



September 18 – 22  
Sheraton Hotel – Needham, MA

# **Emulator Clustering Hands-on Lab**

## **Session I319**

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# Emulator Clustering Hands-on Lab

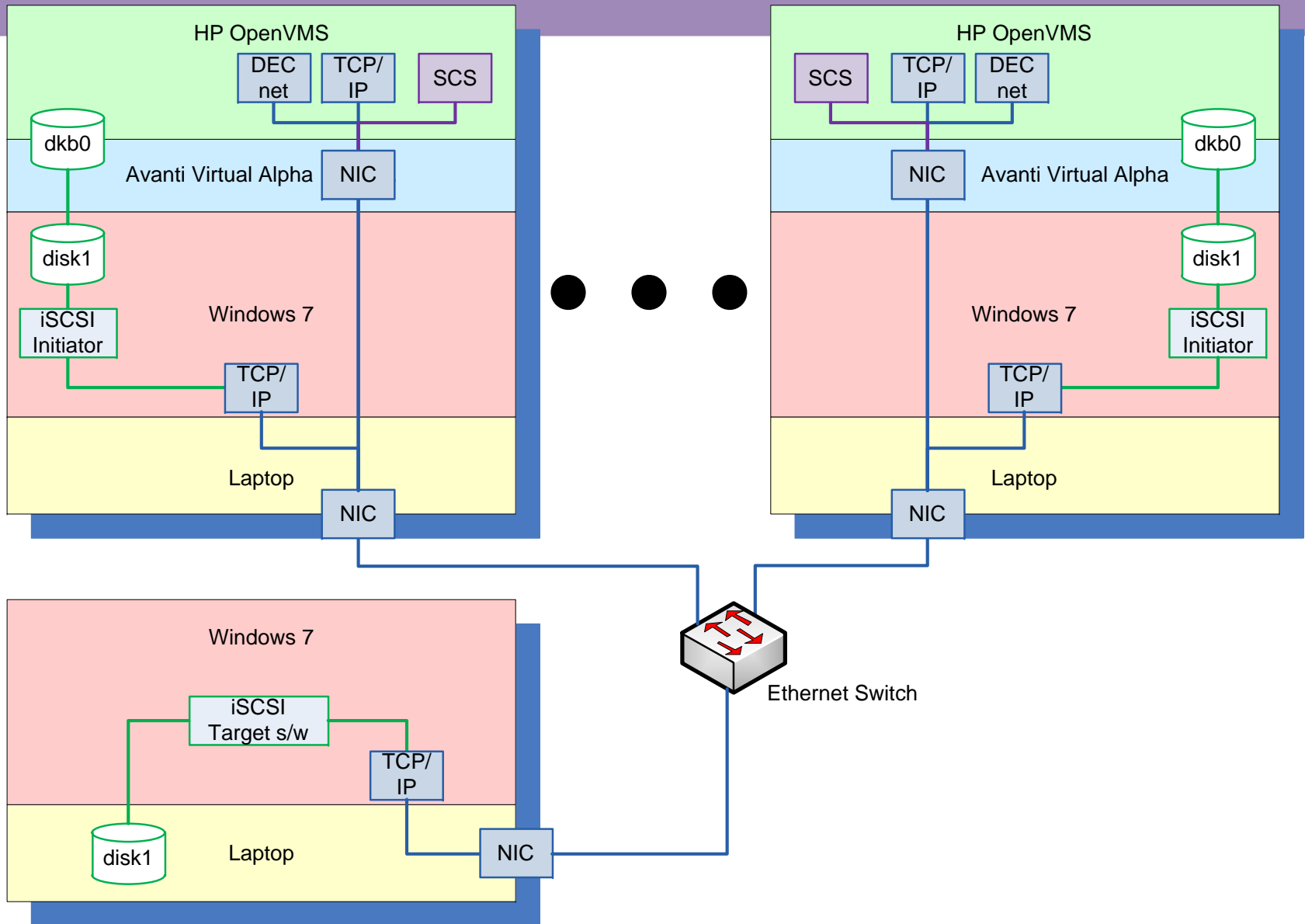
- Session Goals
  - Introductions
  - Overview of virtualization
  - Hands-on experience setting up OpenVMS clusters on emulators
  - Tips, helps and best practices for using emulators in a production environment

# Emulator Clustering Hands-on Lab

- Terms
  - Host or host system – The hardware and software running on a physical machine. The software can be a full operating system or a hypervisor
  - Emulator – Software running on the host system that emulates hardware. The emulated hardware can be the same or a different CPU architecture from the architecture of the host system
  - Guest system – An operating system running within the emulator

# CONNECT OPENVMS

Bootcamp 2011

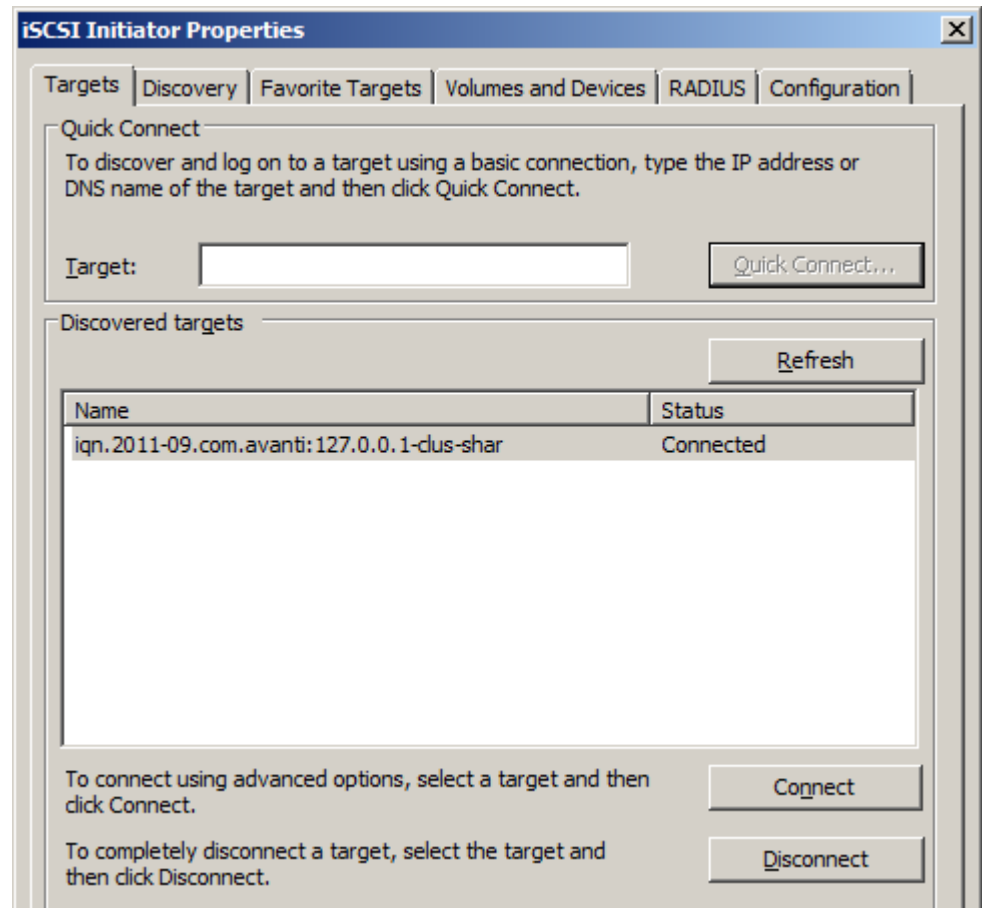


# Steps

- 1. Connect to iSCSI target
- 2. Install Avanti emulator software
- 3. Configure emulator
- 4. Install VMS
- 5. Configure Clustering
- 6. Configure networking
- 7. Mount shared disk

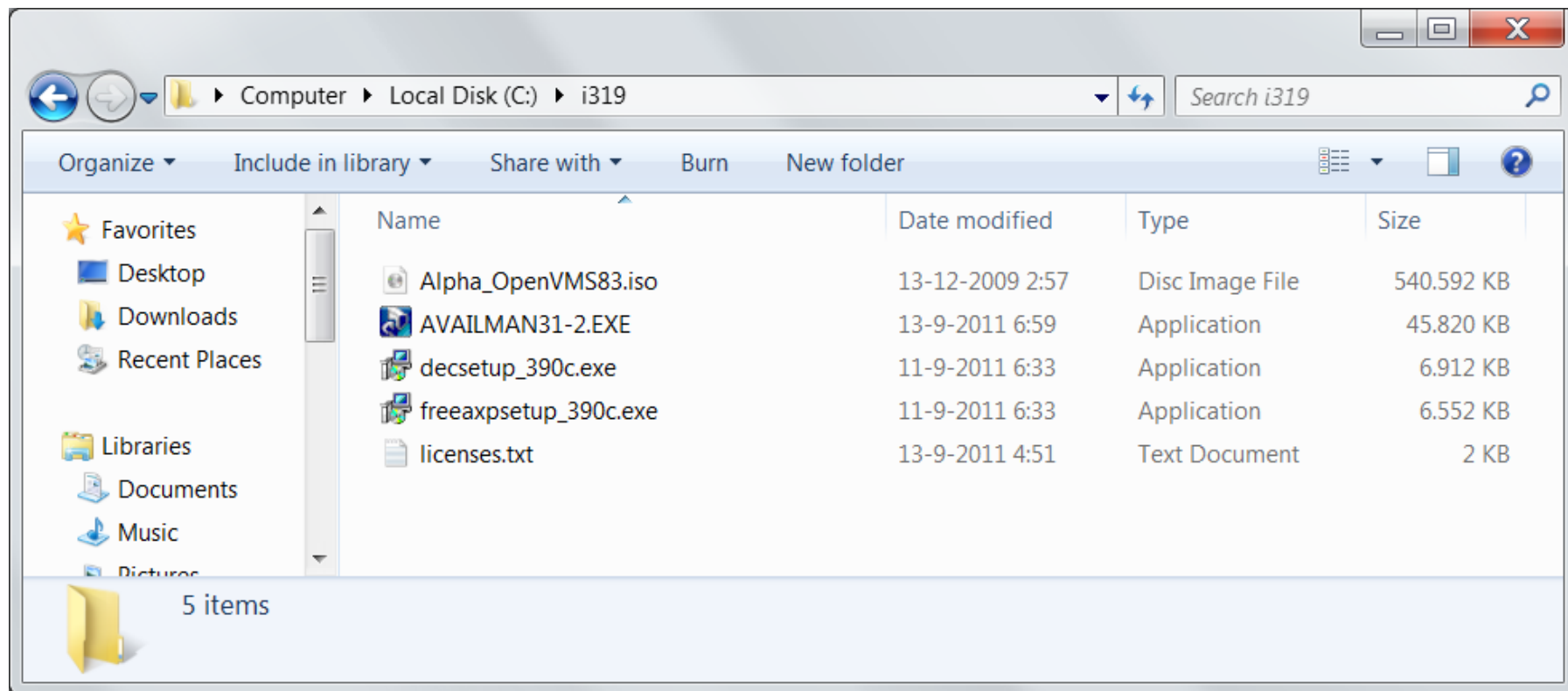
# Connect to iSCSI target

- Start->Control Panel->Computer Management->iSCSI Initiator
- Target: 172.18.253.150
- QuickConnect...



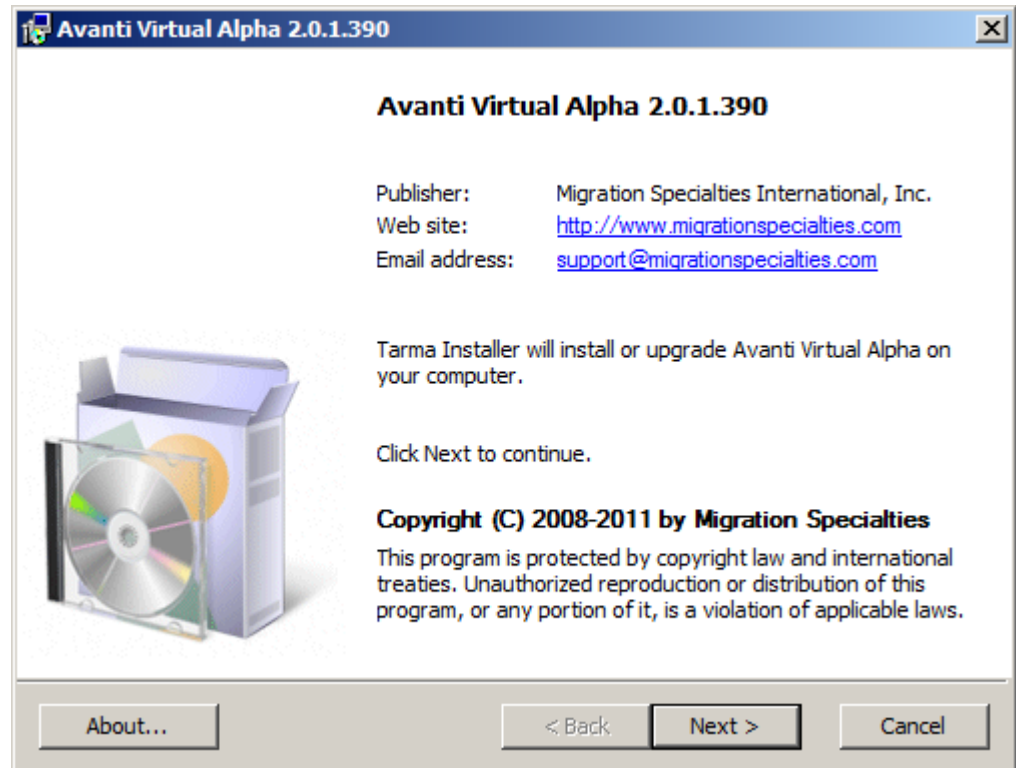
# Files

- In C:\i319



# Install Avanti 2.0.1.390

- Run C:\i319\decsetup\_390c.exe





## NODE ID

- NODENAME: **NDE119**
- System disk label: **SYS119**
- DECNET: **10.119**
- TCP/IP: **172.18.253.119**



# Configure Avanti

- File -> New configuration file
- Name for new AlphaServer: NDE**119**
- Main memory: 256 MB
- Enable JIT

Virtual Alpha Configuration Utility

File Help



VLC  Logfile  ... keep  versions

<base> will be defined when file is saved.

NDE119

AlphaServer 400 | Main memory:    JIT  | PCI bus

OPA0/tty00 - Telnet | TTA0/tty01 (disabled) | pci6 - KZPAA | pci11 - DE435 | pci12 (empty) | pci13 (empty)

OPA0/tty00 Telnet server

Telnet

Port

Start session automatically

Log file

Log file  ... keep  versions

## PCI 6 – KZPAA (PKA)

- Disk0.0 (DKA0)
  - Image file c:\i319\NDE**119**\_DKA0.img
  - Known disk type (pick one...) or custom size
  - Advanced: check “Sparse”
- Disk0.4 (DKA400)
  - Image file c:\i319\Alpha\_OpenVMS83.iso

Virtual Alpha Configuration Utility

File Help



VLC +  Logfile <base>\_vlc.log ... keep 6 versions +

<base> will be defined when file is saved.

NDE119

AlphaServer 400 Main memory: 256M  JIT + PCI bus +

OPA0/tty00 - Telnet TTA0/tty01 (disabled) pci6 - KZPAA pci11 - DE435 pci12 (empty) pci13 (empty)

pci6 SCSI Controller

SCSI Type KZPAA (narrow)

disk0.0 image file +

File name C:\y319\nde.119\_dka0.img (create, RZ40L) ...  CD-ROM

disk0.1 none

disk0.2 none

disk0.3 none

disk0.4 image file +

File name C:\y319\Alpha\_OpenVMS83.iso (RRD42) ...  CD-ROM

disk0.5 none

# PCI 11 – DE435 (EWA)

- Interface: physical NIC (wired, not wireless)

The screenshot shows the 'Virtual Alpha Configuration Utility' window. The title bar reads 'Virtual Alpha Configuration Utility'. Below the title bar is a menu bar with 'File' and 'Help'. A toolbar contains icons for file operations and a red power button. The main area shows configuration options for 'NDE119' on an 'AlphaServer 400'. The 'Main memory' is set to '256M', 'JIT' is checked, and 'PCI bus' has a '+' button. A row of device slots is visible: 'OPA0/tty00 - Telnet', 'TTA0/tty01 (disabled)', 'pci6 - KZPAA', 'pci11 - DE435', 'pci12 (empty)', and 'pci13 (empty)'. The 'pci11' slot is selected, showing a 'Network card' dropdown. Underneath, the 'NIC' section is expanded, showing 'Type' as 'DE435' and 'Interface' as 'External Network (Intel(R) 82566MM Gigabit Network Connection)'. There is an empty 'Internal network' field and a 'Set MAC address' checkbox with the value '00-00-00-00-00-00'. A note at the top right states '<base> will be defined when file is saved.'

## PCI 12 – KZPAA (PKB)

- SCSI Controller
- KZPAA
- Disk0.0 (DKB0)
  - Raw Device
  - ROCKET RAM DISK

Virtual Alpha Configuration Utility

File Help



VLC  Logfile  ... keep  versions

<base> will be defined when file is saved.

NDE119

AlphaServer 400 Main memory:   JIT  PCI bus

OPA0/tty00 - Telnet  TTA0/tty01 (disabled)  pci6 - KZPAA  pci11 - DE435  pci12 - KZPAA  pci13 (empty)

pci12 SCSI Controller

SCSI Type

disk0.0

Device   CD-ROM

disk0.1

disk0.2

disk0.3

disk0.4

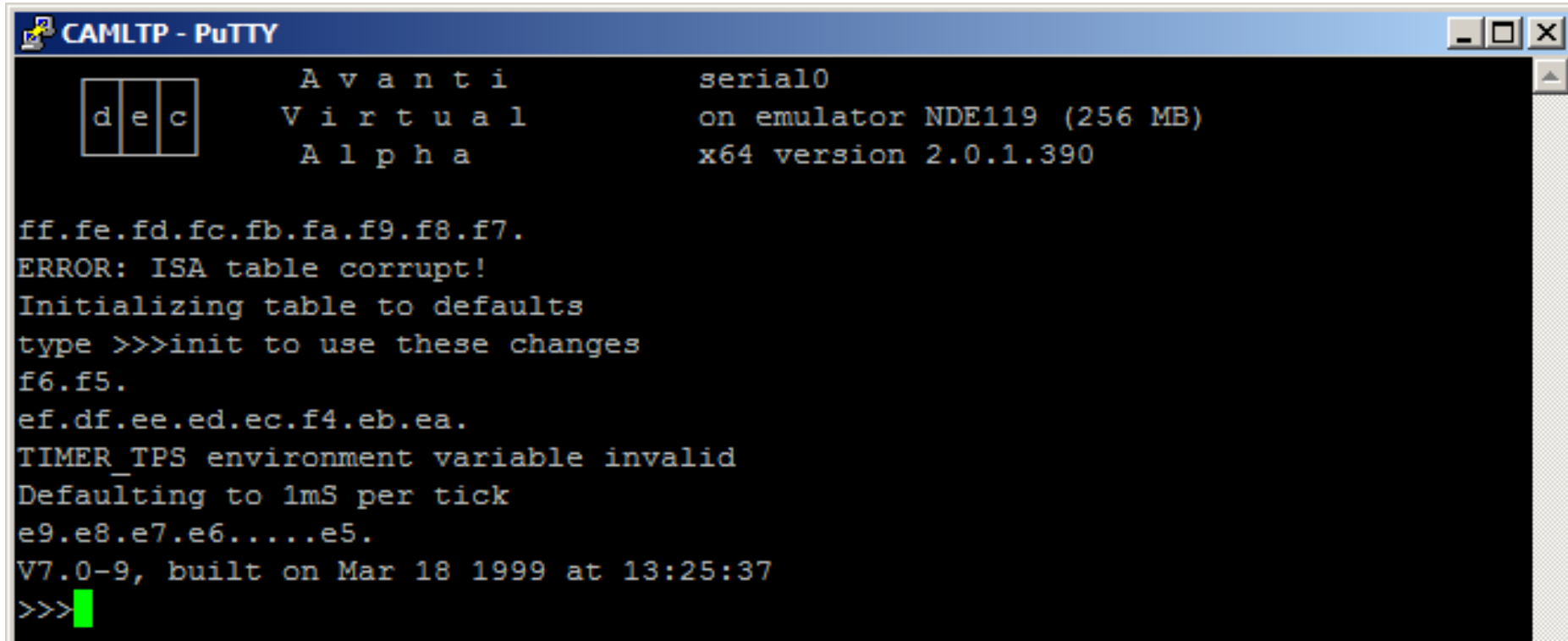
disk0.5

disk0.6



# Start the Emulator

- Press “Play” [ |> ] button
- Yes to save changes
- Save as c:\i319\NDE**119**.cfg



```
CAMLTP - PuTTY
Avanti      serial0
Virtual    on emulator NDE119 (256 MB)
Alpha      x64 version 2.0.1.390

ff.fe.fd.fc.fb.fa.f9.f8.f7.
ERROR: ISA table corrupt!
Initializing table to defaults
type >>>init to use these changes
f6.f5.
ef.df.ee.ed.ec.f4.eb.ea.
TIMER_TPS environment variable invalid
Defaulting to 1mS per tick
e9.e8.e7.e6.....e5.
V7.0-9, built on Mar 18 1999 at 13:25:37
>>>
```

# Install VMS

- boot dka400
- 1) Upgrade, install or reconfigure
- INITIALIZE
- Device: dka0
- Volume label: **SYS119**
- ODS-5
- Hard links: yes
- OK?: yes
- SYSTEM Password: vmsbootcamp

# Install VMS

- Cluster member: yes
- Galaxy instance: no
- SCSNODE: NDE**119**
- DECnet: yes
- DECnet Address: 10.**119**
- Timezone: 17 (EST)
- Register PAKs: no
- Motif: if you like
- DECnet-Plus: yes
- TCP/IP: yes
- no/yes/no

# Emulator Clustering Hands-on Lab

- Virtualization overview
  - Idea around for a long time
    - Portability goals – Save time, development costs, etc.
      - Languages - Fortran, C
      - Displays – Xwindows
      - Environments – Java, etc.
      - Systems – Hardware emulators

# Emulator Clustering Hands-on Lab

- Virtualization overview
  - Hardware emulators
    - Low utilization of a physical system
      - Many single purpose systems – keeps maintenance simple
      - Timesharing on a system level to decrease number of physical systems
    - Need for fast disaster recovery
      - Ability to move virtual machines while running
      - Easy backup and restore – testing, recovery
    - Create, modify and move systems as needed for testing, extra capacity, unique situations

# Emulator Clustering Hands-on Lab

- Virtualization overview
  - Hardware emulators
    - Run older emulated systems on faster, less expensive hardware
      - Disks, network cards, CPU speeds faster than original hardware
      - Options like hardware RAID, etc. on the host system are available for use by the guest system
      - Less expensive for licensing and hardware maintenance

# Emulator Clustering Hands-on Lab

- Usage scenarios
  - High availability on inexpensive hardware
    - Take idea from Google/Amazon, RAID, new “supercomputers”
      - Software overcomes hardware failure
      - Use host-based shadowing, clustering
      - Set up more systems to mitigate single system failure
        - » Preserving single systems not as important

# Emulator Clustering Hands-on Lab

- Usage scenarios
  - Larger sites - extend capacity of existing systems
    - Set up emulated systems as satellites
    - Use emulated systems to offload tasks so the physical systems have less load
    - Use emulated systems to add temporary capacity at peak times
  - Smaller sites – replace systems as appropriate
  - Development and testing
    - Can extend testing scenarios
      - Easy backup and restore
      - Flexibility of hardware choices and locations
        - » Laptops, etc.



# Emulator Clustering Hands-on Lab

- Helps, tips and best practices
  - Host setup
    - Usually one network adapter per guest
      - Turn off host IP if possible
      - Low-cost adapter for management
        - » Turn on/off Internet connectivity for software updates, etc.
    - Keep the host system setup simple
      - More complex, more possible points of failure
      - Just the OS, emulator and needed drivers, remote connect software
    - System settings
      - OS updates – set to manual, update on your timetable
      - Turn off unneeded services (Windows Search, etc.)

# Emulator Clustering Hands-on Lab

- Helps, tips and best practices
  - Guest setup
    - If satellites, set up LOCKDIRWAIT, etc. to keep locking on real machines
    - Network access to drives may be faster

# After reboot: configure cluster

- Shared SCSI/Fibre-Channel bus: yes
- SCS node name: NDE**119**
- Cluster group: 10
- Cluster password: 10
- Boot server: no
- Disk server: yes
- Serve RFX disks: no
- Allocation class: 0
- Quorum disk: no
- pkb0 port allocation class: 100
- Expected votes: 3

# After reboot: configure networking

- Register PAKs
- Include OpenVMS-Alpha license on node
- Start AM driver: `@sys$startup:amds$startup start`
- Configure DECnet (`@sys$manager:net$configure`)
  - LOCAL
  - LOCAL:.NDE**119**
  - NDE**119**
  - ENDNODE
  - 10.**119**
  - MOP: no
  - Cluster alias: BC2011

# Configure TCP/IP

- @sys\$manager:tcpip\$config
  - Domain: bootcamp.local
  - IPv4: 172.18.253.**119**/16
  - Node name: nde**119**.bootcamp.local
  - Default route: 172.18.1.1
  - Configure servers/clients as needed

# Modify systartup

- Edit sys\$startup:systartup\_vms.com
  - Uncomment @sys\$startup:tcpip\$startup
  - Add @sys\$startup:amds\$startup start
  - Add mount/cluster/noassist \$100\$DKA0: BC2011 DISK\$BC2011
- Reboot