VAX system replacement
with CHARON-VAX

“Preserving your software investment across hardware generations”

Dogan Baser / April 2005
Software Resources International SA

- Created in Oct 1993 as a DEC software Migration Center
- Software porting and system engineering (predominantly VMS)
- Designed a PDP-11 emulator (CHARON-11) for ABB and Agfa
- 1999 Compaq takeover; Management buyout:
  - Created Software Resources International SA Geneva.
  - Transfer of all projects and Intellectual Property.
- Executed large migration projects for Compaq / HP:
- DFS Germany, VMS/Alpha to Itanium binary converter, etc
- Established offices in GY, FR, Benelux, Sweden, USA, UK

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Contents:

- Why a VAX Emulator?
- How does CHARON-VAX work?
- Compatibility
- Connecting Qbus hardware
- Limitations and “extra”s of a system emulator
- The CHARON-VAX product family
- Performance
- Clustering
- Support
- Business case: THALES Netherlands
- Business case: SPIDA Switzerland
- Summary
Why a VAX Emulator?

- Hardware is end-of-life and failing, especially disks
- Service costs have increased significantly (if available)
- Application rewriting expensive relative to the new system cost
- Experts and/or application source code not always available
- Automatic conversion (OMSVA, OMSAI) does not always work
- Market expects modern platforms
- There are still ~200,000 operational VAX systems worldwide
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CHARON-VAX Principle

Application
Layered software
System libraries
VMS (or other)

VAX Hardware

VAX Emulator
Host Operating System
CPU(s)

Application
Layered software
System libraries
VMS (or other)

Direct copy or re-install of VAX software, no conversion process

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CHARON-VAX Characteristics

VAX Operating System Independent:
- Runs VMS, VAXELn, Ultrix, NetBSD, etc
- No special host system or VAX Operating System drivers

Full VAX Hardware Compatibility:
- Tested with diagnostics and architecture tests (AXE)
- No VAX binary code changes
- No VAX application source code required
- Supports NI clustering, shared disk clustering, shadowing, striping
- DECnet, Ethernet, TCP/IP, LAT...
CHARON-VAX History

- Initial design based on a 3th generation PDP-11 emulator
- Start in April 1999 (VAX CPU for emulated PDP-11 Qbus)
- First VMS logon: March 2000
- First Customer Ship: September 2000, 10 VUPS
- High-End Product: June 2002, 50+ VUPS
- Shared Disk Clustering: August 2004
- VAX SMP Emulation: Sept 2004, 250+ VUPS (3 CPU)
- Performance grows with host system
- Lightweight and Portable (100% in C++)
Inside CHARON-VAX

- Memory
- VAX CPU Emulator
- System bus interface

- Ethernet
- Disk controller
- Tape controller
- Serial ports

- VAX Console
- VTxxx Terminal, etc

- SCSI VAX disk
- SCSI VAX tape
- Host system disk
- Virtual disk
- Tape image

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Compatibility with hardware VAX systems

Tools Used to Obtain Compatibility:

- Hardware Diagnostics (XXDP, MDM)
- AXE: VAX Architecture Exerciser
- Running VMS, VAXEln, Ultrix, NetBSD

Recent HP/Compaq QA Tests Proved Compatibility:

- 100K error-free AXE test loops per instruction group
- MDM fault-free ‘hardware’
- UETP application level tests

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Connecting Qbus Hardware

BCI-2104 solution provided by The Logical Company, USA

- Adapter maps Qbus I/O space in the virtual VAX environment
- Existing device drivers can be used, no code changes

Limitations:

- Requires emulated Qbus: CHARON-VAX/Industrial (Plus)
- Keeps the physical Qbus cage and the legacy I/O option
- Individual calibration required for some real-time peripherals
- Alternate solutions exist for high-volume applications
Emulation limitations

- VAX software timing loops
  - Sometimes found in industrial/military software
- No connection to hardware DSSI/CI storage on Windows hosts
  - But legacy disk are low speed compared to SCSI-3
- SCSI peripheral connections
  - SCSI-1 device timing and speed (TK50)
- Legacy peripheral connections
  - Bus adapter for Qbus options; host influences operation
- Ethernet connections
  - VAX = 10 Mbps. 100 Mbps adapters do not run at full speed
- In case of uncertainty, prior testing is recommended
Emulator “Extra’s”

- Disk/tape storage alternatives
  - Physical disk/tape, disk/tape image, fast backup (DVD)
- Architecture extensions
  - 512 MB, 24 disk controller MV 3600
  - KDM70 that supports disks, disk images, tapes, tape images
- VAX CPU emulation speed control
  - Used with Military / Industrial applications
- Archiving of VAX system “snapshots”
  - Keeping configuration + disk images in archive
## CHARON-VAX Products Overview

<table>
<thead>
<tr>
<th>Product</th>
<th>Platform</th>
<th>Earliest VMS version supported</th>
<th>Emulated Memory Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHARON-VAX/XM for Windows</td>
<td>Windows 2003 or XP</td>
<td>4.6 (*)</td>
<td>128 MB (*)</td>
</tr>
<tr>
<td>CHARON-VAX/XM Plus for Windows</td>
<td>Windows 2003 or XP</td>
<td>4.6 (*)</td>
<td>128 MB (*)</td>
</tr>
<tr>
<td>CHARON-VAX/XK Plus for Windows</td>
<td>Windows 2003 or XP</td>
<td>5.5-2H4</td>
<td>256 MB</td>
</tr>
<tr>
<td>CHARON-VAX/XL for Windows</td>
<td>Windows 2003 or XP</td>
<td>5.5-2H4</td>
<td>512 MB</td>
</tr>
<tr>
<td>CHARON-VAX/XL Plus for Windows</td>
<td>Windows 2003 or XP</td>
<td>5.5-2H4</td>
<td>512 MB</td>
</tr>
<tr>
<td>CHARON-VAX/6610 Plus for Windows</td>
<td>Windows 2003 or XP</td>
<td>5.5-2H4</td>
<td>1 GB</td>
</tr>
<tr>
<td>CHARON-VAX/6620 Plus for Windows</td>
<td>Windows 2003 or XP</td>
<td>5.5-2H4</td>
<td>2 GB</td>
</tr>
<tr>
<td>CHARON-VAX/6630 Plus for Windows</td>
<td>Windows 2003 or XP</td>
<td>5.5-2H4</td>
<td>2 GB</td>
</tr>
<tr>
<td>CHARON-VAX/Industrial for Windows</td>
<td>Windows 2000 or XP</td>
<td>4.6</td>
<td>64 MB</td>
</tr>
<tr>
<td>CHARON-VAX/Industrial Plus for Windows</td>
<td>Windows 2000 or XP</td>
<td>4.6</td>
<td>64 MB</td>
</tr>
<tr>
<td>CHARON-VAX/AXP Plus for OpenVMS/Alpha</td>
<td>OpenVMS Alpha</td>
<td>5.5-2H4</td>
<td>512 MB</td>
</tr>
</tbody>
</table>

(*) Depends on the CPU emulated
Decision factors for CHARON-VAX version

- Replacement platform preference
- VMS version to run
- Memory size need
- Performance need
Relative VUP Performance Comparison (Sep 2004)

CPU model - VUPs

0 50 100 150 200 250

- VAX 11/780
- VAX 4000-500A
- VAX 3100-98
- VAX 7000-710
- VAX 7000-740
- VAX 7000-760
- CH-VAX/Industrial+ on dual Xeon, 2.8 GHz
- CH-VAX/AXP Plus on Alpha EV68, 1GHz
- CH-VAX/XM on dual P4, 3.4 GHz
- CH-VAX/XM+ on dual P4, 3.4 GHz
- CH-VAX/XL+ on dual AMD MP2800+, 2.1 GHz
- CH-VAX/XL+ on dual AMD 64, 2.4 GHz
- CH-VAX/XL+ on dual Xeon, 3.0 GHz
- CH-VAX/XL+ on dual AMD 248, 2.2 GHz
- CH-VAX/XL+ on dual AMD 250, 2.4 GHz
- CH-VAX/6610+ on DL585 2x AMD 850 CPUs, 2.4 GHz
- CH-VAX/6620+ on DL585 3x AMD 850 CPUs, 2.4 GHz
- CH-VAX/6630+ on DL585 4x AMD 850 CPUs, 2.4 GHz
4U/4P – HP ProLiant DL585 with 4 x Opteron 850

The ideal platform for CHARON-VAX/66x0 Plus for Windows for large data center deployments

- Top performance, CHARON-VAX: 258 VUPs (VAX 7760: 250 VUPs)
- Scaleability
- Outstanding uptime
- ProLiant management

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CHARON-VAX/AXP for OpenVMS/Alpha

- Good replacement for older VAX 3000, 3100 and 4000 models up to ~25 VUPs
- Ideal for users who want to limit their IT environment to OpenVMS
- Trusted OpenVMS qualities: Stability, availability, bullet-proof security
- Inexpensive HP transfer licenses

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Shared disk clustering with iSCSI

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Traditional VAX/VMS NI Cluster

**Application**
- System Utilities
- System Libraries
- VMS

**CHARON-VAX**
- Host OS
  - Adapter Emulation
  - Ethernet Adapter
- Hardware

**Application**
- System Utilities
- System Libraries
- VMS

**CHARON-VAX**
- Host OS
  - Adapter Emulation
  - Ethernet Adapter
- Hardware

VAX Ethernet
10 or 100 Mbits/s
HP Transfer Licenses

HP Contact for Transfer Licenses and Support:

OpenVMS/Alpha Host
- Right to transfer VAX/VMS $ 500
- All supported layered products $ 500

Other Hosts (Windows)
- Right to transfer VAX/VMS $ 1000
- All supported layered products $ 1000
Obtaining Support

- **VMS and Layered Products Support**
  - From HP, as usual

- **Oracle Support**
  - From Oracle Corp, as usual

- **CHARON Product Support**
  - From SRI or an SRI-certified support organization
  - GOLD Support: 5 days / 8 hours
  - PLATINUM Support: 7 days / 24 hours*

* Subject to geographical availability
CHARON-VAX

Business Case at Thales Group
The Netherlands

Wilm Boerhout, VX Company
Consultant
Source System

VAX 7000-620

Star Coupler

HSJ40

HSJ40

Disks:
• 25x RZ26 (1GB)
• 24x RZ28 (2GB)
• 12x RZ29 (4GB)
• 4x RZ40 (9.1GB)

Tapes:
• 2x TZ877

Ethernet
Source System characteristics

- Dual processor system
- VMS V5.5-2
- 500-800 interactive users
- Night batches with heavy load
- Stable system with lots of legacy applications and middleware
- Structured system disk with management shell
Target System

EMC SAN
70 GB chunks

VMS-disks:
“virtual” RZxx

Compaq Proliant DL360R03
2x2.8 GHz Proc, 2GB memory
Win 2000 Server on local SCSI
SAN Connection

CHARON-VAX / XL-Plus for Windows
VAX 3100 instruction set
“1x2.8 GHz Proc, 512MB memory”
All VMS-disks are containers on SAN

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Target System considerations

- **VMS Version:**
  - emulator needs V5.5-2H4
  - clean build not possible due to some sources lost or missing
  - system disk upgrade to 7.3

- **Ethernet connections:**
  - Throughput optimized by setting of network switch configuration (10Mbit, 100Mbit)

- **Backup solution:**
  - Containers are backed up on SAN
  - Restore of single files awkward
  - Selected files and databases backed up via Veritas Netbackup client (Corporate Solution)

- **I/O Performance:**
  - I/O bound night batch runs significantly faster on emulated system!
Economies of Scale

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Economies of Scale

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Performance Leap for SPIDA‘s VAX Applications

Götz Hoffmann  Dipl. Ing.  CEO HOLEON GmbH  Switzerland

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Business Case SPIDA

State Pension Fund

VAX 4000-500A

New application software available in ~3 years
Bottleneck: Performance

- End-of-month processing: 15 hrs

- Response time: In the magnitude of minutes
Challenge

- Increase performance
- ASAP
- No interruption of the operations
CHARON-VAX, final system configuration

HP Proliant ML530

- Dual-CPU Xeon 3 GHz, 2 GB
- Fast hot-swap SCSI drives 15’000rpm
- Two-channel RAID controller with 128 MB cache
CHARON-VAX, final system implementation

- Back-up / restore
- Implementation in target environment
- Parallel operation of VAX and CHARON-VAX
- Final tests by multiple selected users
- Final system activation over a weekend
  - Stop VAX applications
  - Copy data to CHARON-VAX
  - Activate CHARON-VAX as host

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Characteristics of the final solution

- Performance increase: 5x
- Cost reduction: 50%
- Implementation time: 1 to 6
- Disruption of operations: No
- Risks: Eliminated by stepwise implementation
- Sustainability: Yes
CHARON-VAX Benefits Summary - 1

- Emulates the VAX hardware, not VMS or any other OS
- Implements immediately, quickly, simply
- No risk
- Enthusiastic users: set-up, install VMS, copy application, run
- Replaces old HW by modern HW
- Increases performance automatically with modern CPU speeds
- Preserves current investments
  - Keep current applications
  - Keep current business processes, no impact on day-to-day operations
  - No re-training, no re-staffing
CHARON-VAX Benefits Summary - 2

- Supports SCSI / iSCSI disk clustering – transparent to VAX/VMS
- Provides an API to add custom Qbus peripheral emulations
- Product variations available to match user application need
- Licensing:
  - Unlimited usage license, or
  - Initial one-year license + yearly license extensions
- TRIAL PURCHASE with money-back guarantee
CHARON-VAX Benefits Summary:
System Manager Testimonials

- Ability to do VMS backups using WINDOWS/PC tools
- Ability to “add” DEC disks as needed
  - As virtual disks represented as CHARON container files
  - Up to the limit allowed by VMS
  - Up to the limit of PC disk space
- Ability to do VMS tape backups at PC server speeds
  - Backup first to DEC virtual tape drives (as CHARON container files)
  - Then backup PC files to modern media (local or networked)
- Reduce “VAX hardware footprint” substantially
  - Even with one-to-one VAX-to-PC replacement
  - Especially by consolidating multiple VAXes to high-performance CHARON-VAXes
- Reduces cost of ownership
For More Information

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www.softresint.com
www.vaxemulator.com

Product descriptions
www.softresint.com/charon-vax/index.htm

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Documentation
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