OpenVMS Hints & Kinks

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Audience

This is a technical session

- Target Audience:
  - OpenVMS Programmers
  - OpenVMS System Managers
- OpenVMS Familiarity is Assumed:
  - User Commands
  - System Management Commands
  - Programming Commands
- *This session is a series of vignettes*

The Hints

Things you might not know about OpenVMS, but were never afraid to ask.

Controlling Interactive Logins

Shutting out all users?

```
$ SET LOGIN /INTERACTIVE=0
$ @SYS$MANAGER:TCPIP$REXEC_SHUTDOWN
$ @SYS$MANAGER:TCPIP$RSH_SHUTDOWN
$ @SYS$MANAGER:TCPIP$FTP_SHUTDOWN
$ MCR NCL RESTRICT SESSION CONTROL
```

V7.3-2 Unit Limits Increased...

- Increase limit from 9999 to 32767 units
  - Used for MB (mailbox) and BG (IP) devices
  - See the scalable kernel support for TCP/IP Services

Messages, Definitions

- GNM
  - SDML
    - DOCUMENT

  - MSG Message File
    - MESSAGE/SDL
    - SDL/LANGUAGE=
      - SDML
        - DOCUMENT

  GNM also serves as a lib$table_parse example

Media Overwrites, Recovery

DLT and DDS media cannot generally be recovered (using standard drives and firmware) once overwritten…

- Drive firmware does not allow access past EOT, and drives can silently erase data on media beyond EOT.
- Service vendors specializing in data recovery can potentially recover data from overwritten media.
- To avoid media overwrites should a tape be immediately (and erroneously) reloaded into the drive, consider:
  - /TAPE_EXPIRATION="TODAY+7-"

Shareable Images

- Shareable Image Cookbook
  - OpenVMS Ask The Wizard (ATW)
    - http://www.hp.com/go/wizard/
- Upward Compatibility
- Multiple Versions, Redirection

Debugging

Integrate Debugging

- OpenVMS tools
- Application-specific tools
- CC/WARN=VERBOSE

Integrate Debugging

- SS$_DEBUG signal
  - Counted ASCII string
- SS$_PRCDMP signal

Integrate Debugging

- SS$_PRCDMP file IMAGENAME.DMP redirection
  - $ define SYS$PROCDMP SYS$ERRORLOG:
  - $ define /exec SYS$PROTECTED_PROCDMP SYS$ERRORLOG:
- No mechanism to rename the IMAGEDMP.DMP file

Debugging

- XQP Activity
  - SET WATCH/CLASS=cls FILE
    - ALL,NONE,etc

- System Service Logging (V8.2 and later)
  - SET PROCESS/SSL=command

- Security Auditing
  - Use the privilege audits, alarms

- License PAK failures
  - LMF$DISPLAY_OPCOM_MESSAGE

Applications

- Descriptors
  - Static
  - Dynamic
  - 64-bit

VAX vs. Alpha vs. I64

- Memory Page Size
  - VAX: Fixed Page Size
    - 0.5KB (512 bytes)
  - Alpha: Implementation-specific
    - 8KB to 64KB (8192 to 65536 bytes)
  - Itanium®: Implementation-specific
    - 8KB+ (8192+)

Applications

Ensure Completion

- Condition Values
  - LBS/LBC
  - stsdef.h/$stsdef
  - $VMS_STATUS_SUCCESS(x)
- I/O Status Block (IOSB)
- Event Flags (EF)
  - efndef.h/$efndef (V7.1 and later)

Applications

Signals

- Centralize Error Handling
  - chfdef
  - stsdef
- VAX vs. Alpha vs. I64
  - VAX: Hardware
  - Alpha: Software
  - I64: Software

Applications

- Compiler Code Generation Options
  - Architecture EV56
  - Tune Generic (or EV56)
  - FAQ has details
  - Logically similar mechanisms expected on I64
- Alpha AMASK/IMPLVER
  - Example code at ATW

OpenVMS I64 Image Upward Compatibility

- Starts at OpenVMS I64 V8.2
- Incompatible changes made V8.0 through V8.2
- Rebuilding can be (may be? is?) required…

Run-time differences in compiled C code

- C Compiler Bitshift Differences
  - Alpha: Low Six Bits; Upper Bits Silently Ignored
  - I64: Full Specification

Applications

Alpha, VAX, I64

- Synchronization, common programming bugs, etc
  - ATW topics (1661), …

Applications

Alpha

- Memory Caching
  - Memory Barriers
  - ATW Topics (1661), (2681), …

Applications

VAX vs. Alpha vs. I64

- LINKER
  - SYS.STB vs. SYS$BASE_IMAGE
  - LINK/SYSEXE
  - Kernel C RTL

VAX vs. Alpha vs. I64

- LINKER and Shareable Images
  - Transfer Vector vs. Linker Directive
  - ATW Examples Available
    - Shareable Images, Commons
    - Examples of Transfers
  - No based shareable images on I64; no /SYSTEM=0
    - BASE=0 directive is OpenVMS VAX only
    - /BASE_ADDRESS=n (replaces CLUSTER directive)

Applications

OpenVMS I64

- Floating point support; IEEE v VAX floating point
  - Whitepaper Available:
  - "OpenVMS Floating-Point Arithmetic on the Intel Itanium Architecture"
  - Default is /FLOAT=IEEE_FLOAT/IEEE_MODE=DENORM_RESULTS

System Performance

- EXE$GETSPI
  - I_SPI.C
  - $GETRMI (V7.3 and later)

XFC performance is better in base allocation...

- To dedicate 200MB memory for XFC caching
- Note that the MPW_HILIMIT setting takes precedence over the allocation of memory for XFC cache.
- To reserve the memory, use the following:
  - SYSMAN> RESERVED_MEMORY ADD – VCC$MIN_CACHE_SIZE - /ALLOCATE/NOPAGE_TABLE-/NOZERO/NOGLOBAL/SIZE=200
  - Now set VCC_CACHE_SIZE to at least 200 MB in size.

Counter Confusion

XFC...

- Increments performance counters differently than VIOC
  - PMS$GL_DIRIO incremented for XFC cache hits
  - SDA extensions
    - XFC SHOW FILE/BRIEF
    - XFC SHOW VOLUME/BRIEF

End Of File, End Block

RMS Indexed Files and EOF...

- The End Of File (EOF) handling is subtle on indexed files...
  - The EBK value indicates the last block written, and not the actual EOF
  - EBK is updated for record-oriented extends, but not for block-mode extends
  - There are tools that depend on this EBK behaviour

Console Confusion

Alpha SRM Console...

- SRM Console V6.3 and later have SET PROMPT
- P00>>> set prompt "_foo>"
- P00_foo>

PCSI v VMSINSTAL

- Choice of Tools
- Installation v Configuration

Current and Prior Version Support (PVS)

- Rule of Thumb:
  - current release (CVS)
  - upgrade window from immediately previous release (CVS)
  - last maintenance release of previous minor release (PVS)
  - last maintenance release of previous major release (PVS)
- CVS and PVS algorithm at OpenVMS website
- OpenVMS Alpha V7.3-2 and OpenVMS VAX V7.3 will be PVS releases

Software Licensing

OpenVMS I64 Licensing...

- existing support or right-to-upgrade licenses?
  - check for platform right-to-transfer options & programs

OpenVMS I64 Licensing…

- Operating Environments
  - Foundation: OPENVMS-I64-FOE
  - Enterprise: OPENVMS-I64-EOE
  - Mission Critical: OPENVMS-I64-MCOE
  - Hobbyist: OPENVMS-I64-HOE
- Per-Processor Licensing (PPL)
  - One CPU is One Unit
- à la cart licenses are also available

OpenVMS I64 Operating Environments

Mission Critical Operating Environment (MCOE)

Enterprise Operating Environment (EOE)

Foundation Operating Environment (FOE)

- OpenVMS I64
- OpenVMS Unlimited Users
- TCP/IP Services
- DECnet End-Node
- DECwindows
- Performance Data Collector
- OpenVMS Web Agents
- OpenVMS WEBEM/CIM

Integration Technologies
- Secure Web Server (SWS)
- Secure Web Browser (SWB)
- Java™ Platform SDK
- XML Technology
- NetBeans
- SOAP Toolkit
- Kerberos
- Enterprise Directory
- CDSA
- SSL
- OpenSource Tools

Add to Foundation:
- **RMS journaling**
- **VolumeShadowing**
- **DECram**
- **OpenVMS System Management Tools**
  - Management Station
  - Enterprise Capacity Planner - ECP
  - Availability Manager

Add to Enterprise:
- **OpenVMS Clusters**
- **OpenVMS RTR Backend**

Easier to order

Easier to license

Easier to install

Please consult SPD for final/official/complete product list

DSPP and PAKGEN, PAK Management...

- New PAK keywords implemented
- Source code changes are optional
- New PAKs required
  - For I64
  - For PAKGEN
- PAKGEN built into V7.2, and updates in V8.2
- SYS$MANAGER:LMF$COMPLIANCE_REPORT.COM

V7.3-2 Error Count Reset Support

- SET DEVICE/RESET=ERROR
- See the FAQ for procedure for other releases

CD and DVD Bootable Media

How to build Bootable Optical Media

- Ask The Wizard topic (9820)
- Sector Sizing and the OpenVMS I64 Boot Block
  - 512 bytes
  - 2048 bytes

Host-Based MiniMerge

Shadowing and Volume Merges

- Any Fibre Channel or SCSI disks
- Get the VMS732_HBMM ECO kit
- Documentation is in the kit

Unaligned references trap to PALcode on OpenVMS Alpha, and trap to hardware or OpenVMS on OpenVMS I64...

- sys$perm_report_align_fault()
- sys$examples:set_align_report.c

Kernel Memory Management Changes

New 50-Bit PFN support means kernel changes...

- SCH$GI_FREECNT and (old) SCH$GL_FREECNT
- Allows addressing of additional physical memory on OpenVMS I64

The Kinks

"And now for something completely different"

BACKUP/IGNORE=INTERLOCK…

- This command does **NOT** provide what most folks expect…
  - Silent corruptions are possible
  - Modification dates can (will) be wrong
- *The ignored interlocks were implemented for a reason…*
- *See the FAQ for related information*

Perl Kit on OpenVMS I64 E8.2 Field Test...

- HP I64VMS PERL T5.6-1A1 won't install on E8.2 as was intended -- when it balks during OpenVMS I64 E8.2 installation, override and tell PCSI to install it anyway.

This kit requires a minimum OpenVMS IA64 software version of V8.2.

Terminating is strongly recommended. Do you want to terminate? [YES]   NO

CC/CASE_LOOKUP=SENSITIVE.

- The #include suffix must be .H (not .h)
- This is expected to be a permanent restriction of case-sensitive compilation
- either use no file type, or use an uppercase type
- effects nested includes, too

C++ traceback on OpenVMS I64

- Causes larger object sizes
- /DEBUG=TRACE is close to /DEBUG=FULL in size
- Update expected in new version of C++

DISABLE SERVICE doesn't do what you want...

- Use SYS$MANAGER:TCPIP$*_SHUTDOWN.COM
- Start or Restart with TCPIP$*_STARTUP.COM
- FTP, NFS, etc, can lock into odd states

LAN Controller Negotiation...

- "Beware hubs set to auto-negotiate or for full-duplex 10Mbit Ethernet, as these are causing errors with the newer PEDRIVER support with the updated multi-path LAN support. 10Mbit must be half-dup, and auto-negotiation is not supported prior to later DE500 controllers."

- cont'd…

NIC Duplex, Negotiation

If your LAN mis-negotiates…

- DE500 details in FAQ

- 10 Mb Ethernet is assumed half-duplex

- Negotiation
  - switch: Hello, I will be serving as your switch, and here is what I can offer. What are you?
  - NIC: [silence]
  - switch: OK, I know your speed, but will have to guess your current duplex setting… And since most any NIC can support half-duplex…

- Negotiation detection improvements in V8.2:

    "possible duplex mismatch condition detected"

lib$table_parse source code changes

lib$table_parse and ARCH_DEFS

- The $TRAN macro now expects ARCH_DEFS

  `$ MACRO /OBJECT=SYS$LOGIN:LTPTBL.MAR -`
  `    SYS$SHARE:ARCH_DEFS.MAR+SYS$LOGIN:LTPTBL`

- OpenVMS V7.3-2 and later

- See GNM on Freeware V.next release

V7.3-2 RECALL/ALL…

- sensitive to leading spaces

V7.3-2 SYSMAN procedure verification

- UPDATE introduced the bug
- MANAGE removes the bug

IP Printing?

Kinks in IP Printing, Third-party Printers...

- DCPS
- TCP/IP
  - ATW topics (1020)...

VIOC or XFC

XFC...

- Extended File Caching
  - Available in V7.3 and later
  - XFC V2.0 ECO for OpenVMS Alpha V7.3
    - Please install the ECO,   ...or...
    - Please set VCC_FLAGS parameter to one (1)
  - Select VIOC if mixing older (and un-eco'd) releases

XFC Revision and Modification Dates

- Cached in-memory with XFC, updated values written on file close
  - REVDATE will return later of FCB$Q_MODDATE
  - or the file header's FCB$Q_REVDATE
  - Behaviour changes with ECO kits
  - Related Commands:
    - Use DUMP/HEADER to show the on-disk value
    - SDA shows the FCB$Q_MODDATE value
    - BACKUP/IGNORE=INTERLOCK
- XFC does not cache FCBs, VIOC does…

LD and XFC

LD Virtual Disk Driver Bypasses XFC...

- Disable XQP Caching on LD Container Files
    - Use of ALTSTART bypasses XFC caching
    - SET FILE/CACHING_ATTRIBUTES=NO_CACHING
    - Reduces exposure to corruption; fix underway

WWIDtoname and nametoWWID logicals...

- The logicals are just part of the fun
- WWID values are stored in several locations, including logical names and kernel-mode data structures, and in SYS$CONFIG.DAT
- OpenVMS is sensitive to mappings, consistency
  - Don't even try remapping, lest chaos and corruption visit

Galaxy SRM Firmware

Galaxy Systems with Single-Instance Limits...

- Most Alpha systems can be Single-Instance
- SRM Galaxy GCT creation prevents Single-Instance
  - AlphaServer ES45

Controller Firmware

Kinks known in HSJ80…

- HSJ80 block comparison failure
  - Adversely effects volume shadowing
  - upgrade to current firmware

Volume Shadowing Performance

Shadowing Kinks...

- Very conservative I/O (greatly) slows merge
  - SHAD$MERGE_DELAY_FACTOR 1000
  - Also: ...DELAY_FACTOR_DSAnnn
  - Dynamic

Shadowing and System Dumps

Shadowing Kinks...

- System Dump files are written to one shadowset member
  - See FW4 CLUSTER tool COPY_SHADOW_DUMP
  - SDA on V7.3-1 and later can find the proper volume

System Dumps

System Dump Kinks...

- Dump file formats changed with V7.3-2

- %SDA-F-INCDUMPFORM

- Debugger ADB073 can redefine SDA$SHARE, you'll need the shipped V7.3-2 image with SDA itself.

- The error can also appear if the dump file hasn't been rewritten after the OpenVMS upgrade; if there have been no crashes.

Can't see the TQEs for the Trees

- ***Kernel Change in V7.3-1...***
- SPAWN process name algorithm changed!
- Kernel TQE linked list becomes a tree

V7.3 and ECO Kits...

- *ECO rollback support*
  - PRODUCT INSTALL/SAVE
- Recommended Sequence
  - Install the LPs
  - Upgrade OpenVMS
  - Install the ECO kits

V7.3 and ECO Kits...

- *Please read the cover letter!*
    - SYS$UPDATE:VMS$REMEDIAL*.TXT
    - Key files can be *deleted* during V7.3 upgrade
    - If all else fails, apply the upgrade again!

V5.3 and ECO Kits...

- *Floating-point register corruption in NFS server*
  - causes transient HPARITH and other FP errors
  - ECO (and newer releases) are available

PCSI cannot cross versions

V7.3[-] PCSI Kits From Older OpenVMS...*

- To examine newer kits on older releases…
  - Boot OpenVMS V7.3[-*] kit
  - Redirect to newer PCSI images
    - DEFINE pcsi$main ddcu:[dir]PCSI$MAIN
    - DEFINE pcsi$shr ddcu:[dir]PCSI$SHR
    - SET COMMAND ddcu:[dir]PCSI.CLD
- Do not modify any existing (old) products database with the newer PCSI tool
- Apply LPs, upgrade OpenVMS, apply OpenVMS ECO kits

Freeware Errors

Kinks discovered in OpenVMS V7.2...

- latent bug in older versions of zip was triggered
  - Get new zip via Freeware V5.0 kit or website
- menu system error on second volume of Freeware
  - Both Freeware V5 (V7.3) and Freeware V6 (V7.3-2)
  - current menu system due for replacement

Graphics Support

New Graphics Controller Support...

- ### *Get GRAPHICS ECO Kit...*

- Radeon 7500
  - DMA with Open3D license

- 3DLabs Oxygen VX1 Graphics
  - Pause screen system interrupt loading bug found on V7.2-1 is fixed in current GRAPHICS ECO

- PowerStorm 300, PowerStorm 350

- ELSA GLoria Synergy (4D10)
  - remove outdated and now stale SYS$USER_CONFIG.DAT entry; correct entry is now in SYS$CONFIG.DAT

Graphics Support Retirements

V8.2 and Older Graphics Controller Support...

- Various older graphics controllers are retiring
- 3D support is retiring on other older controllers
- Details are in the release documentation

DECwindows Screen Saver Oddities..

- The screen saver restarts the display every three minutes even if only one screen saver is selected, and this can increase accounting file activity

  Increase the (default) three minute value

so I was telnetting myself....

changes in IPv6

- use "telnet localhost" or "telnet 0.0.0.0"
- do not use "telnet 0"

Call for OpenVMS Freeware

Freeware submission deadline is 8-Nov-2004
http://www.hp.com/go/openvms/freeware/

Where to go for help?

http://www.hp.com/go/openvms/

http://www.hp.com/go/openvms/faq/

http://www.hp.com/go/openvms/wizard/

http://www.hp.com/go/openvms/freeware/

http://www.hp.com/go/dspp/

http://www.hp.com/go/productbulletin/

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