OpenVMS & DCL on Alpha & VAX

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Server Operating Systems
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Outline

- Introduction
- Logging On/Off
- Digital Command Language (DCL)
- Exercises
- Resources
Introduction

- Labs based on
  - 4 x AlphaServer 1000[A] [233|266], OpenVMS 7.3-1
  - VAXStation 4000-60, VAX/VMS 5.5-2
  - HP Integrity BL 860c, OpenVMS 8.3-1H1
AlphaServer

- AlphaServer 1000 4/266 (\texttt{F$GETSYI} ("hw_name"))
- 64 Bit RISC Processor (Alpha AXP) (\texttt{SHOW CPU/FULL})
  - CPU Type...........: EV45 (21064A), Pass 1.1
  - Speed............: 266 Mhz
- 256 MB RAM (\texttt{SHOW MEMORY})
- SCSI-Bus
  - CD-ROM (DKA600:)
  - Floppy (DVA0:)
  - 4 Hard Disks (DKC[0|100|200|300]:)
- Node: AXP2
AlphaServer (cont.)

- Software
  - OpenVMS 7.3-1
  - HP C-Compiler  V6.5-001
  - HP FORTRAN V7.5-1
  - GNV 1.6-2
  - HP TCP/IP Services 5.3
    - Telnet
    - FTP
  - Zip/Unzip Tools (DISK$TOOLS:[TOOLS])
1. Login
   - Protocol: SSH
   - Port: TCP/22
   - Host: tb0.asg-platform.org.de (141.89.226.2)

2. Login
   - Protocol: Telnet
   - Port: TCP/23
   - Host: AXP1,2,3,4

Password
   - Change the password at first login! (SET PASSWORD)
   - Spaces are ignored
   - 0-32 Alphanumeric characters, Dollar sign ($) and Underscore (_)
   - Lowercase characters are converted to uppercase
   - At least 6 characters
Login/Logout (cont.)

- Home directory is SYS$LOGIN
- SYS$LOGIN:LOGIN.COM is executed at login
- Logout
  - LOGOUT
  - LOGOUT/FULL displays used Resources (Terminal must kept open!)
Digital Command Language

- DCL Interpreter is the default shell
  - $ , marks a DCL Command Line
  - - extents a Command across multiple lines
  - ! Commentary in DCL Command Lines

- English like commands
  - command/qualifier parameter
  - command parameter/qualifier
  - SHOW, SET, COPY, TYPE, CREATE, EDIT
Digital Command Language

- Smallest unique character sequences required
  - show -> sh  (help show for options and qualifiers)
  - %DCL-W-ABKEYW, ambiguous qualifier or keyword - supply more characters

- Interactive help system
  - help command [options]
  - Context depended
  - Available within OpenVMS programs
Definitions

- **Symbol**
  - Can store information such as strings or integers
  - $X = 4$, holds a value
  - $PWD = "SHOW DEFAULT"$, holds a string
  - $STR := Hello World!$, assigns a string, preserves Spaces
  - Single $=$, current command level only
  - Double $==$, global symbol table
  - SHOW SYMBOL PWD
Definitions (cont.)

- Logicals
  - SYS$STARTUP:SYLOGICALS.COM
  - String to specify directory sets, abbreviations, and other stuff
  - Interpreted by the DCL Interpreter
  - Stored in Tables
    - Process
    - Job
    - Group
    - System
  - DEFINE/<TABLE>/<Access Mode> Logical Value
  - DEFINE/JOB SYS$LOGIN USER:[HOME.FALKEN]
  - DEFINE/SYSTEM USER:[TEMP.] SYS$TEMP
Definitions (cont.)

- Foreign Commands
  - Run programs with command line arguments
  - vi*m:==$ VIM:VIM.EXE
    - * indicates how much of the command must be typed for it to be recognized
    - $ Denotes to run a program
Definitions (cont.)

- **Delete Symbols, Logicals, Foreign Commands**
- **Symbol**
  - `DELETE/SYMBOL <Symbolname> [/GLOBAL,/LOCAL,/ALL]`
- **Logical**
  - `DELETE/KEY <Logical> [/ALL]`
- **Foreign Commands are Symbols**
Strings

- **A := VAX VMS**, Symbol A has value “VAX VMS”

- **String Reduction**
  - **B = A – “VAX”**, Symbol B evaluates to VMS

- **String Concatenation**
  - **C = “Open” + B**, Symbol C has Value “OpenVMS”

- **Evaluate Symbols**
  - **D := C**
  - **SHOW SYMBOL D**
  - **C**
  - **SHOW SYMBOL ‘D’**
  - **OpenVMS**

- **SET PROCESS/CASE=SENSITIVE/PARSE_STYLE=EXTENDED**
Lexicals

- F$...
- F$DIRECTORY() Current Directory
- F$FAO(format,arguments,...) , sprintf equivalent
- F$SEARCH(), get full path a file
- ...

...
Directories

- Directories have the extension DIR
  - 000000.DIR;1
  - 000000 is device/logical’s root directory
  - Specification in Square Brackets [000000] without .DIR Extension

- Change Device & Directory
  - SET DEFAULT [device-name[:]][directory-spec]
  - SET DEFAULT SYS$LOGIN
    - USER:[HOME.FALKEN] on AXP

- Show current Location
  - SHOW DEFAULT
    - USER:[HOME.FALKEN] on AXP
Directories (cont.)

- Directory separator is . (dot)
- Parent directory is – (hyphen)
- 3 Dots in directory selection means recursive
  - [USER...] Directory USER and all subdirectories
- Directory listing
  - DIRECTORY [filespec[,....]]
  - *.*;* by default
- Create Directories
  - CREATE/DIRECTORY [.DEMO], creates subdirectory DEMO
  - CREATE/DIRECTORY [HOME.FALKEN.DEMO], creates subdirectory DEMO in Directory HOME.FALKEN
Directories (cont.)

- **Delete Directory**
  - Directory must be empty
  - `DELETE [.DEMO]*.*;*`
  - `SET SECURITY/PROTECTION=(O:D) DEMO.DIR`
  - `DELETE DEMO.DIR;1`

- **Version Limit**
  - `SET DIRECTORY/VERSION_LIMIT=xxx <DIR>`
  - useful for Compiler Output ;)
Files

- A File must have a Name or an Type Extension
- A single Dot separates Name and Extension
- Files can have multiple Versions
  - Hello.c;1  Hello.c;2  Hello.c;5
  - Every write creates a new version up to /VERSION_LIMIT
  - Read without version number opens the highest version
    - type Hello.c => type Hello.c;5
  - PURGE [filespec[,....]]
    - deletes all but the highest numbered version
    - /KEEP=<number of versions to keep>
- Special Files
  - .COM Command Procedures, DCL scripts
  - .EXE Executables
File Security Settings

- **SET FILE**

- **/PROTECTION**, superseeded by **SET SECURITY/PROTECTION**
  - \(=(\text{System}, \text{Owner}, \text{Group}, \text{World})\)
  - Access: \text{Read, Write, Execute, Delete, Control, ...}
  - \(\text{SET SEC/PROT}=(S:RWED,O:RWED,G:RE,W:RE) \ \text{USER: [000000]000000.DIR}\)

- **/VERSION_LIMIT** Version Limit (default is 0 => 32K)
  - works only if equal or less versions at SET time
  - otherwise the current number of versions is kept
DCL Procedures

■ DCL Command Procedure
  □ executable DCL Script, Extension .COM
  □ @Scriptname[.COM]
  □ Up to 8 command line arguments P1-P8

■ DEMO SHOWARGS.COM
Programs

- Normally Extension .EXE
- Execution Methods
  - RUN <program>
    - No command line arguments
  - Call from DCL Procedure
    - Up to 8 Command line arguments
  - Foreign Command
  - Command Line Definition (CLD)
  - DCL$PATH Logical
- DEMO MAKE.COM
Editors

- CREATE [file]
  - Sequential file
  - Save with CTRL+Z
- APPEND
- EDIT
  - /TPU – *Eve* Screen Mode Editor (default)
  - /EDT Line Mode (*OpenVMS EDT Reference Manual*)
  - /TECO, Ed like Editor
  - /ACL, ACL Editor
- VIM 7.1
  - vi*m Logical
Other things

- Queues
- Cluster
- Shadow Sets
- Distributed Lock Manager
- ...

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Exercises / Challenges

1. Create customized Login Actions
   - LOGIN.COM
   - PWD, CD, ... Symbols
   - DCL$PATH Logical

2. Unzip the ZIP File in your Home Directory
   - DISK$TOOLS:[TOOLS]UNZIP.EXE
   - Execute demo_create.com in your Home Directory
   - RMDIR DCL Script
     - Delete Directory [.USERNAME] completely

3. Execute a job on the cluster batch queue
   - determine node name of job execution
Resources

- OpenVMS Systems Documentations
  http://h71000.www7.hp.com/doc/os731_index.html
- OpenVMS DCL Directory (Part I & II)
  http://dcl.cpenvms.org
- OpenVMS EDT Manual
- TECO Text Editor and Corrector