Building an OpenVMS web server

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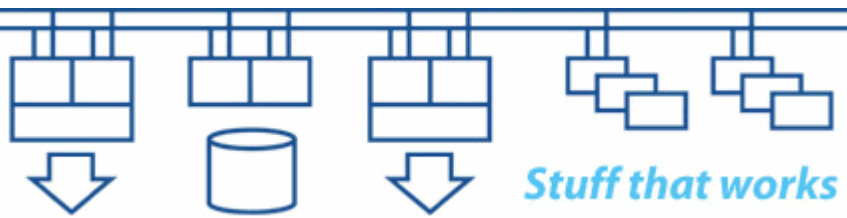

Session goal

A "guided tour" of setting up an OpenVMS web server using live demo equipment. We intend to finish with an OpenVMS Galaxy cluster running as a web server.

This seminar is unlikely to answer all of your questions, so please be prepared to contribute and share your knowledge.

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Topics

- Hardware platforms (Alpha and Integrity)
- Overview of configuration process
- OpenVMS base system requirements
- Building an OpenVMS Galaxy cluster
- TCPIP configuration
- Installing CSWS (based on Apache)
- Installing PERL, PHP
- Installing JAVA and TOMCAT
- Performance and availability
- V8.2 update, porting notes etc.

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Useful aphorisms

- **Occam's Razor:**
  "Pluralitas non est ponenda sine neccesitate"
  "Entities should not be multiplied unnecessarily"
  "Keep it as simple as possible"

- **Hanlon's Razor:**
  "Never attribute to malice that which can be adequately explained by stupidity"

- **Colin's Caveat:**
  "Allow for failures, success is one of many possible outcomes"

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OpenVMS and hardware naming

VAX and Alpha are used interchangeably to refer to system architectures, processors / microprocessors and platforms

- **VAX VMS was used up to V5.5-2H4**
- **OpenVMS VAX and OpenVMS Alpha are used from V6.0 onwards**

Intel implementations are different:

- **IA-64 is the Intel architecture**
- **Itanium is the Intel microprocessor family**
- **Integrity is the HP platform**
- **OpenVMS I64 is the HP operating system name**

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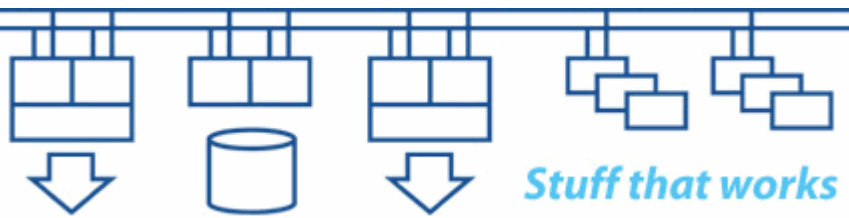

Stuff that works

Demonstration hardware

- **AlphaServer 4100:**
  - **4x CPUs, 2Gbyte memory**
  - **SANswitch/16 and KGPSAs (courtesy of MIT Limited)**
  - **HSG80 based disc array (courtesy of Digital Networks)**
  - **Partitioned and Clustered (Galaxy)**
  - **OpenVMS V7.3-2 + current patches**
  - **TCP/IP V5.5-ECO05**
  - **DECnet-Plus V7.3-2-ECO01 + MUP01**
  - **DECwindows/Motif V1.5**

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AlphaServer 4100 setup

- **Serial consoles for Galaxy**
- **Firmware updates for system and devices**
- **Galaxy setup (LP* variables in NVRAM)**
- **HSG80 setup (unit identifiers, SCSI_version etc.)**
- **SANswitch setup (zoning)**
- **WWIDMGR –quickset –udid <ident> (set mode diag)**
- **Booting: boot –flags <root>,<flag_bits> <device>**

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OpenVMS Alpha V7.3-2 installation

- **Boot firmware update CD**
- **Install firmware updates**
- **Boot OpenVMS installation CD**
- **Select installation menu (option 1)**
- **Answer installation questions**
  - **“yes” to ODS5 and hard links**
- **Install O.S. patches and base L.P. patches**
- **Set up system parameters ready for layered product installations (read product requirements)**
- **Startup and login command files**

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OpenVMS post-installation

Configure base system:

- Edit / create startup files
- Configure network software
- Page / swap / dump files
- Set up other system components (e.g.: LAT, MOP)
- Set up queues and queue manager database
- System parameters
- Layered products (compilers etc.)
- BACK IT UP (and test restore)

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Building a Galaxy cluster

- Create primary node
- Add second node booted from same system disc – set boot flags appropriately
- Page / swap / dump files off shared system disc – use local SCSI disc if possible
- Set Galaxy system parameter to use SMCI (shared memory cluster interconnect)
- Configure system parameters (votes, quorum disc etc.)
- Configure network layers (do not use DECnet, TCPIP, LAT etc. over the SMCI)

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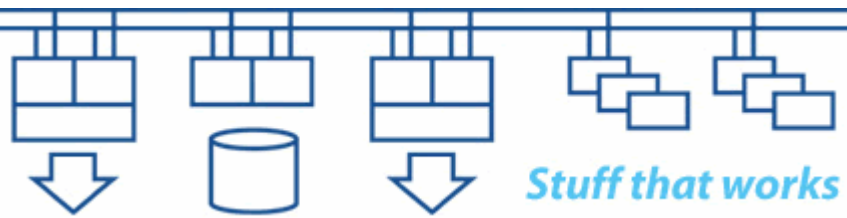

Building a web server - overview

- First ensure that TCPIP is configured and running
- In general discs should be ODS5 (LDdriver is useful)
- Install and configure CSWS (APACHE)
- Add PERL, PHP, PYTHON etc. if needed
- Install and configure JAVA and CSWS_JAVA (TOMCAT)
- Quotas and system parameters
- UNIX heritage, so not “traditional” VMS style configuration – uses text files in most cases
- Getting good JAVA performance requires attention
- Examine your code carefully!

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TCPIP configuration

- **Use multiple addresses – private ones for management and published ones for access to services**
- **Consider using failsafe IP for access to services – addresses are no longer "tied" to interfaces**
- **Load Broker and Metric Server**
- **Scalable kernel and dedicated CPU on large multiprocessor systems**

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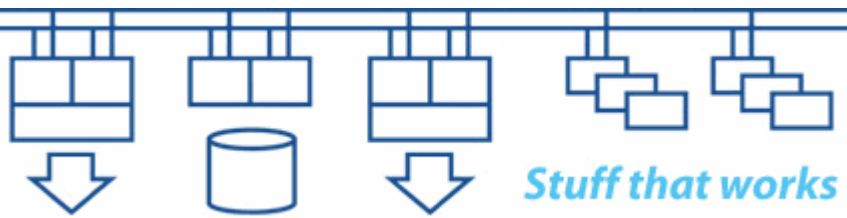

ODS5 discs – DCL commands

```
INITIALIZE <disc> -
    /STRUCTURE=5 –
    /VOLUME_CHAR=(HARDLINKS)

SET VOLUME <disc> -
    /STRUCTURE=5 –
    /VOLUME_CHAR=(HARDLINKS)

SET PROCESS /PARSE=EXTENDED
```


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CSWS (APACHE)

- **Must have TCPIP installed and configured first**
- **Install with PCSI**
- **Configure via HTTPD.CONF**
  - **Can have multiple web server configurations (each on a different TCPIP port, default is TCPIP port 80)**
  - **Consider how many processes to start for each web server – increase on big systems**
  - **Consider where to place files**
  - **File ownership and access control**

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PERL, PHP etc.

- **Must have CSWS running first – these are "modules" that hook into APACHE (eg: MOD_PERL) so that they run as "server side" processes**
- **Install PHP with PCSI**
- **Install PERL with PCSI first**
  - **Doesn't come with a startup file**
  - **Define PERL_ROOT and PERLSHR logicals**
  - **Install the images**
- **Install MOD_PERL once PERL is installed and configured**
- **Consider writing your own APACHE "modules"**

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JAVA

- **Use the JAVA FastVM wherever possible**
- **Check your process quotas (and system parameters) – PGFLQUO is one of the key ones**
- **It uses LOTS of memory**
- **Read the User Guide carefully – there are many options that can be controlled by logical names, some of them can make a big difference to performance**
- **Also see the C run-time library logical names – they too can have a big effect on performance**
- **JAVA is horribly case sensitive**

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TOMCAT

- **Must have JAVA and APACHE installed first**
- **Configure to use APACHE "modules"**
- **Configure to use the APACHE$WWW account**
- **Configure TOMCAT to use the JAVA FastVM via the ".TOMCATRC" file**
- **Check the APACHE$WWW process quotas (and system parameters) – PGFLQUO is one of the key ones**
- **TOMCAT uses TCPIP port 8080 by default**
- **TOMCAT makes extensive use of threads (see DECthreads)**
- **Threads on Galaxy (CPU migration) and the MULTITHREAD system parameter**

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Demo build of web server

- **Build cluster (partitioning, HSG80 shared discs, system roots, network configurations, startup command files, parameters, quotas etc.)**
- **Test cluster and back it up (save example files)**
- **Install web server components**
- **Configure web server components and test**
- **Performance**

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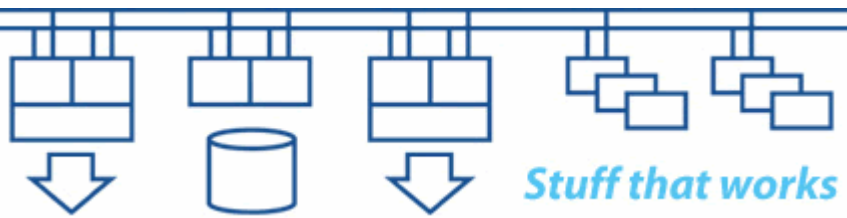

OpenVMS V8.2 changes overview (1)

- **Most changes are related to the port of OpenVMS to Integrity Servers**
- **Use standard mechanisms – don't "roll your own"!**

- **Image layout for Integrity Servers (ELF / DWARF)**
- **Calling standard for Integrity Servers (register usage etc.)**
- **Linker / debugger changes for Integrity Servers**
- **System services**
- **DCL lexical functions**

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OpenVMS V8.2 changes overview (2)

- **Host-based mini-merge (HBMM) – also back-ported to V7.3-2 with TIMA kit**
- **Internals and data structures changes**
- **System service logging**
- **SDA extensions**
- **Performance features such as finer granularity of locks**
- **Extended lock value blocks**
- **Revised system parameter defaults**
- **DCL command line length and parse token length**
- **DCL mailboxes**

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Mixed architecture clustering

- **VAX and Alpha are supported in the same cluster**
- **Alpha and Integrity are supported in the same cluster**
- **VAX and Integrity are not supported in the same cluster**

- **Be careful with mixed version clusters. Older versions of OpenVMS can restrict overall cluster performance and functionality.**
- **OpenVMS VAX V7.3 does not include full support for HBMM bitmaps, ODS5 extended file naming etc.**

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OpenVMS porting considerations (1)

- **Binary translation (VAX to Alpha, Alpha to Integrity)**
- **Implicit assumptions, eg: (if .not. vax)**
- **Synchronisation and serialisation of access to data structures**
- **Performance features**
- **Platform independent interfaces (system services, lexical functions etc.)**
- **IEEE floating point format for best performance**
- **Privileged code may require additional work**

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OpenVMS porting considerations (2)

- **Make a thorough audit and analysis of what you're doing at the moment**
- **Consider taking advantage of new features and new ways to do things**
- **There may be no direct equivalents**
- **Direct 'bug for bug' port?**
- **Opportunity to re-implement application?**
- **Plan for expansion & growth**
- **Are you going to have to continue to support non-migrated systems as well?**

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Further OpenVMS information

- **OpenVMS main site** (http://www.hp.com/go/openvms)
- **Technical Journal** (http://www.hp.com/go/openvms/journal)
- **FAQ** (http://www.hp.com/go/openvms/wizard)
- **Ask The Wizard** (http://www.hp.com/go/openvms/wizard)
- **Integrity Servers** (http://www.hp.com/go/integrity)
- **Alpha Servers** (http://h18002.www1.hp.com/alphaserver/)
- **HP DSPP** (http://www.hp.com/dspp)
- **Intel Itanium 2 systems** (http://www.intel.com/design/itanium/documentation.htm)

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OpenVMS Symposium ("bootcamp")

Week of May 19th 2006 at Sheraton Tara hotel, Nashua (next door to OpenVMS Engineering building ZKO)

- **An "Ambassadors" style week for non-HP staff.**
- **An intense week of learning, information gathering and meeting people. Well worth going to.**
- **Contact Sue Skonetski (susan.skonetski@hp.com).**
- **See http://www.hp.com/go/openvms/bootcamp**

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