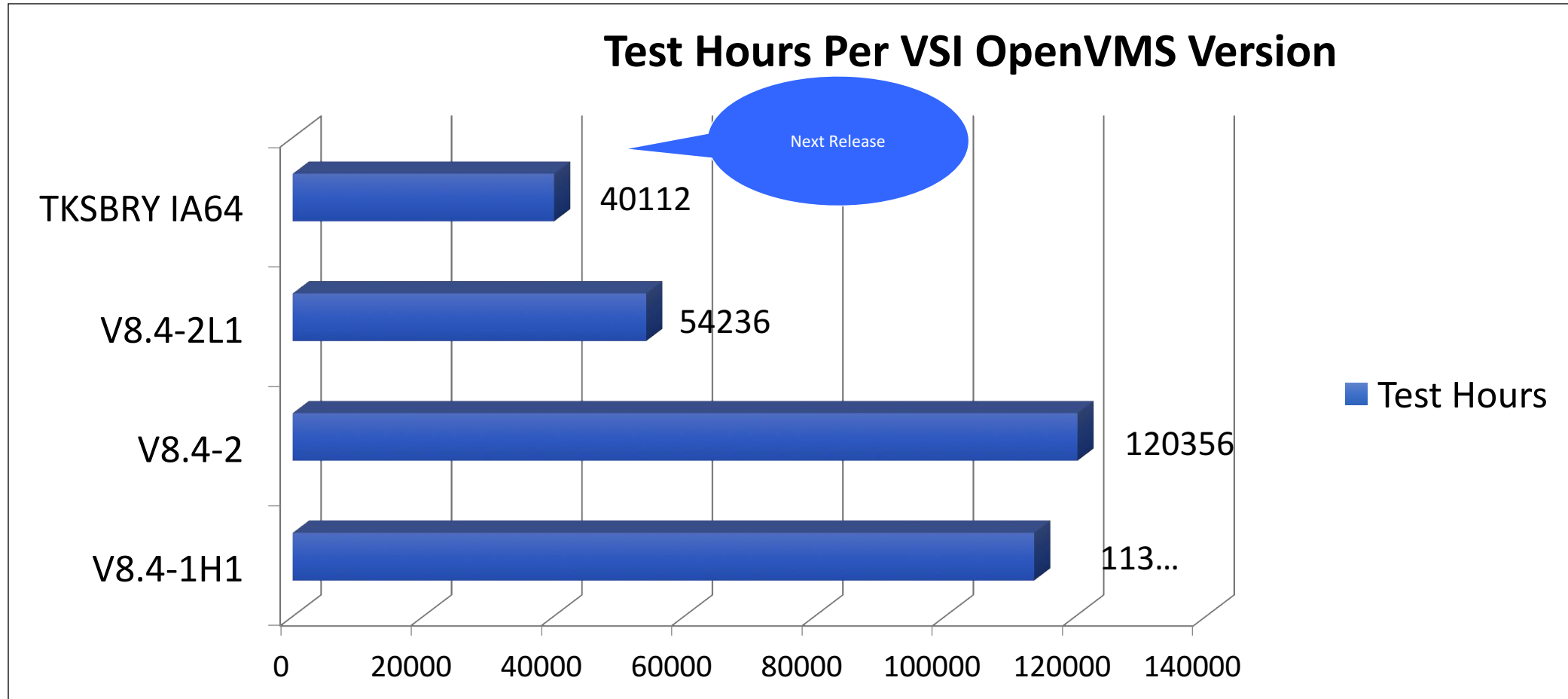
VSI Alpha Engineering and Development

Product Improvements



VSI OpenVMS Full Regression Test Hours

(at Release)



VSI OpenVMS Alpha Enhancements

Subsystem

- PEdriver Enhancements
- LAN Drivers
- File System Improvements
- Lock Manager Fixes
- AMDS Enhancements

Benefit

- Reduce CPU load, Multi-rail Support
- Higher Throughput, Less CPU Overhead
- Larger Volume Size – 1TB to 2 TB
- Improved Scaling, Removed Potential Corruption
- Runs on 64-bit Clients, Virtual Friendly

- **179 Enhancements since V7.3-2**
- **515 Bug Fixes since V8.4**

O/S & Layered Products

OpenVMS Alpha – OS & Layered Products

| Released | | | Planned |
|--|---|--|---------|
| <ul style="list-style-type: none"> • V8.4-2L1/V8.4-2L2 OS • CDSA V2.4-320A • DCPS V2.8-1 • DECnet Phase IV V8.4-2L1 • DECnet Phase V V8.4D • DECram V8.4-2L1 • DECwindows Motif V1.7F • DCE (runtime) V3.2B • ENCRYPT V8.4-2L1 • Enterprise Directory V5.8-2 • Kerberos V3.2-152B • DQS V1.4 • NOTARY V1.0 • OpenSSL V1.02n • TCP/IP V5.7-13ECO5F • The Data Collector V2.3-1220 • VSI Binary Checker V1.1A • AM Base V8.4-2L1 | <ul style="list-style-type: none"> • RMS Journaling V8.4-2L2 • Volume Shadowing V8.4-2L2 • OpenVMS Cluster Client V8.4-2L2 • OpenVMS Cluster Software V8.4-2L2 • RTR V5.4-1 • T4 V4.4D • ABS / MDMS V4.6-1 • ACMS dev, remote, runtime V5.3 • BASIC V1.8-5 • C V7.4-1 • C++ V7.4-8 • COBOL V3.1-7 • Datatrieve V7.4-1 • DECforms dev, runtime V4.2-1 • DECset V12.9-3 (CMS, DTM, MMS, SCA, LSE, PCA) • DFO V3.3-1 • DEC DFS V2.5-1 | <ul style="list-style-type: none"> • FMS dev, runtime V2.6-1 • FORTRAN V8.3-3 • MRU V1.9-1 • PASCAL V6.2-125 • SSM V1.9-1-2 • TDMS dev, runtime V2.1-2 • AM Base V8.4-2L1 • AM Data Analyzer V3.2 • GKS V7.3 • OMNI V4.1 • OSAP V4.1 | |

OpenVMS Alpha Open Source Products

| Available | Investigating |
|--|---|
| <ul style="list-style-type: none">• CIFS V1.2ECO1C• CSWS V2.4-3C• CSWS_JAVA V6.0-47A | <ul style="list-style-type: none">• Mosquitto 1.3.5 (MQTT broker)• Paho-C 1.0.3 (MQTT client)• ZeroMQ 4.1-2 |

WHY Upgrade

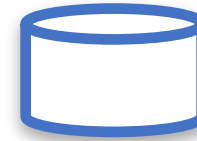
Modern Hardware – Alpha Hardware



- CPU Upgrades
- Additional SMP Processors
- No additional costs within tiers

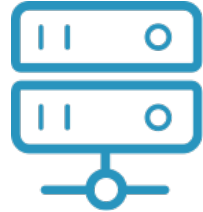


- Network Adapter
- PCI-X 10Gb Ethernet
- Supports XFRAME 10 Gb NIC cards for PCI-X 1.2, CKO



- Disk I/O
- 1, 2, 4 Gb FC HBA
- SSD Replacement

Modern Hardware – Emulation



- CPU Upgrades

- Faster Processors
- RAMdisk
- PCIe Adapters

- Network Adaptor

- PCIe 10Gb Ethernet

- Disk I/O

- 1, 2, 4, 8, 16, 32 Gb FC HBA
- SSD Replacement

What Did VSI Announce

- New OpenVMS Alpha Releases
 - OpenVMS Alpha V8.4-2L1 (February 2017)
 - OpenVMS Alpha V8.4-2L2 (April 2017)
 - Layered Products same as on Integrity
 - More new Alpha Products in the Roadmap
- Alpha Layered Products Releases
- 3 Support Levels
 - Bronze
 - Silver
 - Platinum
- US ITAR Support (In Partnership with IOMAXIS)

Support Levels

| Bronze (9X5) | Silver 24X7 | Platinum (Proactive 24X7) |
|--|--|--|
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1 and 3 year terms

Why Updated Releases on Alpha?

- VSI came to realize there is a large market demand
- Continued Support of OpenVMS Alpha Customer Base
- To have OpenVMS release parity on Alpha and X86
- Easier for customers to migrate to X86 when ready

Supported Systems

What Systems Are Supported?

(V8.4-2L1)

Workgroup Class

| |
|-------------------|
| AlphaServer 200 |
| AlphaServer 300 |
| AlphaServer 400 |
| AlphaServer 500 |
| AlphaServer 600 |
| AlphaServer 800 |
| AlphaServer 1000 |
| AlphaServer 1000A |
| AlphaServer 1200 |
| DS10 * |
| DS15 * |
| DS20 * |
| DS20E * |
| DS25 * |
| DPW Workstation * |
| XP Workstation * |

Departmental Class

| |
|-------------------|
| AlphaServer 2000A |
| AlphaServer 2100 |
| AlphaServer 4000 |
| AlphaServer 4100 |
| ES40 * |
| ES45 * |
| ES47 * |

Enterprise Class

| |
|------------------|
| ES80 * |
| ES1280 * |
| AlphaServer 8000 |
| GS Series |

* Initial list of supported servers

What Systems Are Supported?

(V8.4-2L2)

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

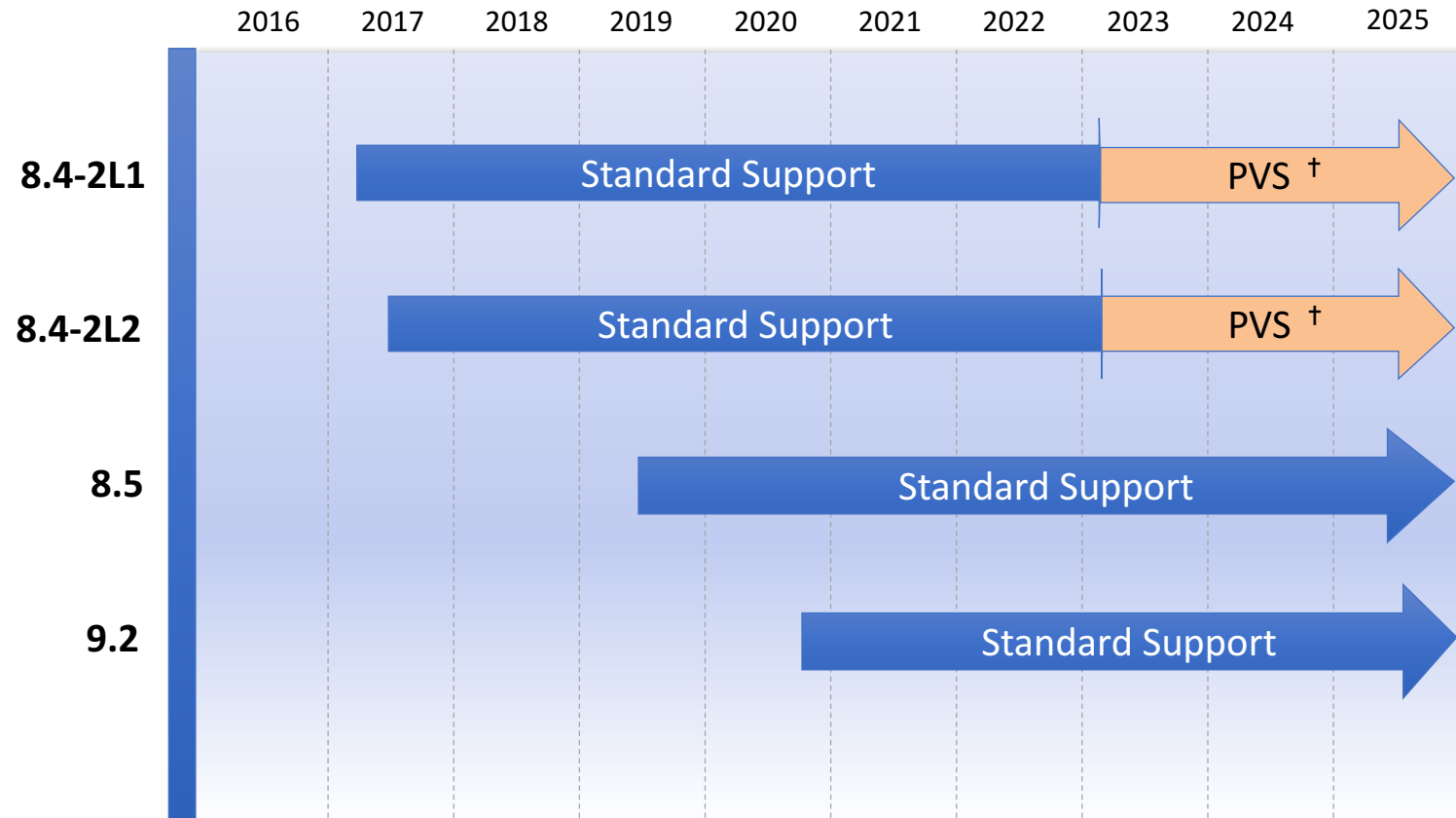


The Performance build (V8.4-2L2) will only run on EV6/EV7 based systems.

Support Roadmap

VSI OpenVMS Alpha Service Roadmap

Alpha



5 Year Standard Support + 2 Year PVS minimum

† PVS – Prior Version Support without Sustaining Engineering
24-month notice provided before support end. Also, Extended Engineering Support (EES) contracts are available.

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OpenVMS V8.4-2L2 Specifics

What is an Alpha Performance Build?

A Rebuild of OpenVMS Alpha optimized for EV6/EV7 processors

Leveraged Alpha hardware instructions

- Byte-Word Extensions (BWX)
- Motion Video Instructions (MVI) (No Compiler Support)
- Floating-point Extensions (FIX)
- Count Extension (CIX) (No Compiler Support)

What is an Alpha Performance Build?

Leveraged 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

What is an 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

What is an Alpha Performance Build?

Specifics for “C” Language Only – Optimizations (CIX)

- Available as Intrinsic – No automatic detection – inclusion
- SQRT – Qualifiers Specific – No “error” update

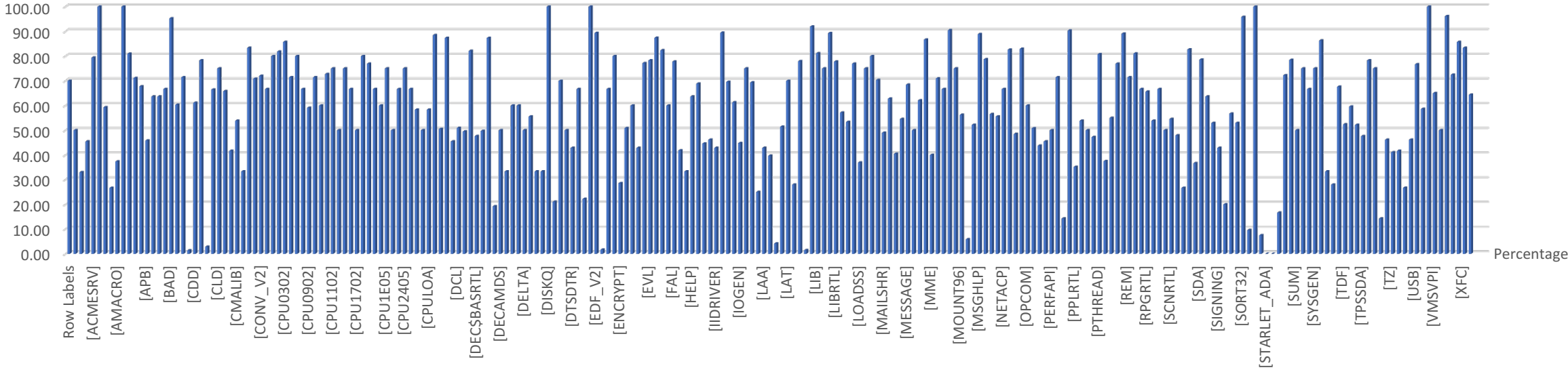
Optimizations (MVI)

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

How Many OpenVMS Modules Are Affected?

EV6 System Modules Optimized

35

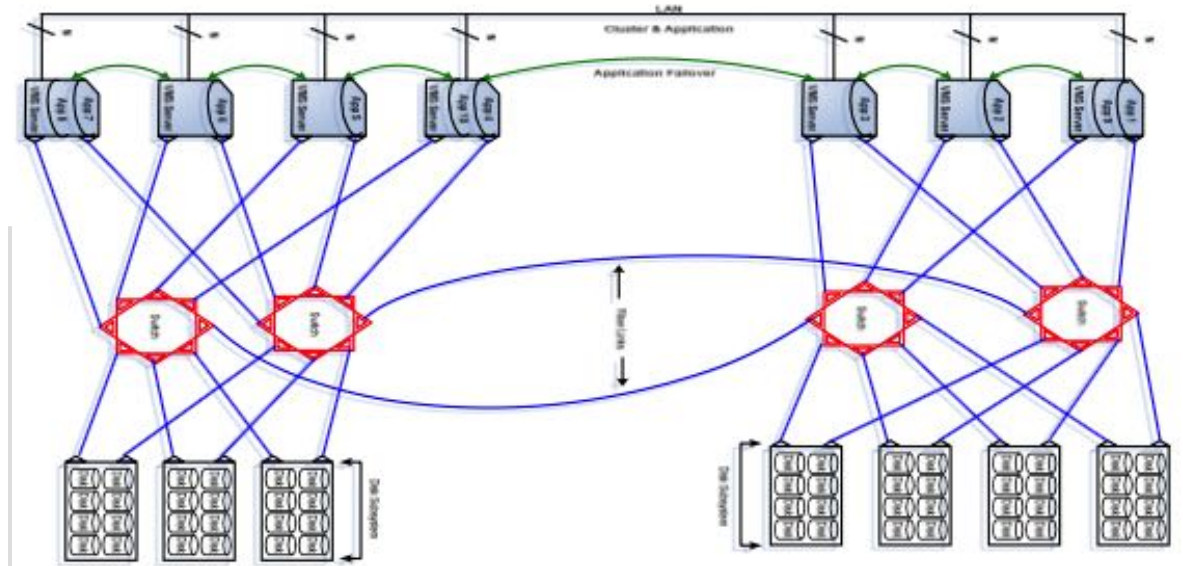


Test Environment

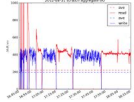
- Pure Storage Array – 22 SSDs
- EVA Storage Array – 24, 300GB Disks (15K RPM)
- MSA P2000 Storage Array – 12, 300GB disks

- 2Gb FC HBA (Emulex)
- 8Gb B Series HPE FC Switch

- ES47 AlphaServer



First Test Run

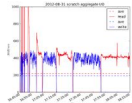


- I/O HAMMER
- 512 byte blocks, file size 126 Blocks



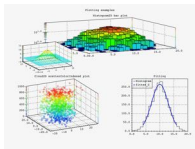
- FileX
- 1 file @ 20000 Bytes

Second Test Run



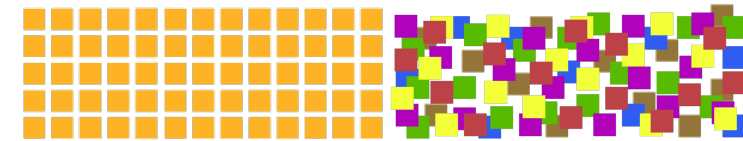
- I/O HAMMER
- 512 byte blocks, file size 126 Blocks

Third Test Run



- MFLOPS

Fourth Test Run

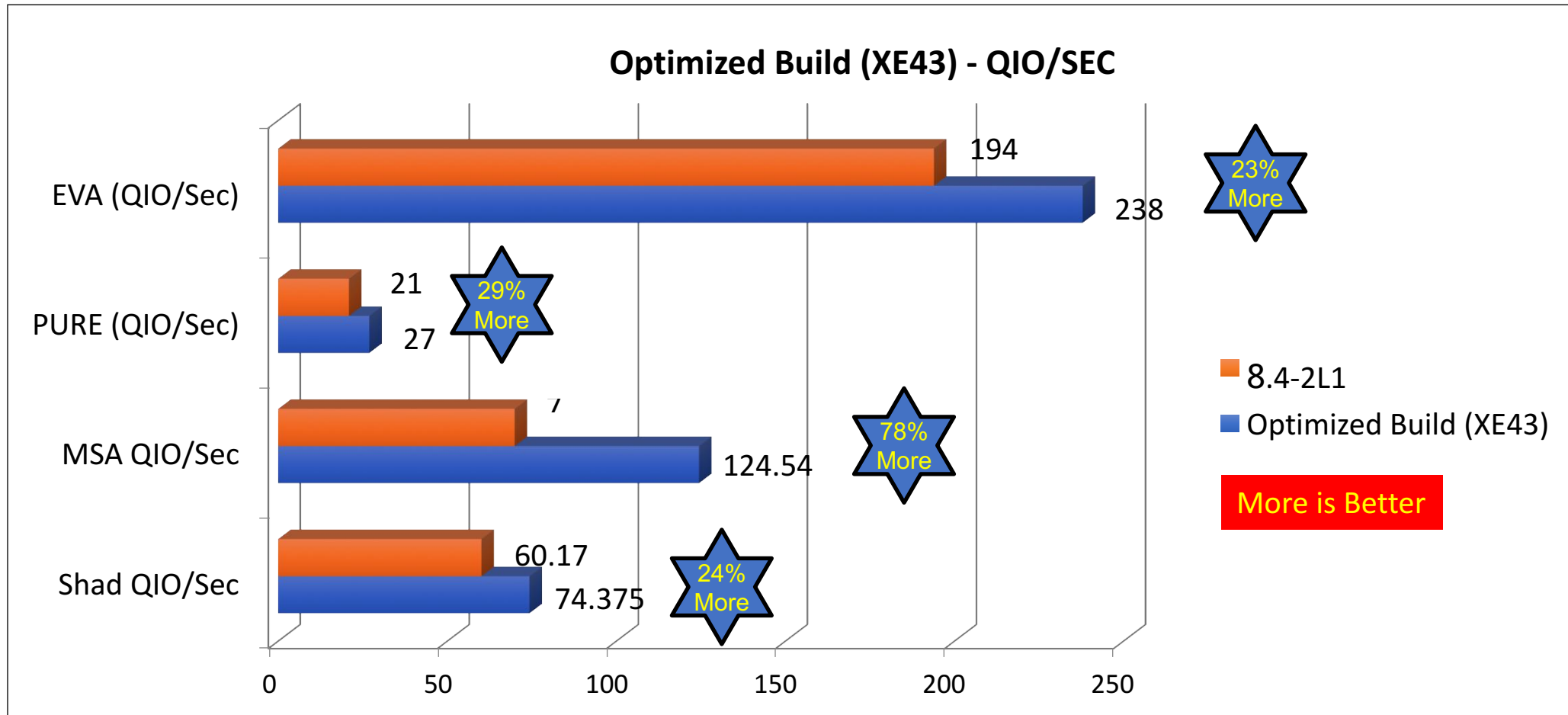


Structured Data vs. Unstructured Data

- IOF

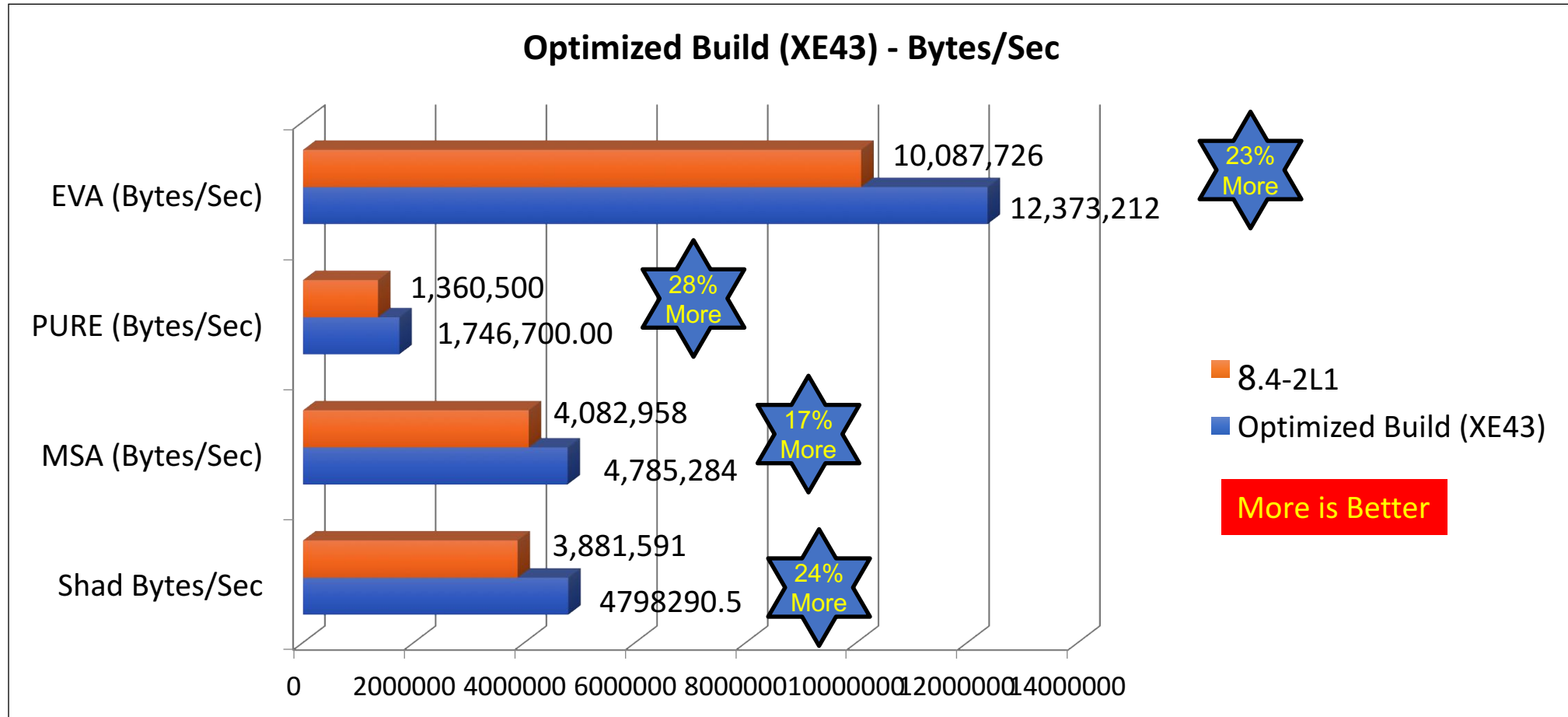
First Test Results – QIO/Sec

(Using XQP/RMS)



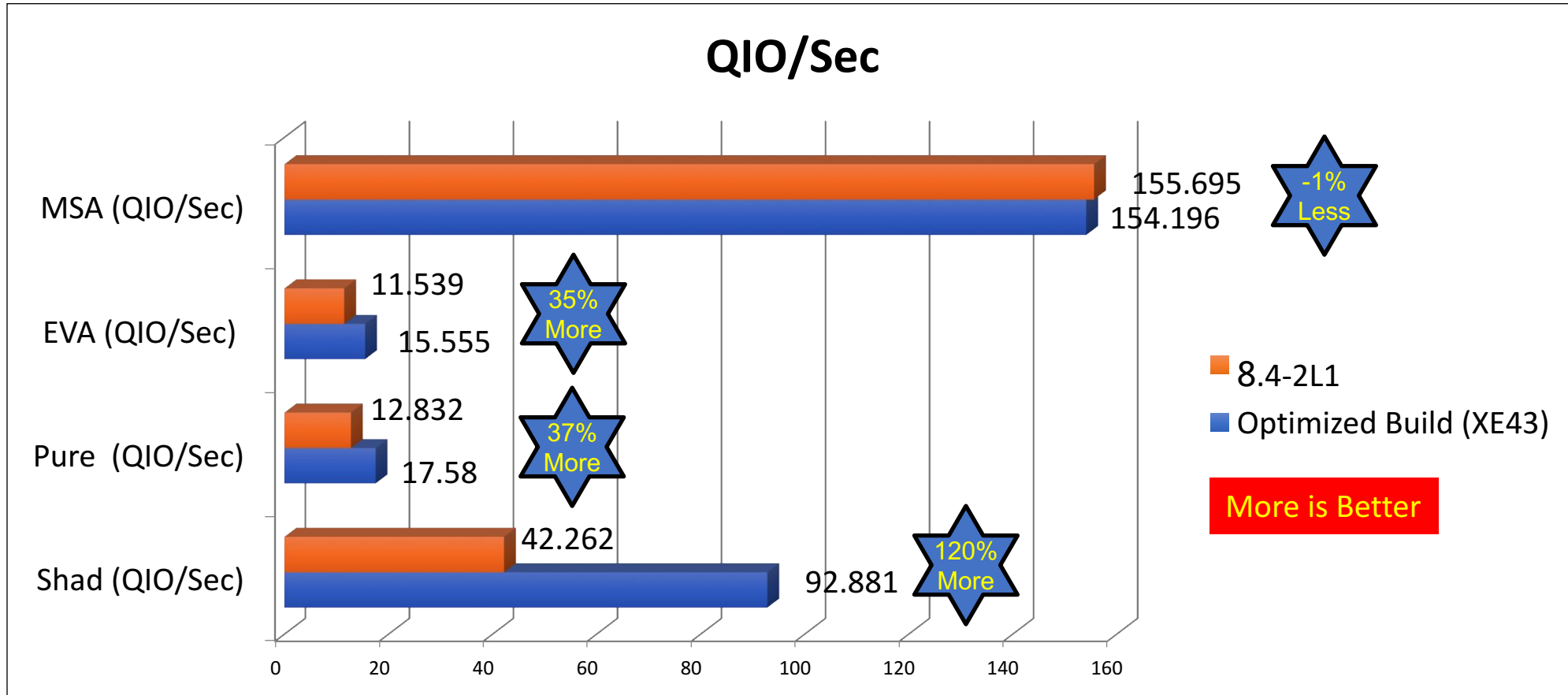
First Test Results – Bytes/Sec

(Using XQP/RMS)



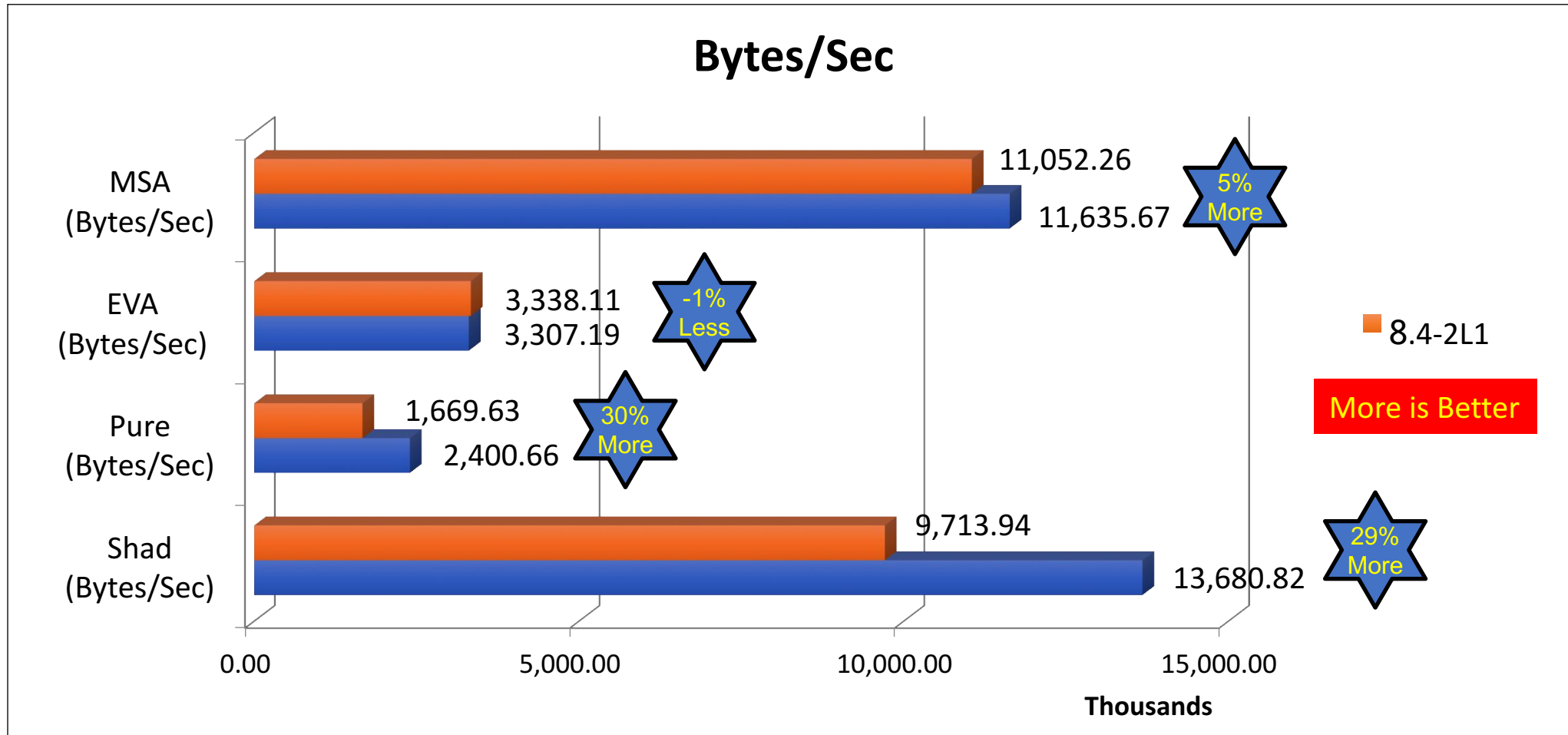
Second Test Results – QIO/Sec

(Using XQP/RMS)

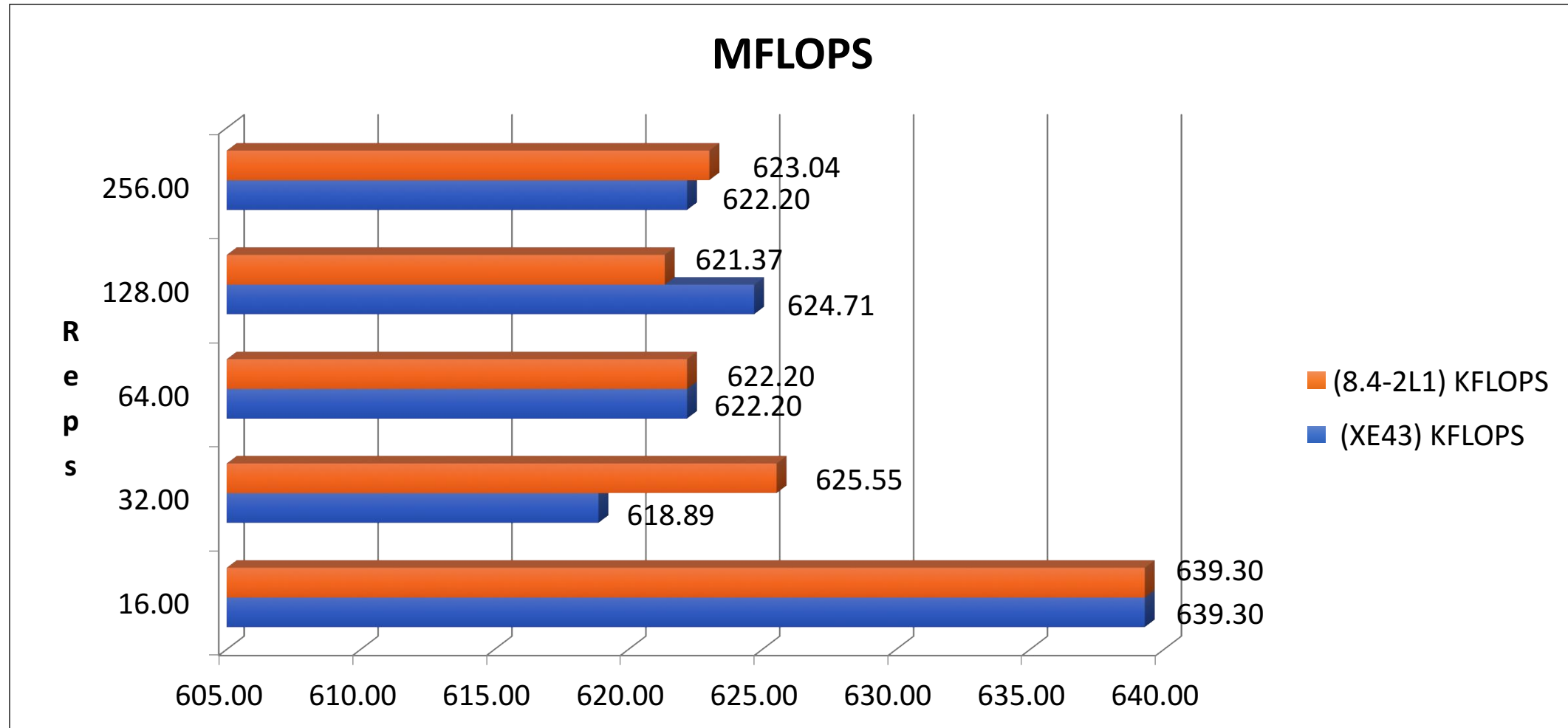


Second Test Results – Bytes/Sec

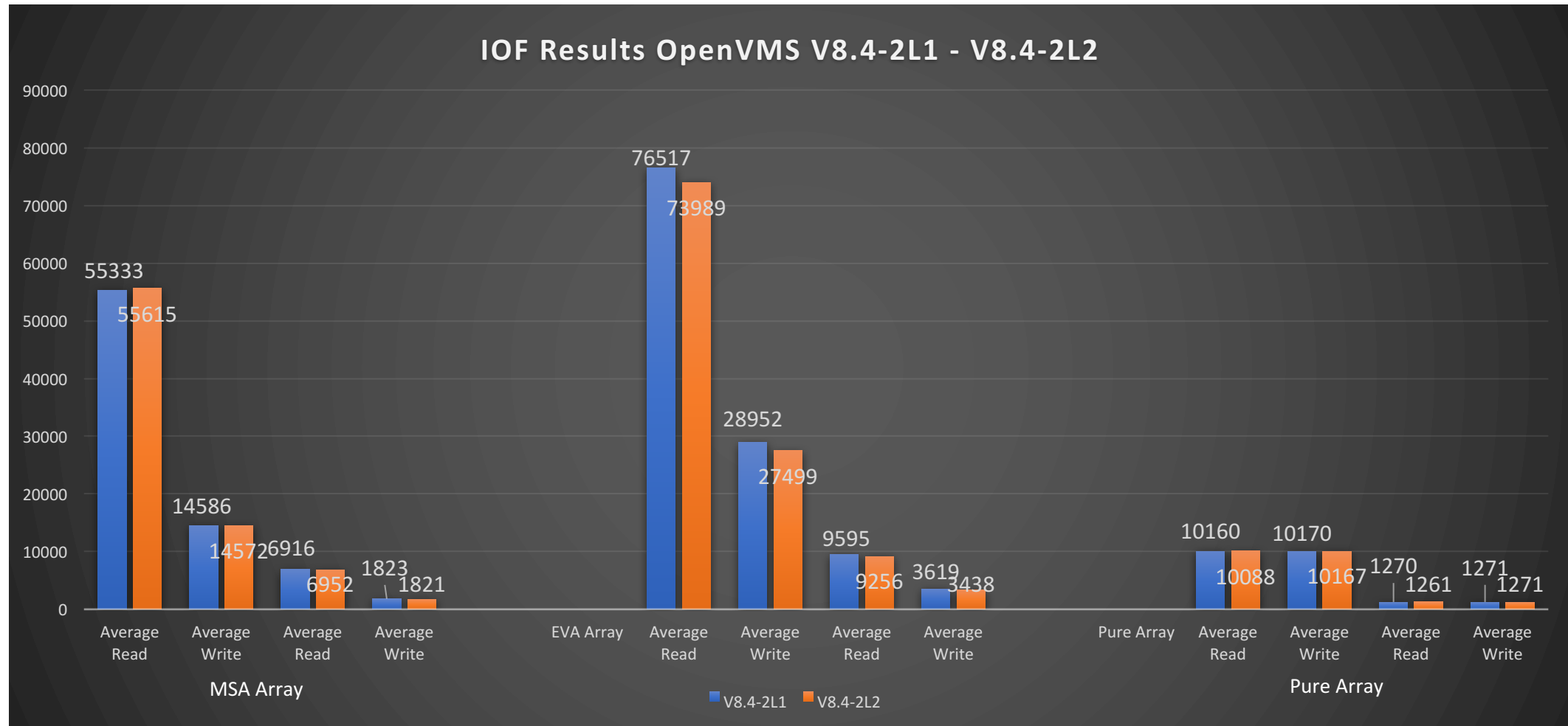
(Using XQP/RMS)



Third Test Run - MFLOPS



Fourth Test Run - IOF



Customer Experiences

Customer Information

Migrating from OpenVMS V7.3-2 to OpenVMS V8.4-2L2

- Improved I/O rates on Disk I/O
 - 10% - 20% reduction in CPU utilization
- CPU saturation reduction (Word/Byte Instructions)
 - 10% - 15% Reduction in CPU Cycles
 - Reduction in Latency (Reduction in in-line instructions)
 - Reduction in Alignment Faulting
 - (Without Source Change – EV6/EV7 Instructions)
- RTL Optimizations
 - Ada
 - LIB\$ / OTS\$ / STR\$ Routines

Customer Information (Cont.)

Migrating from OpenVMS V7.3-2 to OpenVMS V8.4-2L2

- Backup / Shadowing Performance
 - 8% - 22% Reduction in Wall-Clock Time
 - Faster Shadow Set Full Merge
 - Achieved Better Fibre-Channel Utilization

VSI Tools to Modernization

VSI Tools to Modernization

- VSI Offers L1 / L2 Support for older HPE OpenVMS versions
 - V8.4 and Prior
 - Consulting Available
- VSI Upgraded Licenses and Full Support
 - V8.4-2L1
 - V8.4-2L2 Performance Build
 - “Best in Class” VSI Dedicated Support Team
- VSI Cloud Solutions
- VSI Upgraded Licenses and Support for x86 for Bare Metal and the Virtual World



Alpha Upgraded Licenses and Support

- Alpha VSI Licenses and VSI Support Bundles
- Working with the engineering and development team of the OpenVMS O/S
- Benefits of having upgraded VSI licenses
- VSI Rights to New Versions for VSI future licenses when on VSI Support program



ALPHA SERVERS

VSI Pricing Model

- Bundle based
 - Workgroup
 - Departmental
 - Enterprise
- Easy to understand
- Convenient installation



VSI OpenVMS Releases – Future



• V8.5

- Q1 2019 Scheduled
 - VSI TCP/IP 10.6
 - CRTL: C99 features, header updates
 - ACPI
 - SSL 1.1x
 - Enhanced Password Management

V9.2

- 2nd Half 2020
- Full Production Release
- Native Build
- Security
 - Secure Boot
 - Encrypted Crash Dumps
- Additional HPE & Dell Servers & I/O Devices
- And more

V9.x

- TBD

VSI Cloud – *powered by AVTware*

- Cloud offering for VAX/Alpha environments
- Virtualize aging hardware
- Upgrade to VSI OpenVMS (Alpha)
- Hypervisors supported
- VSI hosted, or Cloud provider of choice
- VSI managed services available
- More...



Alpha to x86 – x86 Update

Executive Summary – x86-64 Release Plan

- The Release Plan has multiple stages.
- First Boot: September 2018
- V9.0: x86-64 Early Adopter Kit (EAK) – kick the tires
 - The EAK is for a selected set of partners, ISVs, and customers
 - The system will be less than complete
 - Content will depend, to a large degree, on the needs of the participants
 - Cross tools (run on Itanium, target x86) – compilers, linker,
 - Q1 2019
- V9.1: x86-64 General EAK Release – reasonably complete system
 - Available for all partners, ISVs and customers
 - Not for production
 - Native tools
 - 2nd Half 2019
- V9.2: x86-64 Production Release - complete system
 - Same features will be on Alpha and Itanium, where possible
 - Alpha and Itanium V9.2 releases will follow in a few months
 - 2020

VSI General Updates

New VAX server Support Program

- Provides 24x7 OpenVMS technical support (L1/L2)
- Available on VAX models
- Consulting Available
- Priced by hardware tier
 - Workgroup
 - Departmental
 - Enterprise



Coming Attractions

- VSI Participation in Regional Events
 - Scheduling Fall, 2018 / Spring 2019 Regional events
 - OpenVMS Boot Camp – April 7-10, 2019 (Boston, USA area)
- Next VSI Webinar event.
 - September 18, 2018



Thank You

To learn more please contact us:

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