OpenVMS on x86 – NOW!
Introduction

• Raimund Arch – artedi e.U.
  • focused on technical stuff
  • 25 yrs of working life with, on, because of OpenVMS
  • AVTware Sales-and Support-Partner

• Hans Bachner – b.it.co IT Consulting GmbH
  • focused on OpenVMS and other DEC products
  • consulting, services and software development
  • Stromasys Sales- and Support-Partner
Where are we?

• several 100,000s of VAXen and Alphas still around
• increasing problems with hardware (disks, power supplies)
• getting spare parts becomes difficult
• no more hardware maintenance offered
• but: applications still do valuable work
  • highly customized
  • certified
  • mission critical

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What can be done?

• get used hardware
  • still old parts, maintenance problem not solved

• replace applications
  • expensive, takes time, requires business changes

• port applications
  • probably best choice for applications still under active development

• hardware emulation
Virtualise, to be or not to be?

- Emulate, Translate or Hypervise?
- Emulators basics, terms, history (a bit of)
- Hypervisors basics, terms, history (a…)
- Types of Emulators
- Types of Hypervisors
Emulate, you don’t know me

- aemulare...lat. word for 'to imitate'
- System/Software which imitates another System...in some aspects
- Imitation by Transformation
- Emulators transform translated code for
  - different Processors with different 'vocabulary'
- Emulators are the supporting pillars for bridging
  - different Architectures with different Infrastructures

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Emulators, practical use

- original Hardware
- original Operating System+Apps (OS+)
- new Hardware
- Emulator
- transfer OS (still original)
- discard old Hardware

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Hypervise, divide and conquer

• hyper ... ancient greek for 'over'
• videre ... latin word for 'to see'
• Hypervisor ... the 'overseer' / surveillant
• no transformation, but controlled distribution
• Two types of Hypervisors (Ref. R. Goldberg)
  • Type-1 native or Bare Metal
  • Type-2 hosted
Hypervisor, Type-1 Bare Metal

- doesn’t need an underlying Software Infrastructure (Host OS)
- Kernel which supports HW Infrastructure + Management Interface
- allows controlled distribution of given Infrastructure
- depends in Hypervisor producer for
  - Patches
  - Security Updates
  - License / maintenance contract prolongations
- is used by diverse higher level Infrastructure aka Guest OS Systems (like OpenVMS)
Hypervisor, Type-2 hosted

• needs supporting Software Infrastructure → fully-fledged OS
• does share HW Investment and electrical power resources
• has to share with other 'normal' applications
• is fully dependent on hosting OS
  • Patches
  • Security Updates
  • License / maintenance contract prolongations
Hypervisors, practical use

- Hardware (X86 most likely)
- 8 Cores
- the Hypervisor
- 1st Virtual Machine (VM)
- 2 Cores assigned
- OS installed
- others to follow

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How VAX and Alpha virtualization works
We will now look at

- VAX and Alpha emulation products from
  - AVTware
  - Stromasys
## Product Line-up AVTware vtAlpha

<table>
<thead>
<tr>
<th>AlphaStation 200, 250, 255, DEC3000</th>
<th>vtAlpha-AS</th>
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</thead>
<tbody>
<tr>
<td>AlphaServer 300, 400</td>
<td>vtAlpha-AS</td>
</tr>
<tr>
<td>AlphaServer 800, 1000</td>
<td>vtAlpha-BS</td>
</tr>
<tr>
<td>AlphaStation 500, 600, DPW, XP900, XP1000</td>
<td>vtAlpha-BS</td>
</tr>
<tr>
<td>AlphaServer 2000, 2100</td>
<td>vtAlpha-CS</td>
</tr>
<tr>
<td>AlphaServer 4000, 4100</td>
<td>vtAlpha-CS</td>
</tr>
<tr>
<td>AlphaServer DS10, DS15</td>
<td>vtAlpha-DS</td>
</tr>
<tr>
<td>AlphaServer DS20, DS25</td>
<td>vtAlpha-DS</td>
</tr>
<tr>
<td>AlphaServer 1200</td>
<td>vtAlpha-DS</td>
</tr>
<tr>
<td>AlphaServer ES40, ES45, ES47</td>
<td>vtAlpha-ES</td>
</tr>
<tr>
<td>AlphaServer GS80, GS160, GS320</td>
<td>vtAlpha-GS (Q2/2015)</td>
</tr>
</tbody>
</table>

*NEW!*
## Product Lineup AVTware vtVAX

<table>
<thead>
<tr>
<th>VAXstation II, GPX, 2000, VAXserver 3600/3900</th>
<th>vtVAXstation</th>
</tr>
</thead>
<tbody>
<tr>
<td>MicroVAX II, 2000</td>
<td>vtVAX-128 (+ AC)</td>
</tr>
<tr>
<td>MicroVAX 3100 - 3900</td>
<td>vtVAX-256 (+ AC)</td>
</tr>
<tr>
<td>VAX 4000</td>
<td></td>
</tr>
<tr>
<td>VAX 6000</td>
<td></td>
</tr>
<tr>
<td>MicroVAX 3100</td>
<td>vtVAX-512 (+ AC)</td>
</tr>
<tr>
<td>VAX 4000</td>
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</tr>
<tr>
<td>VAX 6000</td>
<td></td>
</tr>
<tr>
<td>VAX 6000 1 – 6 CPU, up to 3.5 GB memory</td>
<td>vtVAX-7000</td>
</tr>
<tr>
<td>VAX 7000 1 – 6 CPU, up to 3.5 GB memory</td>
<td></td>
</tr>
</tbody>
</table>
INFRASTRUCTURE

Configure via Web Interface

- create type of System
- select # of CPUs
- select size of RAM
- configure Adapters
  - add Devices (Disks, Tapes etc.)

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Product Line-up Stromasys

• CHARON-VAX /XM(+), /XK+, /XL(+)
  • several models to configure MicroVAX II, VAX 3600/3900, VAX 3100/9x, VAX 4000/10x, VAXstation 4000/90, VAX 6310
    • up to 512 MB memory

• CHARON-VAX /66x0
  • VAX 66x0, 76x0
    • up to 6 CPUs, 3 GB memory
Product Line-up Stromasys (cont.)

- CHARON-AXP /4100
  - AlphaServer 400, 800, 100(A), 1200, 2x00, 4x00

- CHARON-AXP /xS
  - any AlphaServer from DS10 to GS1280

- CHARON-AXP /SMA(+)
  - DEC 3000-400, DMCC, Flexor OEM systems
  - AlphaServer 300, 400, 800, 1000, 1200, 2x00, 4x00, 8x00, DS10/20/25, ES40/45
  - AlphaStation 500, 600, Personal Workstation au, XP900, XP1000

- CHARON-AXP /Station
  - AlphaStation 200, 250

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Product Line-up Stromasys (cont.)

NEW!

- CHARON-AXP+
  - erstes 'bare metal' Produkt von Stromasys
    - Vorabversion jetzt verfügbar
    - Produktions-Version Q4 / 2015
  - AlphaServer ES40 / 32 GB
  - AlphaServer GS80 / 64 GB

- beste Performance auf Intel Haswell CPUs (Xeon E5 V3)
Common Features

• no changes to the OS or applications required
• use files, physical devices, or SAN-/iSCSI LUNs as virtual disk or tape drives for VAX or Alpha guest
• guest OS support for physical storage used is not required ➔ use current storage systems with older OS versions
• make use of higher speed of modern network cards
• run any guest OS version (OpenVMS, Digital UNIX/Tru64 UNIX) that is supported on the original hardware
Common Features

• support OpenVMS cluster and Tru64 TruCluster (shared disks)

• support „mixed reality“ clusters, i.e. clustering physical hosts with virtual hosts

• allow multiple virtual VAX/Alpha instances on a single host
Common Features (cont.)

- quick and easy migration – in most cases, just copy disk contents
- performance increase if VAX or earlier Alpha hardware is replaced
- reduced risk of hardware failures
  - modern x86 servers have many redundant components, some even hot-swappable
- less rack space, power, cooling required ➞ cost reduction
## Differences

<table>
<thead>
<tr>
<th></th>
<th>AVTware</th>
<th>CHARON</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host Operating System</td>
<td>not requiredd</td>
<td>Windows 2008 R2, 2012 (R2) Red Hat 6.5, 7 (except /SMA(+), /Station) not required (CHARON-AXP+)</td>
</tr>
<tr>
<td>Hypervisors supported</td>
<td>Vmware, Xen, KVM, Hyper-V</td>
<td>VMware</td>
</tr>
<tr>
<td>Administration</td>
<td>Webinterface</td>
<td>text based config files, local GUI Utilities Webinterface (with restrictions)</td>
</tr>
</tbody>
</table>
## Differences (cont.)

<table>
<thead>
<tr>
<th></th>
<th>AVTware</th>
<th>CHARON</th>
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</thead>
<tbody>
<tr>
<td>number of hardware</td>
<td></td>
<td>higher</td>
</tr>
<tr>
<td>models/variants that</td>
<td></td>
<td></td>
</tr>
<tr>
<td>can be emulated</td>
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<td></td>
</tr>
<tr>
<td>achievable CPU</td>
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<td>somewhat higher</td>
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<tr>
<td>performance</td>
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<tr>
<td>achievable system</td>
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<td>application</td>
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<tr>
<td>performance</td>
<td></td>
<td></td>
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<tr>
<td>console protection</td>
<td>password</td>
<td>host firewall</td>
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