



VMware ESXi Troubleshooting

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This session may contain product features that are currently under development.

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Agenda

- Technical Support Mode and access to the ESXi command line
- ESXi Boot Sequence
- ESXi Direct Console User Interface (DCUI)
- Logs – where are they and how to manage them?
- Troubleshooting Network issues on ESXi
- Troubleshooting Storage issues on ESXi
- VIMSH and VIM-CMD
- ESXi Patching
- Saving and Restoring ESXi configurations

ESXi Boot Sequence

- ESXi firmware boot starts from grub screen
 - Hypervisor loads necessary drivers
 - Hypervisor runs config scripts
 - Hypervisor starts daemons (services)
 - Boot process ends when DCUI screen is loaded
 - Alt+F2 : DCUI (Default)
 - Alt+F1: inactive console
 - Alt+F11 : Summary information (version, server, CPU, memory)
 - Alt+F12 : vmkernel log

ESXi Direct Console User Interface Navigation

- For troubleshooting use the DCUI to
 - Configure Networking
 - Verify Networking
 - Restart Management Agents
 - View Logs
 - Access Tech Support Mode

ESXi Direct Console User Interface Navigation

- Ensure your KVM or remote console solution can map to the corresponding function keys below

- **Actions**

- **Keys**

- View and change configuration

F2 Key

- Shutdown or restart the Host

F3 Key

- Move between selection Fields

Arrow Keys

- Select a menu Item

Enter Key

- Toggle a value

Spacebar

- Confirm sensitive commands

F11 Key / F2 Key

- Save and Exit

Enter key

- Exit without saving

ESC key

ESXI DCUI – Configure and Verify Networking



ESXI DCUI – Restart Management Agents and Networking

The image displays a sequence of four overlapping screenshots from the ESXi DCUI, illustrating the steps to restart management agents and networking. The screenshots are arranged from top-left to bottom-right, showing the progression of the user interface.

- Top-left screenshot:** Shows the main menu with options like "Customize System", "Restart Management Network", "Configure Root Password", "Configure Lockdown Mode", "Configure Management Network", "Restart Management Agents", "Test Management Network", "Configure Keyboard", "View Support Information", "View System Logs", "Restart Management Agents", and "Reset Customized Settings". The "Restart Management Agents" option is highlighted.
- Second screenshot:** Shows the "Restart Management Agents" screen with the text: "Restarting the management agent will disconnect all running virtual machines." The "Restart management agent" option is highlighted.
- Third screenshot:** Shows the "Restart Management Agents: Confirm" screen with the text: "Warning! Restarting the management agent will disconnect all remote management software." The "Restart management agent now?" option is highlighted.
- Bottom-right screenshot:** Shows the "Restart Management Agents: Confirm" screen with the text: "Warning! Restarting the management agent will disconnect all remote management software." The "Restart management agent now?" option is highlighted. The bottom right corner shows the navigation options: "<F11> OK <Esc> Cancel".

Technical Support Mode and access to the ESXi Shell prompt

- Tech Support Mode provides a command-line interface that can be used to diagnose and repair VMware ESXi hosts. Tech Support Mode should only be used at the request of VMware Technical Support. Tech Support Mode is
 - Enabled but inactive for default VMware ESXi installations.
 - Only usable with physical / remote access to the server console and root privileges.
 - Unsupported unless used in consultation with VMware Tech Support.
 - Accessing Tech Support Mode will be logged on the system
 - However, individual commands issued at this interface are not logged

Technical Support Mode and access to the ESXi Shell prompt

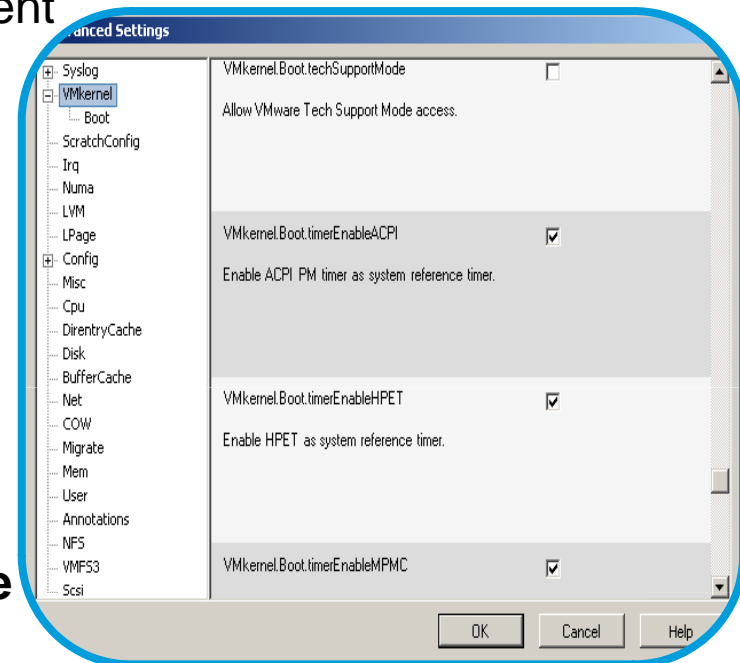
- Customers should be aware of current limitations of Tech Support Mode that May violate corporate security policies or best practices
 - Commands that can be issued from this interface can result in an unusable system
 - The interface only supports logging in as root. No other user account or role can use this management interface
 - VMware only supports the use of Tech Support Mode as a last resort to troubleshooting an ESXi host.
 - As a result, customers should expect to use the Direct Console UI (DCUI), Remote Command Line Interface (RCLI) or the VI Client as available alternatives

Technical Support Mode and access to the ESXi Shell prompt

- To use Tech Support Mode:
 - Log in to your ESXi host at the DCUI console.
 - Press Alt+F1 to switch to the console window.
 - Enter **unsupported** to start the Tech Support Mode login process. Note that no text will appear on the console window.
 - Enter the password for the root user. Tech Support Mode is now active.
 - Complete tasks in Tech Support Mode.
 - Enter the command **exit** to exit Tech Support Mode.
 - Press Alt+F2 to return the server to DCUI mode.

Technical Support Mode and access to the ESXi Shell prompt

- To disable Tech Support Mode:
 - Connect VMware Infrastructure Client (VI Client) to an ESXi host or a VirtualCenter Server.
 - Click the **Configuration** tab.
 - Click the **Advanced Settings** link.
 - Click "VMkernel" in the left-hand side pane.
 - Deselect **VMkernel.Boot.techSupportMode**
 - Restart the ESXi host.



Logs – where are they and how to manage them?

- Compared to ESX 3.0.X and ESX3.5 the locations of the system or vmkernel logs have changed slightly
- vmkernel log file names are no longer used
- All system events are logged to the /var/log/messages file(s)
- System logs are still in the /var/log location
- ESXi has a quite a small storage footprint, thus logs get rotated very quickly
- The current /var/log/messages logs will not be retained after performing a reboot
- If you require the system logs beyond the last reboot, it may be advisable to log to both a remote disk and a remote syslog server.

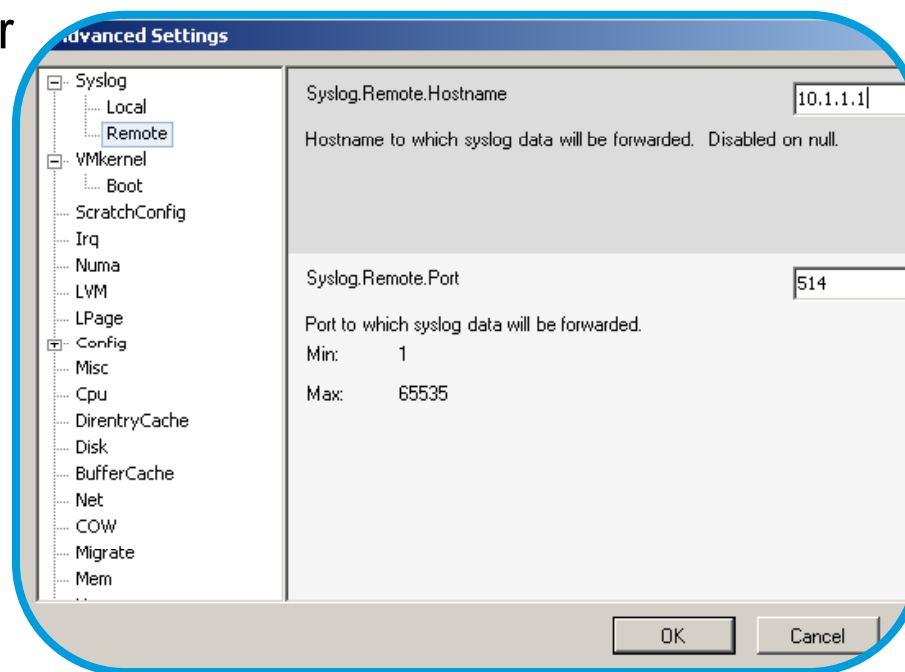
Logs – where are they and how to manage them?

- Configuring ESXi to log to a remote syslog server

- From the VI Client, select your ESXi Server

- Go to Configuration → Advanced Settings → Syslog → Remote

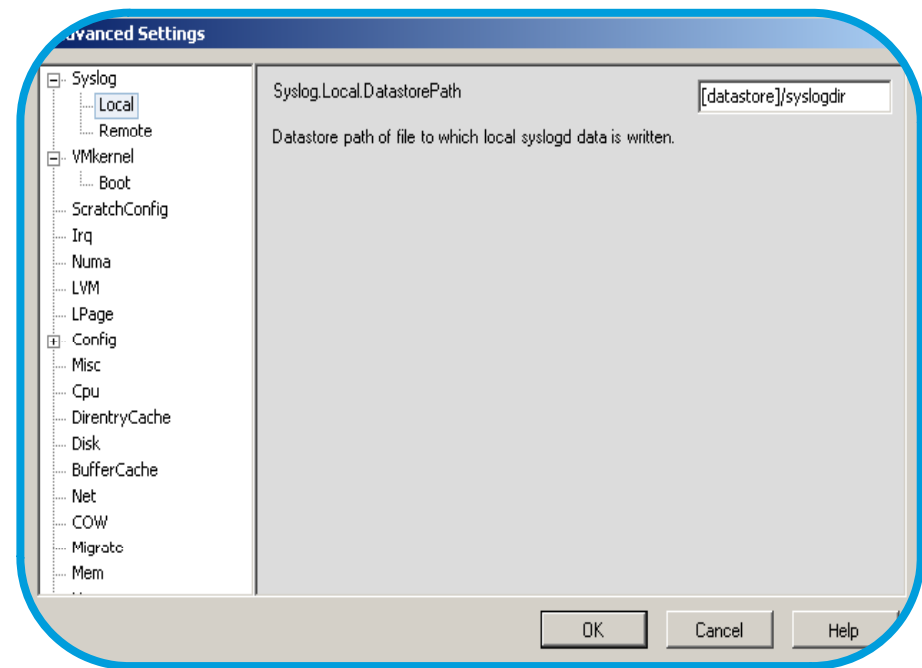
- Enter in syslog server in the following field
“Syslog.Remote.Hostname”



Logs – where are they and how to manage them?

- Configuring ESXi to log to a local or shared datastore

- From the VI Client, select your ESXi Server
- Go to Configuration → Advanced Settings → Syslog → Local
- Enter in the datastore and path for the location of the syslog directory
- The format will be [datastore]/dir



Logs – where are they and how to manage them?

■ ESXi Diagnostic Cores

- Instead of going to the /root dir as on ESX 3.0.X or ESX3.5 cores will be located on /var/core dir on ESXi
- A vm-support script will extract the diagnostic core as part of exporting diagnostic data
- On ESX 3.0.X and ESX 3.5 the diagnostic core is extracted on restart the server, on ESXi the core is extracted when the vm-support script is invoked, to save on space
- ESXi will have a diagnostic core partition or VMKcore partition enabled by default
- Use VMware Remote CLI interface to verify if a VMKcore partition is configured
- vicfg-dumpart.pl -h for command usage

Logs – where are they and how to manage them?

- VMware Agent Logs and Virtual Machine logs
- hostd are still in the same location as ESX 3.5
 - /var/log/vmware/hostd*
- vpxa logs are still in the same location as ESX 3.5
 - /var/log/vmware/vpx/vpxa*
- VMware HA logs are still in the same location as ESX 3.5
 - /var/log/vmware/aam
- Virtual Machine log files are still stored in the same datastore directory as the Virtual Machine configuration files
 - /vmfs/volumes/my datastore/my vm/vmware.*

Logs – where are they and how to manage them?

■ VMware hostd logging options

- There may be times that VMware Technical Support will have to change or enable hostd logging options for debugging reasons
- Use the VMware Remote CLI interface to copy the hostd configuration file to your local machine for offline editing
- For example you can copy the hostd configuration file locally to your workstation using vifs.pl
 - `vifs.pl --get /host/hostAgentConfig.xml localfile.xml`
- Use an editor to change the logging options to trivia levels
- Copy the modified file back
 - `vifs.pl --put localfile.xml /host/hostAgentConfig.xml`
- Restart your Management agents from the DCUI

Troubleshooting Network issues on ESXi

- Use VMware Remote CLI interface to verify networking
- List network cards
 - `vicfg-nics.pl -l`
- List interfaces
 - `vicfg-vmknics -l`
- List vswitch configurations
 - `esxcfg-vswitch.pl -l`
- If required vmkping commands are available on ESXi shell
 - `vmkping -D` pings all configured Management Networks, VMkernel interfaces as well as default routes
- Standard networking commands such as nslookup and ping are available on ESXi

Troubleshooting Network issues on ESXi

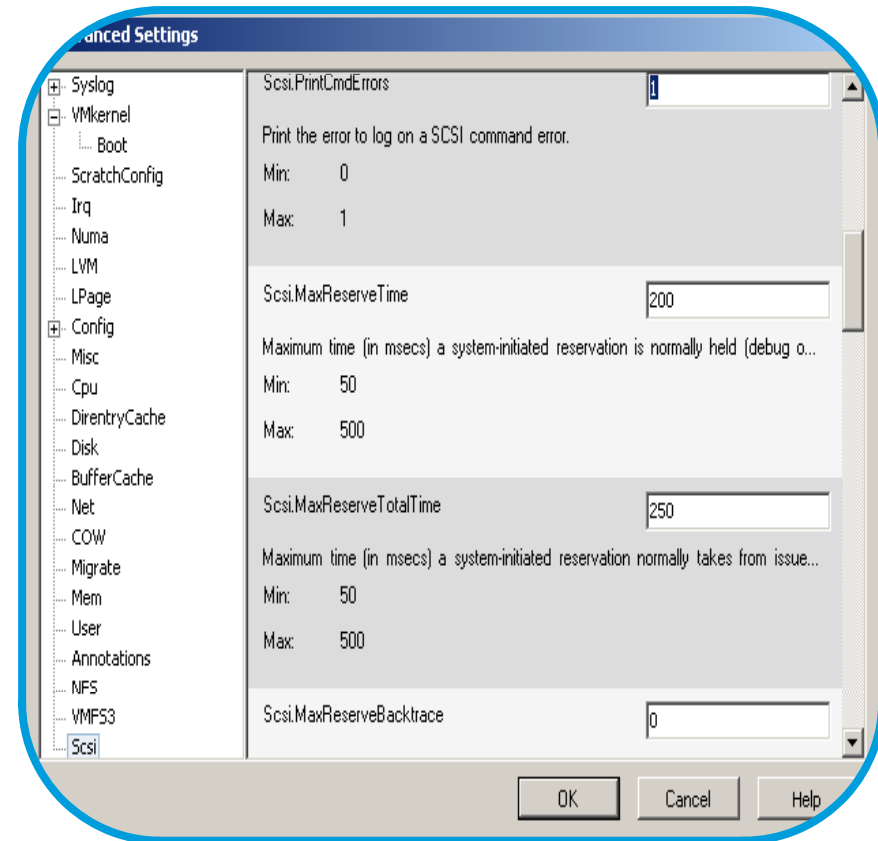
- ESXi does not have tcpdump available as was the case with ESX 3.0.X and ESX 3.5
- To Capture a NetworkTrace
 - Create a new port group on the desired vSwitch
 - Attach a Virtual Machine Network Interface to that Port Group
 - Install, for example Wireshark or Tcpdump on the Virtual Machine
 - Enable Promiscuous mode on your vSwitch
 - Select vSwitch Properties → Security Tab → Policy Exceptions → Promiscuous Mode “Accept”
 - If using VLANS , use VLAN 4095 on your Port Group to capture VLAN traffic

Troubleshooting Storage issues on ESXi

- Using VMware Remote CLI gives many options to view and troubleshoot storage configurations on ESXi
- Command syntax is similar to what is available on ESX 3.0.X and ESX 3.5 service consoles
- `esxcfg-vmhbadevs.pl`
 - Lists available storage devices
- `esxcfg-rescan.pl`
 - Rescans your storage adapters
- `vmkfstools.pl`
 - Manipulation of VMFS3 filesystems and virtual disk files
- All equivalent commands are also available on ESXi command shell

Troubleshooting Storage issues on ESXi

- VMware Technical Support may request to increase the logging level of the ESXi storage layer
- Via GUI
 - Go to Configuration → Advanced Settings → Scsi → Scsi.PrintCmdErrors set to 1 to enable (0 is default)
- Via VMware Remote CLI interface
 - `esxcfg-advcfg.pl -s "1"`
Scsi.PrintCmdErrors



Troubleshooting Storage issues on ESXi

- Modifying Storage module parameters
- This is quite similar to how it is done on ESX 3.0.X and ESX 3.5
- Use VMware Remote CLI interface
- For example I want to change the queue depth on my qllogic driver
- Change the queue depth on your qllogic driver
 - `esxcfg-module.pl -s "ql2xmaxqdepth=64" qla2300_707_vmw`
- Verify Change
 - `esxcfg-module.pl -g qla2300_707_vmw`
- A graceful reboot of your ESXi Server will save and apply the changes

Troubleshooting Storage issues on ESXi

- Again with the assistance of VMware Technical Support, we can help customers to diagnose storage connectivity issues
- ESXi compared to ESX 3.5 have very few proc nodes available to view
- However certain proc nodes are still available for troubleshooting certain issues, namely fibre-channel proc nodes, e.g. qllogic and emulex drivers
 - /proc/scsi/vendor

```
emulex LightPulse FC SCSI elx_7.4.0.13-2
emulex LP1000DC-M2 2Gb 2-port PCI-X Fibre Channel Adapter on PCI bus 06
device 08 irq 209
BoardNum: 0
SerialNum: MS63794337
Firmware Version: 1.91A5 (T2D1.91A5)
Hdw: 1001206d
VendorId: 0xfa0010df
Portname: 10:00:00:00:c9:5a:78:fc Nodename: 20:00:00:00:c9:5a:78:fc

Link Up - Ready:
  PortID 0x6a1e00
  Fabric
  Current speed 2G

Current Mapped Nodes on Physical Port:
lpfc0t00 DID 6a0a00 WWPN 50:06:01:61:30:21:b9:df WWNN 50:06:01:60:b0:21:b9:df
lpfc0t01 DID 6a0800 WWPN 50:06:01:69:30:21:b9:df WWNN 50:06:01:60:b0:21:b9:df
lpfc0t02 DID 6b0600 WWPN 50:06:01:60:41:e0:b2:0c WWNN 50:06:01:60:c1:e0:b2:0c
lpfc0t03 DID 6b0500 WWPN 50:06:01:68:41:e0:b2:0c WWNN 50:06:01:60:c1:e0:b2:0c

vmkadapter: vmhba2
```

Troubleshooting Storage issues on ESXi

- For iSCSI connectivity troubleshooting there are also proc nodes available to quickly diagnose connectivity issues
- Software iSCSI procnodes are available at
 - /proc/scsi/vmkiscsi/
- Using vmkiscsi-util on the ESXi shell we can quickly diagnose and repair iscsi connectivity issues
 - vmkiscsi-util -h for usage

```
# cat /proc/scsi/vmkiscsi/3
iSCSI driver version: 3.6.3.0 variant (27-Jun-2005)
#
# SCSI:          iSCSI:
# Bus Tgt LUN    IP address  Port  TargetName
# 0 0 0          10.21.67.203 3260  iqn.1992-04.com.emc:cx.ck200080900932.b0
# 0 0 1          10.21.67.203 3260  iqn.1992-04.com.emc:cx.ck200080900932.b0
# 0 1 ?          ?          ?     iqn.1992-04.com.emc:cx.ck200080900932.a1
# 0 2 ?          ?          ?     iqn.1992-04.com.emc:cx.ck200080900932.b1
# 0 3 0          10.21.67.201 3260  iqn.1992-04.com.emc:cx.ck200080900932.a0
# 0 3 1          10.21.67.201 3260  iqn.1992-04.com.emc:cx.ck200080900932.a0
vmkadapter: vmhba33
```

```
C # vmkiscsi-util -i -t 3 -l
*****
Cisco iSCSI Driver Version ... 3.6.3 (27-Jun-2005 )
*****
TARGET NAME          : iqn.1992-04.com.emc:cx.ck200080900932.a0
TARGET ALIAS         : 0932.a0
HOST NO              : 3
BUS NO               : 0
TARGET ID            : 3
TARGET ADDRESS       : 10.21.67.201:3260
SESSION STATUS       : ESTABLISHED AT Tue Oct 14 18:54:25 2008
NUMBER OF PORTALS    : 1
PORTAL ADDRESS 1     : 10.21.67.201:3260,4
SESSION ID           : ISID 00023d000001 TSIH 9ae4

=====LUN MAP=====
Lun ID:0 found
Lun ID:1 found
#
```

Troubleshooting Storage issues on ESXi

- A common scenario when using shared storage is the loss of a partition table on shared VMFS volumes
- Common symptoms of a missing partition table is
 - Your VMFS volume will not mount
 - If you attempt to add storage your missing VMFS volume LUN ID is available to format
- Question: How can you recover your partition using ESXi ?
- At this point the only choice you will have is to enable Tech Support mode with the help of VMware Technical Support
- Luckily the tools to rebuild your partition on ESXi are available

Troubleshooting Storage issues on ESXi

- The solution is to use Tech Support Mode on your ESXi server
- Get help from VMware Technical Support
- Your typical storage commands such as **esxcfg-vmhbadevs**, **esxcfg-mpath** are available on the ESXi shell, as well as more advanced commands such as “**fdisk**”, “**dd**”, “**hexdump**”
- Isolate your missing VMFS volume using “**esxcfg-vmhbadevs**”
 - The **-q** switch will list all accessible luns
 - The **-m** switch will list all mounted and healthy VMFS volumes
 - Use “**fdisk -lu**” on the lun that does not mount
 - If the partition entry is blank then it needs to be repaired

Troubleshooting Storage issues on ESXi

- VMware Technical Support can help you rebuild your partition
- For example on the below “**fdisk -lu**” output there is no partition table entry
- You will note on ESXi there is no concept of /dev/sdX instances for storage devices, use /vmfs/devices/disks/vml.* format

```
# fdisk -lu /vmfs/devices/disks/vml.020000000060060160cb712000c4bbbead9ec2dd11524149442035

Disk /vmfs/devices/disks/vml.020000000060060160cb712000c4bbbead9ec2dd11524149442035: 21.4 GB, 21474836480 bytes
255 heads, 63 sectors/track, 2610 cylinders, total 41943040 sectors
Units = sectors of 1 * 512 = 512 bytes

                                     Device Boot   Start    End  Blocks  Id System
~ # █
```

Troubleshooting Storage issues on ESXi

- Rebuild the Partition information with the help of VMware Technical Support
- **Always** verify before modifying, use **esxcfg-mpath -lv**
- **Always** use the /vmfs/devices/disks/vml.XXX from the esxcfg-mpath output name for modifying partitions

```
# fdisk -lu /vmfs/devices/disks/vml.020000000060060160cb712000c4bbbead9ec2dd11524149442035

Disk /vmfs/devices/disks/vml.020000000060060160cb712000c4bbbead9ec2dd11524149442035: 21.4 GB, 21474836480 bytes
255 heads, 63 sectors/track, 2610 cylinders, total 41943040 sectors
Units = sectors of 1 * 512 = 512 bytes

                               Device Boot   Start      End   Blocks  Id System
/vmfs/devices/disks/vml.020000000060060160cb712000c4bbbead9ec2dd11524149442035p    128  41929649  20964761  fb  VMFS
#
```

Troubleshooting Storage issues on ESXi

- There may be times that VMware Technical Support will request a dump of metadata of a particular lun
 - To verify VMFS header information
 - To verify data integrity of a VMFS volume
- There are more advanced tools available on the ESXi console to VMware Technical support to gather such information
 - **dd** is supplied on the ESXi to copy out disk header data to a file
 - **hexdump** is also available for live troubleshooting
- As always never use Tech Support Mode unless requested by VMware Technical Support.

VIMSH/VIM-CMD

- VIMSH is an interactive shell buffer available on ESXi and ESX 3.5
- In the context of VMware ESX it has been implemented as an API for the ESX host agent.
- VIM-CMD was introduced in ESX 3.5. This command is a ‘wrapper’ for the vimsh shell. It simplifies the command and means that vimsh can be run without having to enter and exit the shell and use previously documented command switches and “quotes”.
- The vim-cmd command is executed from the ESXi shell.
 - Example: **vim-cmd /hostsvc/maintenance_mode_enter**
 - This runs a non-interactive command which puts an ESXi server into Maintenance Mode.

VIM-CMD

- Within the vim-cmd there are a vast array of interactive commands that allow reporting and configuration of most aspects of the ESXi host.
- Commands consist of 2 main types; either **plugin** or **shell** based.
- The shell commands revolve around **management** of plugins or execution of simple help, list or exit type controls. Shell commands are **common** to the vimsh interface
- The plugin commands are **specific** to a group of particular ESXi functions or Command Sets
- Changes made by using this command appear in the VI Client console at normal refresh schedules.

VIM-CMD

■ Shell commands

- The following list outlines the available shell commands for the vim-cmd interface. To start, Enter Tech Support Mode and type **vim-cmd** at the command prompt.
- If you are unfamiliar with the command ensure you only use non-production test servers when experimenting.

```
[/]$ vim-cmd
```

Commands available under /:

hostsvc/ proxysvc/ vimsvc/ help

internalsvc/ solo/ vmsvc/

VIM-CMD

- It is to be noted that vmware-cmd is also available from VMware Remote CLI interface to control Virtual Machine power and snapshots. vmware-cmd is not available on the ESXi shell
 - vmware-cmd.pl -h for usage
- However for troubleshooting you could use vim-cmd with VMware Technical Support supervision if RCL or the VI Client is not available
 - List virtual machines registered on esx host
 - vim-cmd /vmsvc/getallvms
 - List running virtual Machines
 - vm-support -x

VIM-CMD

- From the vm-support -x output on running Virtual Machines
- You Can check the status of a Virtual Machine using
 - vim-cmd /vmsvc/get.guest <vim id>
- At this point VMware Technical Support can help you to
 - Power off a Virtual Machine
 - vim-cmd /vmsvc/power.off <vim id>
 - Power on a Virtual Machine
 - vim-cmd /vmsvc/power.on <vim id>
 - Reset a Virtual Machine
 - vim-cmd /vmsvc/power.reset <vm id>

VIM-CMD

- Again if there was a situation that VMware Remote CLI or the VI Client was not available the below methods could be used to manipulate Virtual Machines and Snapshots. VMware Technical Support assist you here.
- This set of commands allows the full manipulation of VM snapshots including creating, removing, reverting and reporting.
 - vim-cmd help vmsvc/snapshot.create
 - vim-cmd help vmsvc/snapshot.get
 - vim-cmd help vmsvc/snapshot.remove
 - vim-cmd help vmsvc/snapshot.removeall
 - vim-cmd help vmsvc/snapshot.revert

ESXi and Patching

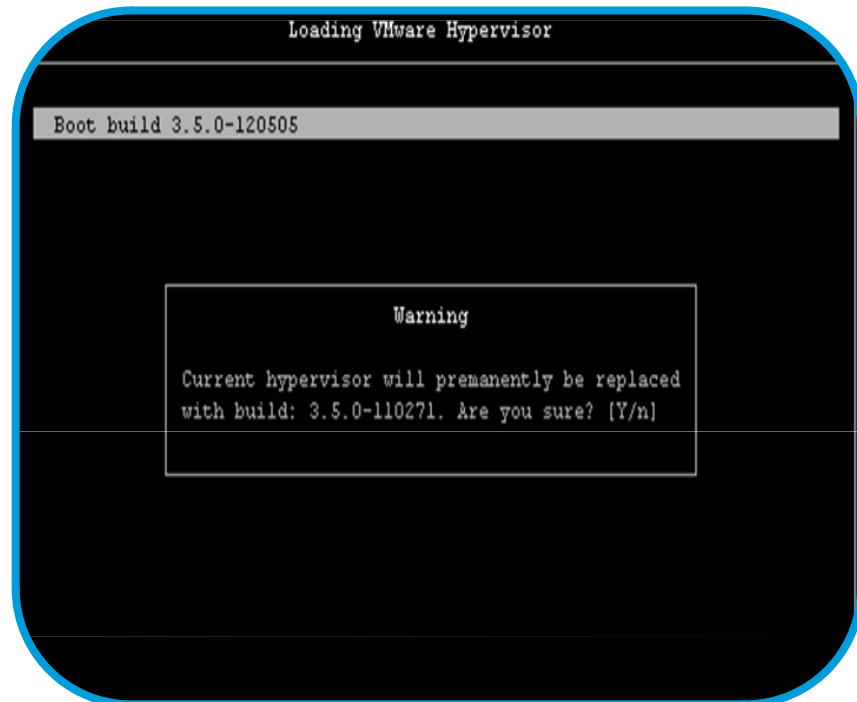
- Each ESXi host can store two builds, one boot build and one standby build. The boot build is the one from which the system is booted.
- For each update, the update utility updates the standby build. After the update, you then reboot the host. On reboot, the newly updated build becomes the boot build.
- If the update is successful, the host continues to boot from the new boot build until the next update.
- There are three methods to Patch your ESXi server
 - VMware vCenter Update Manager
 - Performing Maintenance with Infrastructure Update
 - Performing Maintenance with the vihostupdate Remote CLI Utility

ESXi and Patching

- **Rolling back an update**
- During the boot process, you can manually boot into the standby build. **This causes an irreversible rollback.**
- In other words, when you manually select the standby build, the standby build becomes the new boot build and remains the boot build until you perform another update or manually select the standby build
- You will need physical access to the ESXi DCUI to rollback to a standby build.

ESXi and Patching

- **Rolling back an update**
- Reboot the ESXi host.
- Connect to the DCUI
- When you see the page that displays the Loading VMware Hypervisor..., press Shift + r to select the standby build.
- Press Shift + y to confirm the selection and press Enter.
- This will load the Standby build and the ESXi server will now boot from the standby build



Saving and Restoring ESXi Configurations

- You perform a backup of your ESXi system by using the vicfg-cfgbackup command, which you run from the VMware Remote CLI. The Remote CLI is available in two forms:
 - As a virtual appliance that you import into ESXi Server, VMware Workstation, or VMware Player.
 - As a package that you install on Microsoft Windows and Linux machines.
- Always back up your host configuration after you change the configuration or upgrade the ESXi Server image.
- To restore a configuration you must run the Remote CLI virtual appliance from a remote host. When you restore the configuration, the target host must be in maintenance mode.

Saving and Restoring ESXi Configurations


- Command usage of vicfg-cfgbackup.pl

- Saving your ESXi configuration

- vicfg-cfgbackup --server <3i-host-ip> --portnumber <port_number> --protocol <protocol_type> --username root --password <root_password> -s <backup-filename>

- Restoring your ESXi configuration

- vicfg-cfgbackup --server <3i-host-ip> --portnumber <port_number> --protocol <protocol_type> --username root --password <root_password> -l <backup-filename>
- This action will prompt you to reboot your host.



Virtually anything
is possible.

Virtually anything is possible.

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Breakout Session and Lab Session Survey

Use pencil or black or blue ink and fill the appropriate boxes in the circles.

1. This session was... (pick one)
 already applicable to my job
 indirectly applicable to my job
 personally interesting, but not applicable to my job

2. Did this session provide information that can help you do your job better?
 Yes
 No

3. This session was... (pick one)
 Too technical
 Just right
 Not technical enough

4. What is your technical experience level?
 Not technical
 Novice
 Intermediate
 Advanced

5. Based on what you learned in this session, what is your likelihood to:
 implement what you heard in your environment
 Request more information
 Upgrade or purchase the product/service presented

Please rate your satisfaction with the session or lab on each of the following factors:

6. How satisfied are you...
 VERY
 SOMEWHAT
 NEUTRAL
 SOMEWHAT
 VERY

A. OVERALL SATISFACTION
 B. With the relevance of the material for your needs
 C. That the session matched the session description
BREAKOUT SESSION ONLY:
 D. With the amount of time allocated for the session
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 F. With the speaker's knowledge of the subject
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What, if anything, was the value of the session or how could it be improved?

Thank you for taking the time to give us feedback about this session.

Please return this form to the door monitor as you leave the room.

Thank you for coming.
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