VMS Software Inc. (VSI)

Technical Update & Roadmap

May 2018

Brett Cameron

Agenda

- What we've done to date
- Product roadmap
- TCP/IP update
- Upcoming new products
- Support roadmap
- Storage
- x86 update, roadmap, and licensing
- x86 servers
- ISV programme
- Other stuff

What we've done to date

vms

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OpenVMS releases to date

3 OpenVMS I64 releases:

- V8.4-1H1 – Bolton
  - June 2015
- V8.4-2 - Maynard
  - March 2016
- V8.4-2L1 – Hudson
  - August 2016

Plus …

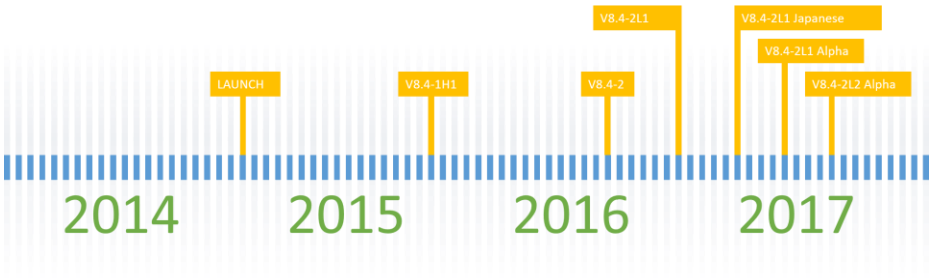
Japanese version

- DECforms V4.2
- DCPS V2.8
- FMS V2.6
- DECwindows Motif V1.7E

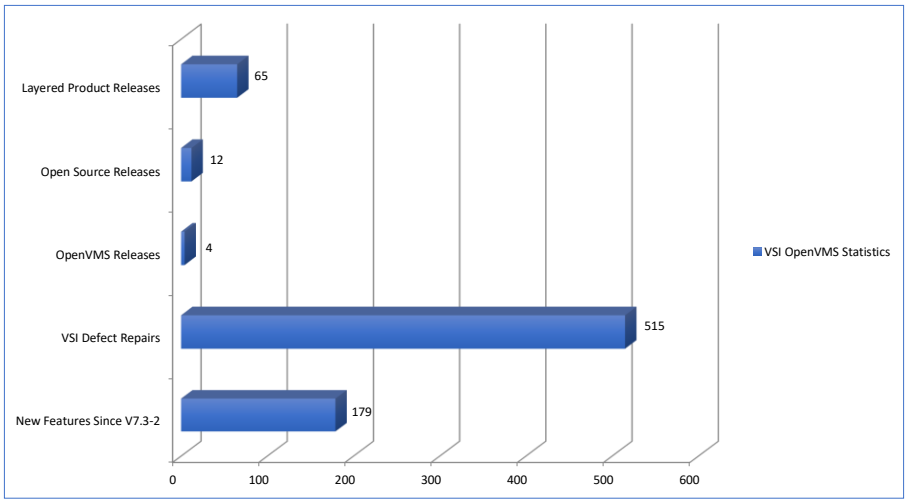
Two OpenVMS Alpha releases:

- V8.4-2L1 – February 2017
- Standard OpenVMS release (Hudson)
- V8.4-2L2 - April 2017
- Performance build, EV6/EV7 (Felton)

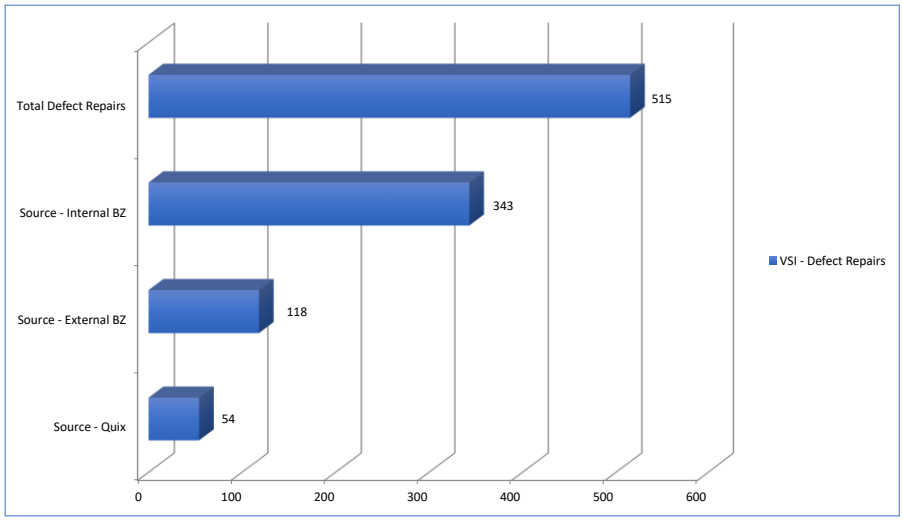
Products introduced from 2015 to date



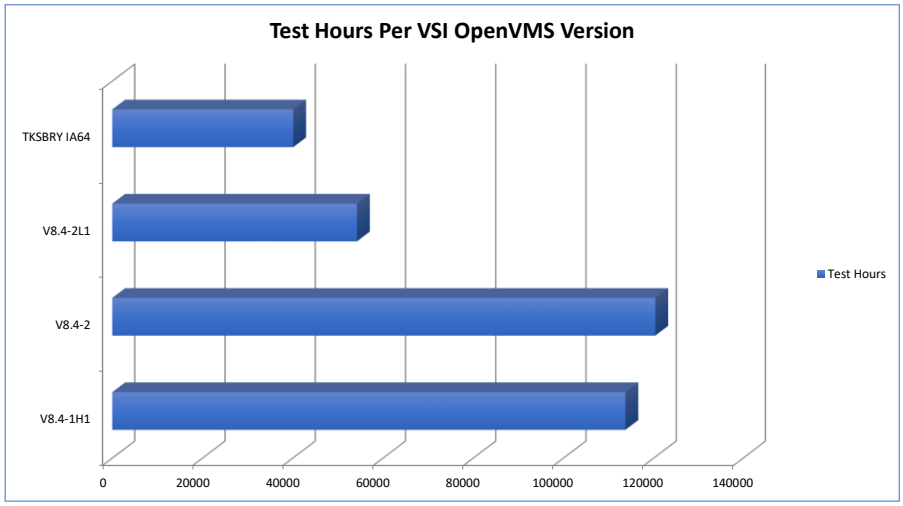
Technical achievements to date



Defect repairs



Testing hours



Product roadmap

vms

OpenVMS Integrity operating environment

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Released

BOE Components:

- V8.4-2L1 operating system
- ANT V1.7-1B
- AXIS2 V1.7-3
- CDSA V2.4-322A
- CIFS V1.2ECO1C
- CSWS V2.4-3M
- CSWS_JAVA V8.5-16
- CSWS_PHP V5.2-17A
- DCPS V2.8
- DECnet Phase IV V8.4-2L1
- DECnet Phase V V8.4I
- DECram V8.4-2L1
- DECwindows Motif V1.7E
- DCE (runtime) V3.2A
- ENCRYPT V8.4-2L1
- Enterprise Directory V5.8
- Kerberos V3.2-260
- GNV V3.0-2
- NOTARY V1.0
- OpenSSL V1.02n
- Perl V5.20-2A
- TCP/IP V5.7-13ECO5F
- The Data Collector V2.3-1220A
- UDDI V1.0B
- VSI Binary Checker V1.2
- WBEM/CIM V3.0-B151019
- WBEM providers V2.2-5D
- WSIT 3.4-2
- XML C++ 3.0-1-1
- XML_JAVA V4.0-1

HAOE components:

- Availability Manager Base V8.4-2L1
- RMS Journaling V8.4-2L1
- Volume Shadowing V8.4-2L1
- OpenVMS Cluster Client V8.4-2L1
- OpenVMS Cluster Software V8.4-2L1
- RTR V5.3

Planned

BOE Components:

- CSWS additional modules
- PHP additional modules
- GNV updates

OpenVMS Alpha OS and layered products

Released

- 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
- 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
- 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

Planned

- GKS V7.3

OpenVMS Integrity layered products

Released

- ABS / MDMS V4.6
- ACMS dev, remote, runtime V5.3
- BASIC V1.8-4
- C V7.4-1
- C++ V7.4-6
- COBOL V3.1-7
- Datatrieve V7.4-1
- DECforms dev, runtime V4.2
- DECset V12.9-1 (CMS, DTM, MMS, SCA, LSE, PCA)
- DFO V3.3
- DEC DFS V2.5
- FMS dev, runtime V2.6
- FORTRAN V8.3-3
- MRU V1.9
- Pascal V6.2
- SSM V1.9-1
- TDMS dev, runtime V2.1-1
- T4 V4.4D
- Japanese VMS
  - DECforms V4.2
  - DCPS V2.8
  - FMS V2.6
  - DECwindows Motif V1.7E

Planned

- OMNI / OSAP
- DQS V1.4
- GKS V7.3
- Alternative interfaces for ACMS
- Java 8u144 update (HPE)
- Samba update

OpenVMS Integrity open source products

Released	Investigating

- ActiveMQ V5.10.0
- cURL & libcURL V7.49.0A (OpenSSL 1.0.2k support)
- Lua V5.2.3
- Mosquitto V1.4.14 (MQTT broker)
- Paho-C V1.2.0 (MQTT client)
- PHP V5.6.10B
- Ruby V2.2.2I
- Scala V2.11.8
- Subversion V1.8-13
- Swig V3.0.5
- Vgit V0.8
- ZeroMQ V4.1.2
- gSOAP V2.8.32
- GNUplot V5.0-2
- Maven V3.3-9
- HAProxy V1.7-9
- Redis V4.0
- libMariaDB V2.1.0
- librdKafka V0.9.5
- syslogd for OpenVMS

- Erlang
- Precision Time Protocol (PTP)
- Python 3.x
- R
- Gearman
- Additional modules for PHP and Ruby
  - RDB
  - Mimer
  - Redis
- libRabbitMQ

OpenVMS Alpha open source products

Released	Investigating

- CIFS V1.2ECO1C
- CSWS V2.4-3C
- CSWS_JAVA V6.0-47A
- Mosquitto V1.4.14 (MQTT broker)
- Paho-C V1.2.0 (MQTT client)
- Redis V4.0

- Gearman
- ZeroMQ 4.1-2

TCP/IP update

VSI TCP/IP

Plan:

- Initially deliver a standalone VSI TCP/IP kit for VSI OpenVMS V8.4-2L1
- Fully integrated into future VSI OpenVMS releases

Schedule:

- Early Adopters Kit will be released calendar Q2 2018
- VSI TCP/IP 10.6 will be included in future VSI OpenVMS releases
  - Also be available as a standalone kit
  - Will include new features and improvements

Future plans

- Alpha and x86 support
- VSI TCP/IP 10.5 is I64 only
- VSI TCP/IP 10.6 will be I64 and Alpha
- Some features such as CKO may not be available on Alpha as they require NIC support that may not be available on some older NICs
- We will have a later version of VSI TCP/IP that runs on x86 for the Q4 2018 OpenVMS x86 Early Adopters Kit, V9.1

Upcoming new products

Upcoming new products

V8.5, Q2/Q3 2018

- VSI TCP/IP 10.6
- LTO-8 tape
- CRTL
  - C99 features,
  - Header file updates
  - Bug fixes
- ACPI
- SSL 1.1x
- Enhanced password management
- Low-cost cluster

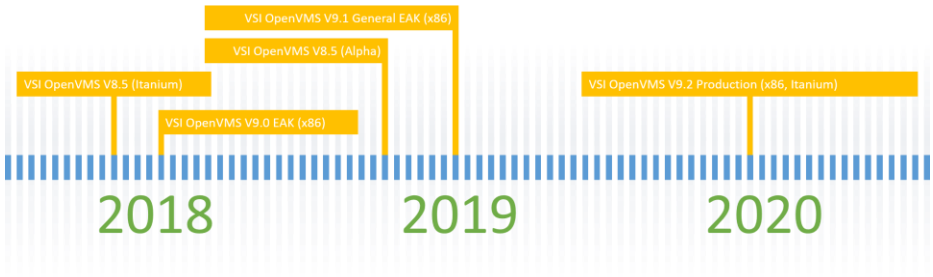
V9.2, Q1 2020

- Full production release
- Native build
- Security
- Secure boot
- Encrypted crash dumps
- Additional HPE and Dell servers and I/O devices
- …

V9.x

- To be determined

Strategy review for 2018 - 2020



Why V9.2 on Alpha and Integrity?

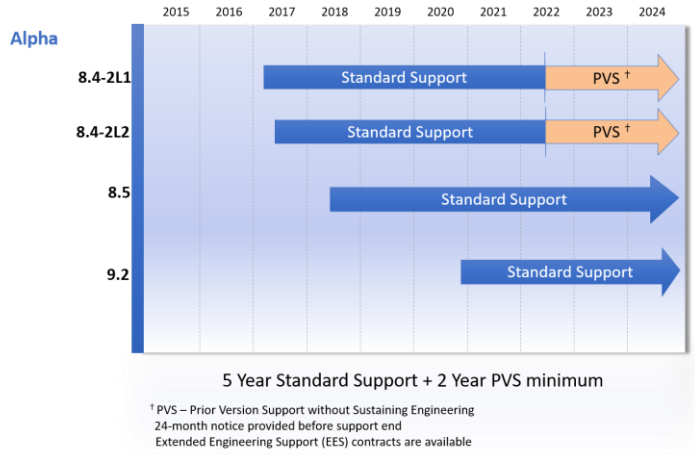
- To have OpenVMS parity on Alpha, Integrity, and x86 when the latter is released
- Part of our Bridge Strategy for customers to more easily migrate to OpenVMS on x86

Support roadmap

VSI support

- Only VSI can provide RTNV (Right To New Versions)
  - If you purchase OpenVMS V8.4-1H1 or higher from VSI along with support you receive automatic license updates and free new version licenses
- 90-Day Conformance Warranty
- Four levels of support
  - Platinum
  - Gold
  - Silver
  - Bronze
- VSI supports OpenVMS layered products and open source products not previously supported
- VSI is in growth mode
  - Increasing OpenVMS engineering resources
  - Increasing OpenVMS support resources
  - Increasing professional services capability

VSI OpenVMS Alpha support roadmap

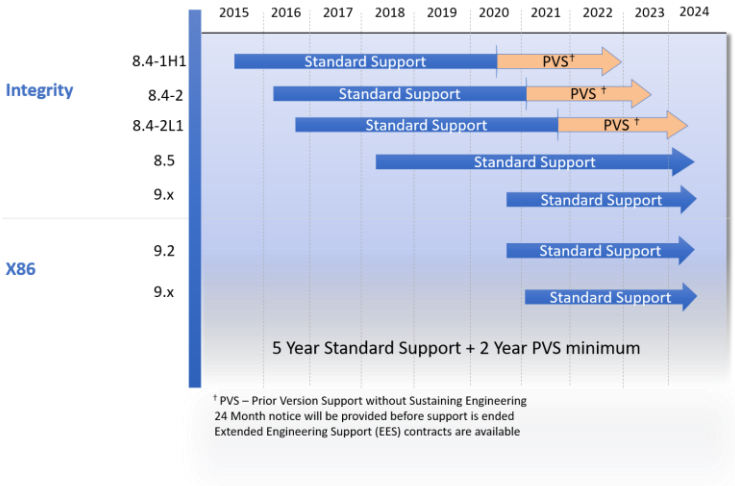


5 Year Standard Support + 2 Year PVS minimum

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

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.

Support roadmap – Integrity and x86



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Current status

- As of 2016 VMS Software Inc. sells more licenses and support direct and through its reseller partners than through its (reseller) HPE
  - And the gap continues to widen as more customers look to VSI for products and support
- VSI offers economic incentives to end users to purchase through VSI
  - When a user buys direct from VSI or one of its reseller partners they get free automatic updates and free-of-charge license upgrades when support is through VSI
  - This includes VSI x86
  - VSI offers license discounts when support is purchased through VSI
- Our current products and services offer a clear and easy path to x86 and beyond

Storage

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Supported storage

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VSI supported

- Hewlett Packard Enterprise
- PURE STORAGE
- KOVE
- HITACHI DATA SYSTEMS
- HUAWEI

In progress

- EMC²
- INFINIDAT

Status

X86 update, roadmap, and licensing

[next]

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Development plan

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General:

- As in any port to a new architecture, implementation includes a number of architecture-defined interfaces that are critical to the inner workings of the system
- System components are being modified to implement the x86 AMD calling conventions
- OpenVMS is currently built for Alpha and Itanium from common source code modules
  - X86 support is being added to that code base
- Compilers
  - Creating a converter to connect DEC-created compiler front-ends to the LLVM back-end code generator
  - LLVM targets x86 as well as many other architectures
  - Provides a direct path for porting to other architectures in the future
- 776 modules needed for first boot
  - 97% of these are done (when I last asked)

Development plan

Major sub-projects:

- System
  - Boot manager
  - Memory disk (boot from memory disk)
  - Dump kernel
  - Device management
  - Memory management
  - Software interrupt services
  - Scheduler and process management
  - Debugger
- Objects and images
  - Calling standard
  - Compilers
  - Linker/librarian
  - Image activator
  - Stack unwinding
  - Dynamic binary translator
  - Conditionalized code

Development plan - compilers

Leveraging LLVM:

- Large user community and good documentation
- Friendly license structure
- Active contributions from companies such as Apple, Google, Intel, …
- Active contributions from research community
- Keeps us out of the “backend business” of chasing every chip release
- Work underway to make clang by the default C compiler on many Linux distributions
- We are actively participating in the LLVM community
- On the program committee for the next LLVM conference fall 2018 in San Jose

Development plan - compilers

Leveraging LLVM's tools and analysers:

- Leveraging LLVM's tools and analysers
- Many tools like "type sanitizers" and "address sanitizers" to detect runtime errors
  - Buffer overruns
  - Use of freed heap memory
  - …
- Other LLVM tools are mostly used by compiler developers
- Intend to push OpenVMS changes back to the LLVM community
- Leverage other frontends on OpenVMS such as Rust
- LLVM's multiple targets gives us potential for other processor types in the future

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Development plan - compilers

C++/clang:

- Will use clang to provide up-to-date C++ standard support
- Will add OpenVMS-isms to clang
  - Dual sized pointers
  - …
  - Exact list is still under development

- Extending the clang "driver" to support existing CLI
  - Will look like the existing compiler
  - Might be a few additional qualifiers/keywords

- Will use the LLVM standard C++ library with OpenVMS additions as needed
- The CRTL headers and CRTL will need extending/enhancing
- The debugger needs refreshed to handle the additional information generated by LLVM

Development plan - compilers

Differences:

- MACRO32's register mapping will use memory instead of a fixed mapping to hardware registers
  - Should be largely invisible
  - Odd linkages that invented for "performance" reasons might be fractionally slower (probably not)
- BLISS/C/MACRO32 non-standard linkages are almost complete
  - Have not required any significant changes to date
- Standardizing on `<stdarg.h>` and will not support `<vararg.h>`
- C code that takes the address of a `VA_LIST` and assumes it is a vector will need conditionalization
- C++ will be different (clang versus Intel) and the list of OpenVMS-isms will be different
  - Exact details to be determined
- Other languages such as Pascal, COBOL, and FORTRAN should just be a recompile

x86 release plan

- Multiple stages…
- 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, …..
- V9.1:
  - x86-64 General EAK Release – reasonably complete system
  - Available for all partners, ISVs and customers
  - Not for production
  - Native tools
- 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

Roadmap to x86 and beyond

2018

Q1
- VSI TCP/IP 10.5 Kit
- LTO-8 Tape

Q2
- Java 8u144 update (HPE)
- 12Gb SAS

Q3
- Samba
- OpenVMS V8.5 Itanium
  - VSI TCP/IP 10.6
  - Assorted CRTL updates
  - Up to date ACPI
  - SSL 1.1.x
  - Enhanced password management
  - Low cost cluster (12Gb SAS)

Q4
- Pre-OpenVMS V8.5 Patch Kit
  - Enhanced Password Management (Alpha & Integrity)
- OpenVMS V8.5 Alpha
  - Includes TCPIP V10.6
- OpenVMS V9.0 x86-64 Early Adopters Kit
  - Selected ISV's, partners & customers
  - New licensing
  - Selected HPE & Dell servers
  - Graphical Boot Manager
  - Virtual machine guest option
  - VSI TCP/IP
  - Compilers
  - Select layered products
  - Cross-build tools

2019

OpenVMS V9.1
- x86-64 General Early Adopters Kit
  - Available to all ISVs, partners & customers
  - Additional HPE & Dell servers
  - Additional I/O devices
  - Additional layered products
  - Additional compilers
  - Additional open source applications
  - VMS Advanced File System
  - Additional virtual machine guest options
  - Alpha to x86-64 dynamic binary translator
  - Native build tools

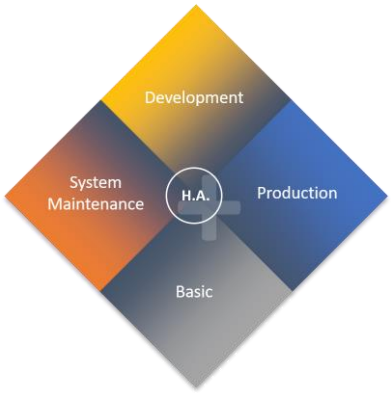
2020

OpenVMS V9.2
- Production release
  - x86 and Itanium*
  - Full production release
  - Secure boot
  - Encrypted crash dumps
  - Additional HPE & Dell servers and I/O devices
  - Enhanced application isolation and management
  - Increased network performance
  - Stronger password encryption
  - OpenJDK (X86-64 only)
  - Same compilers supported on Itanium plus standards updates for C, C++, and Fortran

** OpenVMS V9.2 will be released on Itanium after the x86-64 release followed by Alpha in 2021.*

Pricing model

Perpetual
- Four "flavour" bundles
- Includes four-tiered support
- High Availability option
- Convenient installation
- Same model for physical and virtual



Subscription
- Less initial investment
- Renewable license
- Targeting new customers
- Same pricing model for physical and virtual

X86 servers

[next]

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X86 server roadmap

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	2018	2019	2020
	OpenVMS V9.0 x86-64 Early Adopters Kit	**OpenVMS V9.1** x86-64 General EAK	**OpenVMS V9.2** X86-64 Production Release
HPE			
Rackmount			
• Gen 9, 10	√	√	√
Blade			
• Gen 9, 10			√
DELL			
Rackmount			
• Gen 12, 13, 14	√	√	√
Blade			
• Gen 12, 13, 14			√

HPE x86 servers

Server Generations

Gen 6		Gen 7		Gen 8		Gen 9		Gen 10	
DL160	ML330	DL165	ML110	DL160	ML310	DL20	ML10	DL120	ML110
DL170	ML350	DL360	ML350p	DL320e	ML350	DL60	ML30	DL160	ML350
DL180	ML370	DL380		DL360p		DL80	ML110	DL180	
DL320		DL385		DL380		DL120	ML150	DL360	
DL370		DL580		DL385p		DL160	ML350	DL380	
		DL585		DL560		DL180		DL560	
SL170s		DL980				DL360		DL580	
SL390s				BL660c		DL380			
		BL620c				DL560		MicroServer	
		BL680c		SL230s		DL580			
		BL685c		Sl250s				MC 990X (4-32 Socket)	

Dell x86 servers

Server Generations

Generation	14G	13G	12G		11G		10G	9G
Cloud Models	C6420	C4130 C6320	C6220 C6220 II	C8000 C8220 C8220X C8220XD	C410x C1100 C2100	C5000 C5125 C5220 C6100 C6105 C6145		
Modular Models		M630 M830	M420 M520 M620 M820		M610 M610x M710 M710HD	M910 M915	M600 M605 M805 M905	
Rack Models	R640 R740 R740xd R940	R930 R830 R730 R730xd R630 R530 R430 R330 R230	R220 R320 R420 R420xr R520	R620 R720 R720xd R820 R920	R210 R210 II R310 R410 R415 R510 R515	R610 R710 R715 R810 R815 R910	R200 R300 R805 R900 R905	1950 2950 2970 6950
Tower Models		T30 T130 T330 T430 T630	T20 T320 T420 T620		T110 T110 II T310 T410	T610 T710	T100 T105 T300 T605	1900 2900

ISV programme

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ISV partners – market segments

- Medical
- Publishing
- Process control
- Manufacturing
- Financial
- Education
- Telecommunications
- Government/military
- Gaming
- …

ISV partners – snapshot

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APTEAN
ARS SERVICIOS PROFESIONALES
ASG
ATTUNITY
Automic
CHR Solutions
Compact Data Works
ca technologies
CONNX
ERGONOMIC solutions
eCube Systems
HITACHI Inspire the Next
InterSystems
ISE
worldline e-payment services
JCC Consulting, Inc.
JENZABAR
JFA SYSTEMS
leidos
MIDSCOPE
Mimer SQL
XLNT
Nasdaq
NDC
Northlake
ORACLE
PARSEC Group
PointSecure
PROCESS SOFTWARE
Quayle Consulting Inc.
RAXCO SOFTWARE
Remedy IT
RCVISYS
SCANCO MEDICAL
Software International Concepts
STARK GAMING
STORServer
TMESIS SOFTWARE
UNICOM Systems, Inc.
Vista Control Systems, Inc.
VSM Software
Willow Technology

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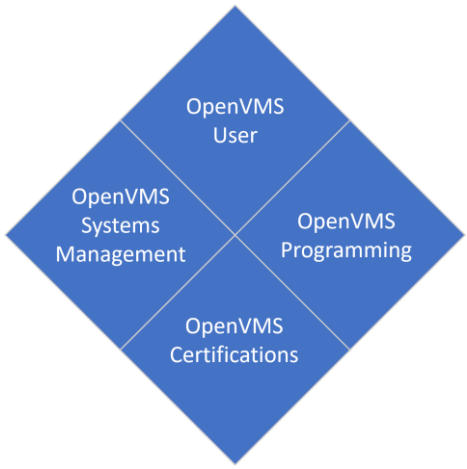
Other stuff

Services offerings

- Training
- Porting lab (particularly relevant for x86)
- Architectural workshops
- Assessment of current environment
- Introduction of new technologies (modernization)
- Migrations and upgrades
- Performance tuning and health checks
- Remote monitoring
- Administration
- Application maintenance and support
- Managed services and hosting
- Compliance
- …

Official VSI OpenVMS training

- Instructor led
- Remote instructor led
- Online self-paced
- Custom client site
- …



Official VSI OpenVMS training

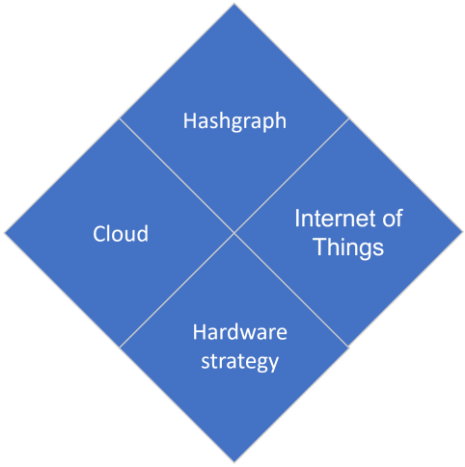
Online self-paced training:

- This is looking really good ☺
- Some 10+ companies already keen to use it as soon as it is available
- Looking to launch website very soon
- Need to do some work to make it production-ready
- Will add more courses over time

- Can provide Alpha emulator/operating system install kit for those who don't have access to an OpenVMS system
  - Probably need to tweak licensing

Looking beyond x86

- Virtualization/cloud (Alpha and x86)
- Hashgraph
- Internet of things
- Alternative hardware platforms
- Interaction with cloud-based services
- More open source products and tools
- More services
- Better package management
- Remote monitoring
- CRTL
- …



Thank you

To learn more please contact me:

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