



Introduction to OpenVMS Technology



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Brief History of VMS

- 1978: V1.0 on VAX-11/780
- 1984: V4.0: VAXclusters
- 1988: V5.0: Symmetrical Multiprocessing
- 1992: XPG4 certification; Name changed to OpenVMS
- 1992: V1.0 on Alpha
- 1998: Galaxy
- 2003: V8.0 on Itanium

VMS Core Values

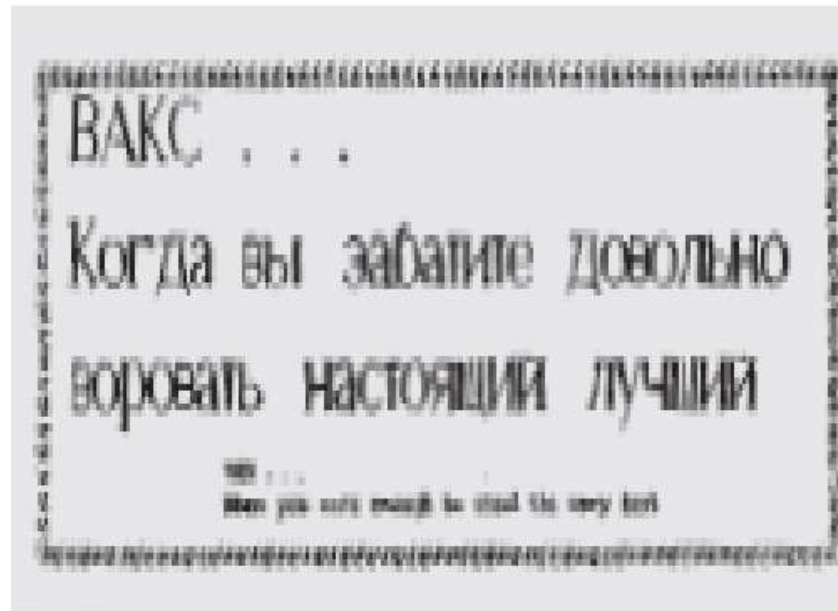
- Reliability
- Security
- Data integrity
- Multiple programming language support
- Consistency
- Documentation
- Upward compatibility

Unique Capabilities in OpenVMS

- No viruses
- File version support
- Terminal re-connect after disconnect:
 - “Virtual Terminals”
- Hardware auto-discovery is built in, so:
 - Different systems can all boot from same system disk
 - No need to “re-gen the kernel” (or load new drivers) after hardware changes

VMS Popularity

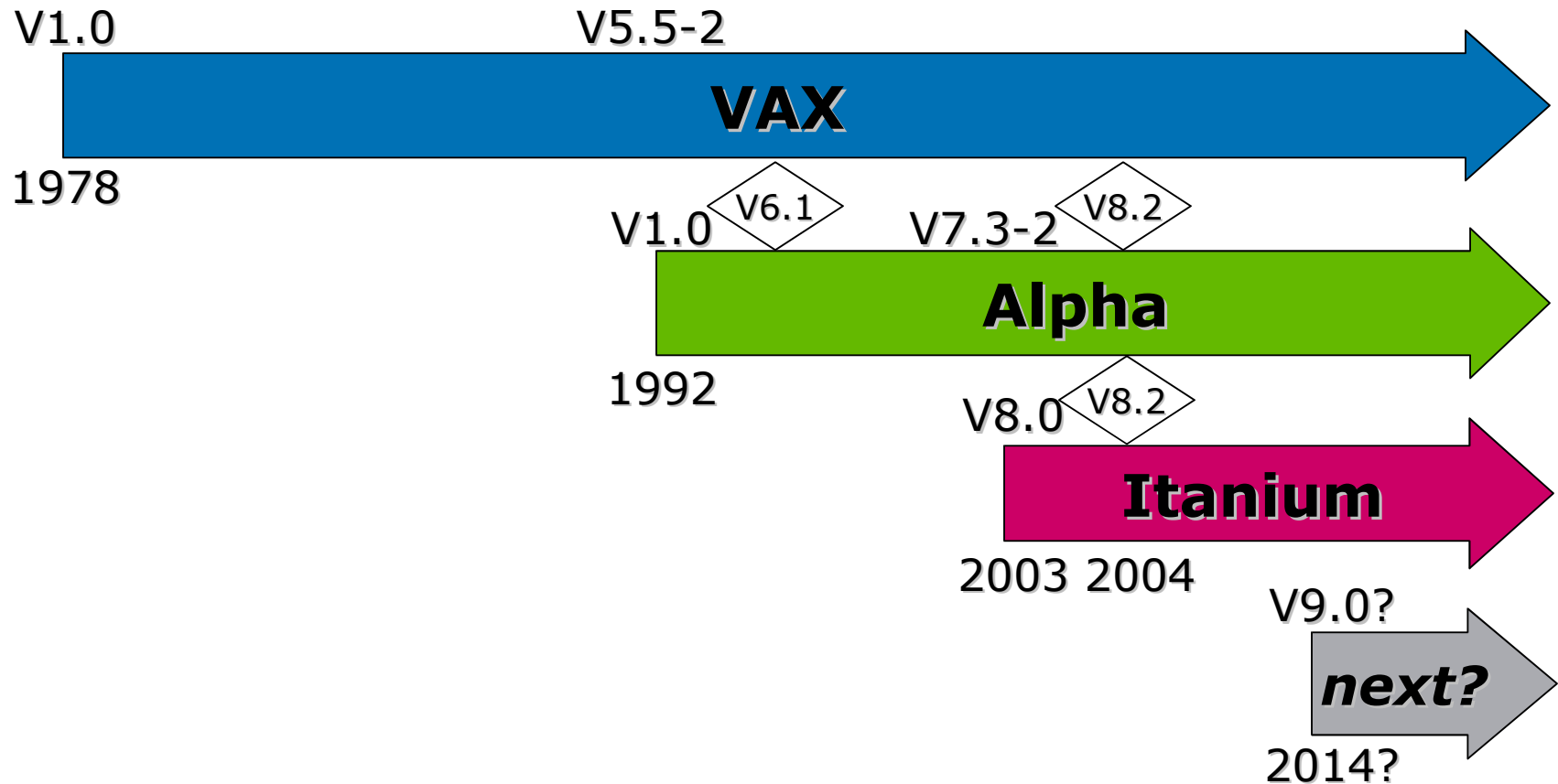
- Communist countries (Russia, Hungary, China) cloned VAX systems during the Cold War
- Inscription on CVAX chip was written in Russian: “When you care enough to steal the very best”



CPUs on which OpenVMS can run

- VAX
- Alpha
- Intel x86
 - via VAX emulator under Linux or Windows:
 - Charon-VAX (commercial software by SRI)
 - simh (freeware by Bob Supnik)
 - TS-10 (freeware by Timothy Stark)
- Intel Itanium

CPU Support in OpenVMS



Support for Multiples of Hardware

- Not just N+1 or 2X redundancy
- Interconnects
 - Cluster Interconnects
 - LANs (Gigabit/Fast/10-megabit Ethernet, FDDI, ATM)
 - CI, DSSI, Memory Channel
 - Storage Interconnects
 - Fibre Channel, SCSI, DSSI, CI
- Disks
 - Host-based Volume Shadowing (RAID 1)
 - Host-based RAID Software (RAID 0, 5, 0+1 with HBVS)
- Entire Servers (nodes in a cluster)
- Entire Sites (Disaster-Tolerant Multi-Site Clusters)
- Entire Disaster-Tolerant Clusters (RTR Shadowing)

Support for Hardware Redundancy

- Online addition of hardware:
 - Disks, tapes
 - Dynamic volume size expansion in 7.3-2
 - Complete server addition / removal from cluster
- Not just failover
 - Active / Active utilization
 - Load balancing / Load sharing
- Online repairs in many cases
 - Disks, tapes, interconnects

OpenVMS Clusters

- Mix VAX, Alpha, Itanium servers in same cluster
 - (Officially supported: VAX + Alpha or Alpha + Itanium)
- Up to 96 nodes supported (design limit: 256)
 - Largest real-life example: 151 nodes
- Connection Manager
 - Quorum Scheme to protect against partitioned clusters
- Distributed Lock Manager to coordinate access to shared resources by multiple nodes
- Cluster-wide File System for simultaneous access to the file system by multiple nodes

OpenVMS Clusters

- User environment appears the same regardless of which node you're using
- Cluster-wide batch job and print job queue system
- Nodes can share system disks (root)
- Common security and management environment
- Cluster Alias for IP (and DECnet)
- Cluster from the outside appears to be a single system

Summary of OpenVMS Cluster Features



- Cluster communications over a variety of interconnects, including industry-standard LANs
- Support for industry-standard SCSI and Fibre Channel storage
- MSCP Server for indirect access to disks/tapes when direct access is unavailable
- Excellent support for Disaster Tolerant Clusters

Popular Open Software Runs on OpenVMS



- TCP/IP stack, NFS, etc.
- Apache web server, Perl, Python, PHP, etc.
- Mozilla web browser
- MySQL, Samba, etc.
- X-Windows / Motif, CDE, etc.
- Kerberos, SSL, Stunnel, GnuPG, etc.
- Java, C, C++
- ❑ Linux / UNIX Portability Initiative is underway to ensure Linux / UNIX software can drop in and run, unmodified



Real-Life Examples of OpenVMS: Accuweather



- Provider of weather information
- OpenVMS user for 20 years
- See <http://h71000.www7.hp.com/openvms/brochures/accuweather/>



“Over the years, AccuWeather has gone from a meteorological weather company that produces forecasts to a technology company. Information technology is the heartbeat of AccuWeather. If we didn’t have accuracy, speed, and most importantly reliability in our IT systems, we wouldn’t have a business. HP OpenVMS systems are the critical lynchpin of our entire process.”

Kathleen Fiore
Vice President and CIO of AccuWeather



Real-Life Examples of OpenVMS: Credit Lyonnais



- Credit Lyonnais fire in Paris, May 1996
- OpenVMS multi-site cluster with data replication between sites (Volume Shadowing) saved the data
- Fire occurred over a weekend, and DR site plus quick procurement of replacement hardware allowed bank to reopen on Monday

“In any disaster, the key is to protect the data. If you lose your CPUs, you can replace them. If you lose your network, you can rebuild it. If you lose your data, you are down for several months. In the capital markets, that means you are dead. During the fire at our headquarters, the DIGITAL VMS Clusters were very effective at protecting the data.”

Jordan DoePatrick Hummel
IT Director, Capital Markets Division, Credit Lyonnais



Real-Life Examples of OpenVMS: International Securities Exchange



- All-electronic stock derivatives (options) exchange
- First new stock exchange in the US in 26 years
- Went from nothing to majority market share in 3 years
- OpenVMS Disaster-Tolerant Cluster at the core, surrounded by other OpenVMS systems
- See <http://h71000.www7.hp.com/openvms/brochures/ise/>



“OpenVMS is a proven product that’s been battle tested in the field. That’s why we were extremely confident in building the technology architecture of the ISE on OpenVMS AlphaServer systems.”

Danny Friel, Sr. Vice President,
Technology / Chief Information Officer,
International Securities Exchange



Real-Life Examples of OpenVMS: Commerzbank on 9/11



- Datacenter near WTC towers
- Generators took over after power failure, but dust & debris eventually caused A/C units to fail
- See <http://h71000.www7.hp.com/openvms/brochures/commerzbank/>

“Because of the intense heat in our data center, all systems crashed except for our AlphaServer GS160... OpenVMS wide-area clustering and volume-shadowing technology kept our primary system running off the drives at our remote site 30 miles away.”

Werner Boensch, Executive Vice President
Commerzbank, North America



OpenVMS Resources

- HP OpenVMS web page
 - <http://www.hp.com/go/openvms/>
 - OpenVMS Documentation on the Web:
 - <http://h71000.www7.hp.com/doc>
 - OpenVMS Technical Journal:
 - <http://h71000.www7.hp.com/openvms/journal/index.html>
- OpenVMS Hobbyist Program
 - Free licenses for OpenVMS, Cluster Software, compilers, development tools, and lots of other software):
 - <http://openvmshobbyist.org/>
- GNV (GNU for VMS):
 - UNIX environment for VMS: BASH shell, etc.
 - <http://gnv.sourceforge.net/>

OpenVMS Resources

- Ken Farmer's OpenVMS.org website:
 - <http://openvms.org/>
- HP ITRC Forums on OpenVMS:
 - <http://forums1.itrc.hp.com/service/forums/familyhome.do?familyId=288>
- Encompasserve (aka DECUServe)
 - OpenVMS system with free accounts and a friendly community
 - Telnet to encompasserve.org and log in under username REGISTRATION
- Yahoo Group OpenVMS_Friends
 - http://groups.yahoo.com/group/OpenVMS_Friends/
- Usenet newsgroups:
 - comp.os.vms, vmsnet.*, comp.sys.dec



Top Ten reasons to use OpenVMS

Top Ten Reasons to Run OpenVMS

1. You want to run more than one thing on a system at a time

- Application Server
- Web Server
- Mail Server
- Print Server
- File Server

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2. To you, “downtime” is a four-letter word

Top Ten Reasons to Run OpenVMS

1. You want to run more than one thing on a system at a time
2. To you, “downtime” is a four-letter word
3. You don’t want to be a member of the Virus-of-the-Week Club

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1. You know that “Reboot; and if that doesn’t work, Reinstall” is **NOT** the answer to every problem

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1. You know that “Reboot; and if that doesn’t work, Reinstall” is **NOT** the answer to every problem
2. You can count to more than five. Five Nines, that is. (99.999% availability)

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2. You want a system that won't trash the disk structure if you get a power failure

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VMS declared “Cool and Unhackable” at DefCon 9

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3. SCO can't sue you



i n v e n t



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