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## Technical Questions and Answers for VMware Interviews

### Installation and Upgrade of ESX 3.0.1 and Virtual Center 2.0.1

#### 1. List the major components of VMware Infrastructure ?

- \* The major components of VMware Infrastructure are:
- ESX Server host .
- Virtual Center Server.
- Virtual Infrastructure (VI) Client .
- Web browser.
- License server.
- Database.

#### 2. What are the minimum H/W requirements to install VirtualCenter Server ?

- \* VirtualCenter Server hardware must meet the following requirements:
- Processor : 2.0GHz or higher Intel or AMD x86 processor. Processor requirements can be larger if your database server is also run on the same hardware.

Memory : 2GB RAM minimum. RAM requirements can be larger if your database is run on the same hardware.

Disk storage : Nearly 1GB free disk space

Networking : 10/100 Ethernet adapter minimum (Gigabit recommended).

Scalability : A VirtualCenter Server configured with the hardware minimums can support 20 concurrent clients, 50 ESX Server hosts, and over 1000 virtual machines.

A dual processor VirtualCenter Server with 3GB RAM can scale to 50 concurrent client connections, 100 ESX Server hosts, and over 2000 virtual machines.

#### 3. Which softwares are supported to install Virtual Center Server Software ?

- \* The VirtualCenter Server is supported as a service on the 32 bit versions of these operating system
- The Virtual Center installer requires Internet Explorer 5.5 or higher in order to run.
- o Windows 2000 Server SP4 with Update Rollup 1 (Update Rollup 1 can be downloaded from Windows Update at any SP level)
- o Windows 2003 (all releases except 64 bit)

Virtual Center 2.0 installation is not supported on 64 bit operating systems.

#### 4. Which Databases are supported to VirtualCenter ?

- \* Virtual Center supports the following database formats:
- o Microsoft SQL Server 2000 (SP 4 only)
- o Oracle 9iR2, 10gR1 (versions 10.1.0.3 and higher only), and 10gR2
- o Microsoft MSDE (not supported for production environments)

#### 5. What are the Hardware requirements for Virtual Infrastructure Client ?

- \* The Virtual Infrastructure Client hardware must meet the following requirements :
- o Processor : 266MHz or higher Intel or AMD x86 processor (500MHz recommended).
- o Memory . 256MB RAM minimum, 512MB recommended.
- o Disk Storage . 150MB free disk space required for basic installation. You must have 55MB free on the destination drive for installation of the program .
- o Networking . 10/100 Ethernet adapter (Gigabit recommended).

#### 6. Which softwares are supported for Virtual Infrastructure Client ?

- \* The Virtual Infrastructure Client is designed for the 32 bit versions of these operating systems:
- o Windows 2000 Pro SP4
- o Windows 2000 Server SP4
- o Windows XP Pro (at any SP level)

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o Windows 2003 (all releases except 64bit)

The Virtual Infrastructure Client requires the .NET framework 1.1 (included in installation if required)

## 7. What are the Requirements for VirtualCenter VI Web Access ?

- \* The VI Web Access client is designed for these browsers :
- o Windows . Internet Explorer 6.0 or higher, Netscape Navigator 7.0, Mozilla 1.X, Firefox 1.0.7 and higher.
- o Linux . Netscape Navigator 7.0 or later, Mozilla 1.x, Firefox 1.0.7 and higher.

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## 8. What are the Minimum Hardware Requirements for ESX Server 3.x ?

- \* You need the following hardware and system resources to install and use ESX Server.
- At least two processors:

- o 1500 MHz Intel Xeon and later, or AMD Opteron (32bit mode) .
- o 1500 MHz Intel Xeon and later, or AMD Opteron (32bit mode) for Virtual SMP.
- o 1500 MHz Intel Viiv or AMD A64 x2 dualcore processors

1GB RAM minimum.

One or more Ethernet controllers. Supported controllers include:

- \* Broadcom NetXtreme 570x Gigabit controllers
- \* Intel PRO/100 adapters

For best performance and security, use separate Ethernet controllers for the service console and the machines.

A SCSI adapter, Fibre Channel adapter, or internal RAID controller:

- \* Basic SCSI controllers are Adaptec Ultra160 and Ultra320, LSI Logic Fusion MPT, and most NCR/Syntech SCSI controllers.

- \* RAID adapters supported are HP Smart Array, Dell Perc RAID (Adaptec RAID and LSI MegaRAID), and (Adaptec) ServeRAID controllers.

\* Fibre Channel adapters supported are Emulex and QLogic host bus adapters (HBAs).

A SCSI disk, Fibre Channel LUN, or RAID LUN with unpartitioned space. In a minimum configuration, RAID is shared between the service console and the virtual machines.

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**VMFS3 partitioning** . For best performance, use VI Client or VI Web Access to set up your VMFS3 partitions rather than the ESX Server installer. Using VI Client or VI Web Access ensures that the starting sectors are 64K aligned, which improves storage performance.

**Processors** . Faster processors improve ESX Server performance. For certain workloads, larger cache sizes can improve ESX Server performance.

**Hardware compatibility** . To ensure the best possible I/O performance and workload management, VI ESX Server provides its own drivers for supported devices. Be sure that the devices you plan to use in your server are supported.

### **11.What is virtualization ?**

Virtualization is the creation of a virtual (rather than actual) version of something, such as an operating system, a server, a storage device or network resources.

What are the types of virtualization?

### **12.What are the inherent benefits of virtualization ?**

primarily cost savings

allows multiple operating systems to be installed on a single server  
reducing the amount of hardware

Consolidating servers

also potentially reduces the amount of physical space that a company needs for its servers or data centers

### **13.What is a Hypervisor?**

A hypervisor, also called a virtual machine manager, is a program that allows multiple operating systems to share a single hardware host. Each operating system appears to have the host's processor, memory, and other resources all to itself. However, the hypervisor is actually controlling the host processor and re-allocating what is needed to each operating system in turn and making sure that the guest operating systems (called virtual machines) cannot disrupt each other.

### **14.What is ESX Server?**

ESX Server is VMware's flagship enterprise server virtualization platform. It comes in two versions – Server and ESXi Server where the latter has no service console and is the thinnest version available. Server has many optional features like VMotion and VMHA (both discussed below) and some built-in features like the VMFS file system. Most end users purchase VMware ESX Server with some set of optional features in a package called VMware Infrastructure. ESX Server is managed by the VMware Infrastructure Client and the centralized management platform is called Virtual Center.

### **15.What is Hyper-V?**

Hyper-V is Microsoft's flagship enterprise server virtualization platform. Hyper-V is a feature of Windows Server 2008 and it is required to be run on a system with a 64-bit CPU. Its Hypervisor is about 100KB, the Hyper-V role is about 100MB, and Windows Server 2008, fully installed is multiple GB. The centralized management platform for Hyper-V is System Center Virtual Machine Manager.

### **16.Difference between ESX and GSX?**

With VMware Workstation and GSX Server, the software sits on top of a host operating system such as Windows or Linux. With ESX Server, the software runs directly on the system's hardware, eliminating the need to install a base OS. In fact, ESX has its own OS. The software basically runs on its own Linux kernel and Linux is quite beneficial to know when working with the product, although it's not an absolute necessity.

### **17.What is the hardware version currently in ESX4?**

Version 7

### **18.What is VMware Workstation?**

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VMware Workstation uses virtual machine technology that is designed mostly for the power user. It allows you to run multiple operating systems on a single PC. The operating systems that can run under a VM virtual machine can include Windows 2000, Windows XP, Windows 2003 Server, Novell Netware, and

## 19. What are the file Extensions?

### Extension

**.log** <vmname>.log or vmware.log

This is the file that keeps a log of key VMware Workstation activity. This file can be useful in troubleshooting you encounter problems. This file is stored in the directory that holds the configuration (.vmx) file of the virtual machine.

**.nvram** <vmname>.nvram or nvram

This is the file that stores the state of the virtual machine's BIOS.

**.vmdk** <vmname>.vmdk

This is a virtual disk file, which stores the contents of the virtual machine's hard disk drive.

A virtual disk is made up of one or more .vmdk files. If you have specified that the virtual disk should be divided into 2GB chunks, the number of .vmdk files depends on the size of the virtual disk. As data is added to the virtual disk, the .vmdk files grow in size, to a maximum of 2GB each. (If you specify that all space should be allocated when you create the disk, these files start at the maximum size and do not grow.) Almost all .vmdk files' content is the virtual machine's data, with a small portion allotted to virtual machine overhead. If the virtual machine is connected directly to a physical disk, rather than to a virtual disk, the .vmdk file stores information about the partitions the virtual machine is allowed to access.

Earlier VMware products used the extension .dsk for virtual disk files.

**<diskname>-<## #>.vmdk**

This is a redo-log file, created automatically when a virtual machine has one or more snapshots. This file stores changes made to a virtual disk while the virtual machine is running. There may be more than one file. The ## # indicates a unique suffix added automatically by VMware Workstation to avoid duplicate names.

**.vmsd** <vmname>.vmsd

This is a centralized file for storing information and metadata about snapshots.

**.vmsn** <vmname>-Snapshot.vmsn

This is the snapshot state file, which stores the running state of a virtual machine at the time you took the snapshot.

**<vmname>-Snapshot<## #>.vmsn**

This is the file which stores the state of a snapshot.

**.vmss** <vmname>.vmss

This is the suspended state file, which stores the state of a suspended virtual machine.

Some earlier VMware products used the extension .std for suspended state files.

**.vmtm** <vmname>.vmtm

This is the configuration file containing team data.

**.vmx** <vmname>.vmx

This is the primary configuration file, which stores settings chosen in the New Virtual Machine Wizard or the virtual machine settings editor. If you created the virtual machine under an earlier version of VMware Workstation on a Linux host, this file may have a .cfg extension.

**.vmxf** <vmname>.vmxf

This is a supplemental configuration file for virtual machines that are in a team. Note that the .vmxf file remains if a virtual machine is removed from the team.

**.VMDK** -- These files are the actual hard disk of the virtual machine itself, and tend to be the largest files within the folder. You can consider the size of this file to be roughly equivalent to the size of either the virtual machine itself (if you've chosen to use preallocated disks) or the size of the data currently stored on that disk (if you've chosen to use growable disks).

**.NVRAM** -- Consider this file the BIOS of the virtual machine.

**.VMX** -- With typically one VMX file per folder, this file holds the configuration information for the virtual machine in a text format. Unlike almost all the other files you'll see, these files can be edited using a text editor, a process that is actually required for some functionality that is not exposed in the graphical interface.

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**.VMXF** -- This file, in XML format, includes additional information about the virtual machine if it has been added to a team. If a machine has been added to a team and then later removed, this file remains retained. This file can also be opened and read in a text editor.

**.VMTM** -- For virtual machines actively participating in a team, this file stores information about that membership.

**.VMEM** -- These files, which contain a backup of the VMs paging file, are typically very small or non-existent when the virtual machine is powered off, but grow immediately to the size of configured RAM when the machine is powered on.

**.VMSN** and **.VMSD** -- When snapshots are created for a virtual machine, these files are created to hold state of the virtual machine. The VMSN file stores the running state of the machine, what you could consider the "delta" between the VMDK at the point of the snapshot and what has been processed up until the time. The VMSD stores information and metadata about the snapshot itself.

**.VMSS** -- If you've suspected the state of your machine, this file contains the suspended state of the machine. These files typically only appear when virtual machines have been suspended.

## **20. What are a host, guest, and virtual machine?**

A host system (host operating system) would be the primary & first installed operating system. If you are using a bare metal Virtualization platform like Hyper-V or ESX, there really isn't a host operating system besides the Hypervisor. If you are using a Type-2 Hypervisor like VMware Server or Virtual Server, the host operating system is whatever operating system those applications are installed into. A guest system (virtual operating system) is a virtual guest or virtual machine (VM) that is installed under the host operating system. The guests are the VMs that you run in your virtualization platform. Some admins also call the host & the parent and child.

## **21. What products are available for Server Virtualization?**

Bare Metal Hypervisor / Native / Type 1:

VMware ESX Server

Microsoft Hyper-V

Citrix/Xen Server

Hosted in an OS / Type 2:

VMware Server

Microsoft Virtual Server

Parallels Server

## **22. What products are available for desktop virtualization?**

Host in an OS / Type 2 / intended for workstations:

VMware Workstation

Microsoft Virtual PC

Parallels Workstation

VMware Fusion for Mac OS

Parallels Desktop for Mac OS

## **23. What is the difference between ESX Server and VMware Server?**

While both ESX Server and VMware Server are server virtualization products, the difference is that VMware ESX installs and runs on the bare metal of a physical server whereas VMware Server needs a base operating system. In other words, VMware ESX has a type 1 hypervisor whereas VMware Server has a type 2 hypervisor.

You will obtain much better performance from ESX Server as it has much less overhead. ESX Server has many features available such as VMFS, VMotion, VMHA, and DRS. On the other hand, ESX Server is a commercial product that must be purchased whereas VMware Server is a free product. VMware Server is an excellent option to choose to slowly migrate to server consolidation at a low cost. VMware Server is an excellent way to learn about virtualization as well as a way to run multiple operating systems on your PC, at no cost.

## **24. What is the difference between Hyper-V and Virtual Server?**

Like the difference between ESX Server and VMware Server, Hyper-V and Virtual Server have similar differences. Hyper-V is a type-1 hypervisor whereas Virtual Server is a type 2 hypervisor. Virtual Server requires that you first host a Windows operating system to load it.

Hyper-V is meant to be a higher performance commercial virtualization platform with a centralized management platform and 3<sup>rd</sup> party add-ons. Virtual Server, on the other hand, is a free virtualization platform meant for the desktop or for small-scale server virtualization solutions.

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## **25. What is the difference between emulation, native virtualization, and paravirtualization?**

Emulation is where software is used to simulate hardware for a guest operating system to run in. This has been used in the past but is difficult to do and offers low performance.

Native virtualization (or full virtualization) is where a type-2 hypervisor is used to partially allow access to hardware and partially to simulate hardware in order to allow you to load a full operating system. This is done by emulation packages like VMware Server, Workstation, Virtual PC, and Virtual Server.

Paravirtualization is where the guest operating systems run on the hypervisor, allowing for higher performance and efficiency. For more technical information and videos on this topic, visit VMware's Technology Preview for Transparent Virtualization. Examples of paravirtualization are Microsoft Hyper-V and VMware ESX Server.

## **26. What are the different types of virtualization?**

**Server Virtualization** – consolidating multiple physical servers into virtual servers that run on a single physical server.

**Application Virtualization** – an application runs on another host from where it is installed in a variety of ways. It could be done by application streaming, desktop virtualization or VDI, or a VM package (like ACE creates with a player). Microsoft Softgrid is an example of Application virtualization.

**Presentation Virtualization** – This is what Citrix Metastream (and the ICA protocol) as well as Microsoft Terminal Services (and RDP) are able to create. With presentation virtualization, an application actually runs on another host and all that you see on the client is the screen from where it is run.

**Network Virtualization** – with network virtualization, the network is "carved up" and can be used for multiple purposes such as running a protocol analyzer inside an Ethernet switch. Components of a virtual network could include NICs, switches, VLANs, network storage devices, virtual network containers, and various network media.

**Storage Virtualization** – with storage virtualization, the disk/data storage for your data is consolidated and managed by a virtual storage system. The servers connected to the storage system aren't aware where the data really is. Storage virtualization is sometimes described as "abstracting the logical storage from the physical storage."

## **27. Why do I care that VMware ESX uses the VMFS?**

VMware's VMFS was created just for VMware virtualization. VMFS is a high performance cluster file system allowing multiple systems to access the file system at the same time. VMFS is what gives you the necessary foundation to perform VMotion and VMHA. With VMFS you can dynamically increase a volume, support distributed journaling, and the addition of a virtual disk on the fly.

## **28. How do I backup my virtual guest operating systems?**

There are multiple ways to backup your virtual guest operating systems. As long as your critical data is offsite and follows your backup rotation, you are doing well.

One option would be to run a backup client inside each guest operating system, just like you do on your physical servers.

If you are using a bare metal virtualization platform (like ESX Server), the greatest challenge is somehow gaining access to your data. For example, with ESX Server, your data is stored inside ESX Server's VMFS system. That file system cannot be accessed by a typical Windows or Linux backup client. For that reason there are specialized virtualization backup products like Vizioncore's vRanger and EsXpress.

## **29. What are VMware VMotion & Storage VMotion (SVMotion)?**

With VMotion, VM guests are able to move from one ESX Server to another with no downtime for the guest. What is required is a shared SAN storage system between the ESX Servers and a VMotion license.

Storage VMotion (or SVMotion) is similar to VMotion in the sense that it moves VM guests without an downtime. However, what SVMotion also offers is the capability to move the storage for that guest at the same time that it moves the guest. Thus, you could move a VM guest from one ESX server's local storage to another ESX server's local storage with no downtime for the end users of that VM guest.

## **30. What is VMware HA?**

One of the most amazing capabilities of VMware ESX is VMHA. With 2 ESX Servers, a SAN for shared storage, a Virtual Center, and a VMHA license, if a single ESX Server fails, the virtual guests on that server will fail over to the other server and restart, within seconds. This feature works regardless of the operating system used or if the applications support it.

## **31. What is VMware VCB?**

VMware Consolidated Backup (or VCB) is a group of Windows command line utilities, installed on a Windows system, that has SAN connectivity to the ESX Server VMFS file system. With VCB, you can perform full backups and restores of your virtual machines.

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or image level backups and restores of the VM guests, back to the VCB server. From there, you will find a way to get those VCB backup files off of the VCB server and integrated into your normal backup process. Many backup vendors integrate with VCB to make that task easier. Contrary to what it sounds like, VCB IS NOT a traditional backup application because it doesn't do anything to get the data off the system onto external media nor does it have a GUI interface.

### **32. What is Virtual Center?**

Both VMware Virtual Center and Microsoft System Center are centralized management applications for their respective virtualization platform.

Virtual Center is a required piece of many of the advanced VMware ESX Server features but it must be purchased separately. Virtual Center runs on a Windows server and it could use SQL as a backend.

### **33. What is System Center Virtual Machine Manager?**

Microsoft System Center is Microsoft's centralized management platform for just about every Microsoft enterprise function ("from data center to desktop", as Microsoft says).

More specifically, Microsoft System Center Virtual Machine Manager is the centralized management platform for virtualization. Microsoft calls it their "comprehensive virtualization management tool". It can perform virtual machine monitoring, configuration, provisioning, and administration. The latest version, VMM, can manage Microsoft Hyper-V, Virtual Server 2005, and VMware ESX Server platforms.

### **34. What is a partition?**

In virtualization terminology, a partition is what is managed by a hypervisor. That partition could have a virtual guest operating system inside of it, or the partition could be empty.

### **35. What are: virtual processor, virtual RAM, virtual NIC, & virtual disk?**

From working with servers and PCs, you are familiar with common components like CPU, RAM, Disk, and so on.

When using server virtualization, each guest operating system will have its own virtual components such as the virtual CPU, virtual memory (RAM), virtual disk, virtual network, and so on.

Inside the guest operating system, the OS will see these devices as physical devices and you may or may not have the vendor's virtualization driver loaded for that device. These virtual devices are configured in the virtual guest configuration for that VM, in the management interface for your virtualization software.

### **36. Why do I need to care about the hardware requirements of VMware ESX and Microsoft V?**

Type 1 virtualization platforms that run on the bare metal of your server hardware will have specific hardware requirements because they are not typical applications that run inside an underlying (host) operating system. Because of this, type-1 virtualization platforms will have strict hardware requirements. For example, they must run on 64 bit hardware and VMware ESX Server only support certain disk storage systems and network interface cards.

For more information on the hardware requirements of these two virtualization platforms, please see [Microsoft Hyper-V Hardware Requirements](#)

[VMware ESX Server Hardware Compatibility List \(HCL\)](#)

### **37. What is a snapshot?**

A snapshot is a "point in time image" of a virtual guest operating system (VM). That snapshot contains a copy of the VM's disk, RAM, and devices at the time the snapshot was taken. With the snapshot, you can return the VM to that point in time, whenever you choose. All changes made after the snapshot was taken may be based on that snapshot information (incremental changes). You can take snapshots of your VM no matter what guest OS you have and the snapshot functionality can be used for features like performing image level backups of the VMs without ever shutting them down. Do not confuse Virtual Machine Snapshot with Microsoft's VSS (Microsoft's Volume Shadow Copy Service). Snapshots can be taken in just about every virtualization platform available.

### **38. What is Quick Migration?**

Quick Migration is a feature of Microsoft's Hyper-V virtualization platform. With Quick Migration, you can move running virtual machines from one host to another host server with minimal downtime. This feature is comparable to VMware's VMotion except Quick Migration, in its current incarnation, is not as quick as VMotion (VMotion is about 1 second vs Quick Migration of about 5-20 seconds)

### **39. Why won't my virtualization product boot from my OS CD to load my new guest OS?**

Many times, admins have complained that they could not access or could not boot a virtual CDROM that was inserted or an ISO file that was mapped.

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And so many times, the cause of this issue is just a simply click. To access a virtual CDROM, that CD must be **connected**. If you look at the graphic below, you can see how the device is both **connected at power on**. **Connected devices** are connected after the VM boots where as **connected power on** devices, are connected before the VM boots. To boot a new OS CD, that CDROM needs to **connected at power on**.

#### 40. What do I need to know about licensing and Virtualization?

Concerning licensing and virtualization – the most important thing to know is that any **guest operating system** must have a license, just as any physical server or workstation does. Thus, if you run Microsoft Virtual Server on Windows Server 2003 and 3 guest operating systems are running (Windows XP, Windows Server 2008, and Windows Vista), you must have 4 Microsoft operating system licenses – Windows XP, Windows Vista, Windows Server 2003, and Windows Server 2008.

As Linux is typically open source, you can generally have as many Linux guest operating systems as you want without paying any licensing fees.

#### 41. What is a P2V conversion?

Virtualization is most frequently used for server consolidation. This is where physical servers are converted into virtual servers. This “physical to virtual” conversion process is commonly called **P2V** conversion. This process can be done manually but it is easier if you use a P2V conversion application. While this P2V (Physical to Virtual machine Import) functionality may be built into the management interface for your virtualization product, there are also standalone P2V products such as VMware Converter (diagram shown below) and Vizioncore’s vConverter.

These P2V products connect to the physical server, copy all data from that physical server into a virtual machine on the virtual server, replace the drivers in the guest operating system with virtual drivers, and start the virtual machine. In some cases, there is no downtime for end users of that server.

Similar to a P2V conversion, a V2V (virtual to virtual) conversion is where a virtual guest machine from one virtualization platform is converted to another virtualization platform.

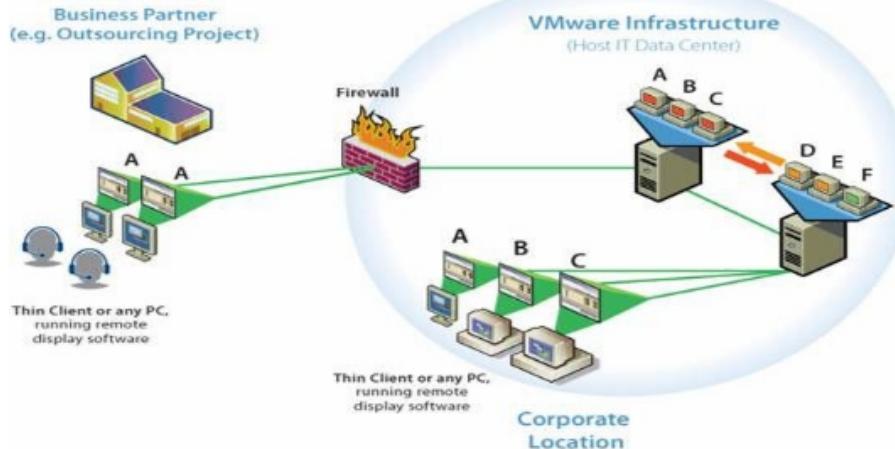
#### 42. What is VDI?

VMware describes Virtual Desktop Infrastructure (VDI) as “delivering desktops from the data center”. In other words, VDI is where enterprise desktop computers are virtualized, moved to the data center, then presented over the LAN or WAN to the end users. Once VDI is used, typically the end user devices are replaced by thin-client devices.

While VMware has a VDI product called VDM (Virtual Desktop Manager), VDI is not a product exclusively from VMware. Other VDI vendors include Citrix XenDesktop & Kidaro (now owned by Microsoft).

With VDI, virtual desktops are served by enterprise virtualization servers running products like VMware, Microsoft Hyper-V, and Xen Server. With the addition of the VDI products, these desktops can be dynamically created, pooled & shared, or even accessed from a GUI menu, over a web page.

The graphic below, shows some examples of how VDI could be used and how it works.



#### 43. What is SoftGrid?

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Microsoft purchased Softgrid and has renamed it Microsoft Application Virtualization. With this software you are able to virtualize your applications and deliver them over the network. With application virtualization, software applications are never installed on the end user devices so there are never any software conflicts. Because of this, software testing is reduced, time to set up end user computers is reduced, and software troubleshooting is reduced. Overall, application virtualization is going to save time and money. Microsoft Application Virtualization competes with XenApp and VMware's ThinApp.

#### **44.What are the best free virtualization options?**

In my opinion, the best free virtualization options are:

For testing, development, and production server virtualization solutions for SMBs, I recommend VMWare Server or Microsoft Virtual Server.

For desktop virtualization on your own PC, I recommend Microsoft Virtual PC.

And for Linux hosts – Xen and KVM

#### **45. What is VM Sprawl?**

Because creating new virtualized servers is so quick and easy, many organizations have a problem with "VM Sprawl". With VM Sprawl, the number of virtual machines (VM) running in a virtualized infrastructure increases over time, simply because of the ease of creating new VMs, not because those VMs are absolutely necessary for the business.

Concerns with VM sprawl are the overuse of the infrastructure if it is not needed and the cost of licensing virtual machines that may not have been required.

To prevent VM sprawl, you should more carefully analyze the need for all new VMs and ensure that you are able to justify the cost of the infrastructure and the licenses for all new VMs created.

#### **46. How many virtual machines can you run on one host?**

As with many server performance questions, the answer to this question is "it depends". You can run VMs on a single host as your hypervisor supports (usually that is a lot) and as you have server resources (RAM, CPU, Disk, and Network).

Typically, on a desktop PC, you can run 1-3 VMs and on a Server you can run 10-50 VMs – depending on application demands.

#### **47. What is ThinApp?**

VMware bought a company (Thinstall) who offered an application virtualization product. VMware renamed the product ThinApp. Similar in concept to Microsoft's SoftGrid (now Microsoft Application Virtualization), allows you to virtualize your applications and deliver them from servers in the data center. This prevents application conflicts, allows for easy end user device replacements, allows for easy software deployment, overall, saves time and money.

#### **48. Why is centralized storage so important for enterprise virtualization products?**

Centralized storage (such as an iSCSI or FC SAN) is very critical to many optional virtualization features. For example, with VMware High Availability (VMHA), VMs are stored in a centralized shared data store. If a Server goes down, those VMs are automatically restarted on another ESX host because that host can access them over the centralized shared storage (SAN). Thus, while centralized storage isn't required to use enterprise virtualization features, many of the advanced or optional virtualization features don't work without it.

#### **49. What are the best online resources for Virtualization knowledge?**

However, there are also a number of other valuable Internet resources for virtualization information. These are:

Virtualization.info

VM Blog

VMware.com

VMware VMTN Blog

Run Virtual

Microsoft.com - Virtualization

SearchVMware.com

VMwareVideos.com

Petri IT Knowledgebase – Virtualization

#### **50.What are the best training options for learning about Virtualization?**

As virtualization is relatively new and there is a large following building for its use, there is a huge demand for virtualization training. Here are a few of my recommendations:

VMware Education – offers a strong classroom and online training program as well as a certification program.

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Train Signal – offers a 3+ virtualization related videos covering Microsoft and VMware video training.

their best sellers is the VMware ESX Server video product.

Dell Virtualization Training – covering VMware products

Citrix/Xen Education – covering XenServer & related products

### **51. What is a VMware VCP & a VCDX?**

Until recently VMware's virtualization certification was the VMware Certified Professional (VCP). Recently VMware announced a more advanced certification – the VCDX. To become a VCP you must complete an official VMware training course (online or in the classroom), then pass a certification test at a local training center.

The VCDX builds on the VCP. To become a VCDX, you must first be a VCP and then you are required to pass more advanced tests and present a VMware Infrastructure Design plan to a certification board.

You can learn more about the VCP and VCDX certifications at the VMware Certification Portal.

### **52. What is a virtual datastore?**

A datastore, as it is used by VMware, is a storage container for files. The datastore could be on a local hard drive or across the network on a FC or iSCSI SAN. Inside the datastore, you will find the virtual machines, VM disks, VM configurations, and any other files you place in the datastore (such as ISO files for installing a VM). Datastores are used in VMware ESX Server (viewed with the VI Client) and in the new Server 2.0.

### **53. Why should I try virtualization on my desktop PC?**

While virtualization is still a new concept to some admins, it has been adopted by so many more. In my opinion, understanding virtualization isn't hard, it allows you so much flexibility and power, and you can run multiple operating systems on one piece of hardware. When it comes to desktop virtualization you could, for example, run a Windows Server with Exchange 2007 and Linux Server running Apache, all inside your laptop or desktop computer – amazing! There are free desktop virtualization products like Microsoft Virtual PC which are easily installed. So, if you haven't tried virtualization, I encourage you to try it out today by downloading Microsoft Virtual PC or Server 2.0.

### **54. What is the Open Virtual Machine Format?**

With various competing virtualization products a problem arose where different every virtualization solution vendor had their own standard for packaging and distributing virtual machines. With the ability to share virtual machines over the Internet and between virtualization platforms becoming more and more important, VMware helped to create the Open Virtualization Format (OVF). The OVF is "a platform independent, extensible, and open packaging and distribution format for virtual machines".

With OVF, you are able to download VMs directly from the Internet and immediately import & start them. Plus, there only needs to be a single file format stored on sites where VMs are downloaded.

### **55. Can I virtualize all my servers or should some servers or applications not be virtualized?**

In my opinion, just about every server or application can be virtualized. What you need to consider is whether there is any specialized hardware that is required for that application which may not be supported when virtualized? Will your virtualized servers have the resources to perform as well as the original physical server did?

Virtualized servers can support just about any amount of CPU, RAM, Disk, and Network bandwidth than required by an application. Additionally, virtualized servers can support special peripherals such as USB, Serial (COM), and Parallel (LPT) ports for special application needs.

Of greatest concern is the virtualization of high performance applications such as SQL and Exchange. However, I have even virtualized these applications without end users noticing. Typically, the only servers that I do not virtualize are DNS servers (which are usually Windows AD Servers) as a DNS server will be needed by the virtualized servers to function.

You can read VMware customer case studies and Microsoft customer case studies to learn more about the types of server virtualization successes they have experienced.

### **56. What are the drawbacks to virtualization?**

In the end, I don't believe that there are any drawbacks to virtualization as virtualization will save money and make server administration easier. However, just like any critical new piece of your infrastructure, setting up virtualization must be done right, from the beginning. You will need to spend time learning and training about virtualization.

Likely, if you choose an enterprise virtualization product, you will need to spend money on virtualization software. It may also be necessary to purchase servers with more RAM (or upgrade existing unneeded

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servers) to be virtualization host servers (however you will be able to get rid of many servers with ie once they are virtualized).

If you do not already have one, you will likely need an iSCSI or Fibre Channel (FC) storage area network (SAN) to support some of the enterprise virtualization features. Also, keep in mind that as servers are consolidated, if a single server goes down, you could lose as many as 50 virtual guest servers. With servers being so consolidated, "all your eggs are in one basket" (or a few baskets), as they say. Because of this, you will need to choose servers that are as redundant and reliable as possible as your virtualization hosts.

Still, all of this investment in time, hardware, and software will be worth it, in the end, as you will realize many benefits.

### **57. How do I manage my virtualized servers?**

Management of your virtual servers is easier than with traditional physical servers because you will have a more centralized interface for those consolidated servers. The application that you use to manage your servers will vary based on what virtualization application you use. For example, with VMware ESX Server, you will manage your servers (ie: power status, configuration, remote control) from either the VMware VI Infrastructure Client (VI Client) or the VMware Infrastructure Web Access interface (via a web browser). You could also manage your ESX Server via the command line using SSH.

With Microsoft Hyper-V, you would manage your server using the Hyper-V Manager MMC.

### **58. How much do virtualization products cost?**

Virtualization products range in price from free to thousands of dollars. You would have to check each manufacturer's website to verify the current prices as prices could change. However, based on today's prices here are current prices for virtualization products:

VMware ESX Server - range in price from \$500 to \$6000 depending on the number of features and type of service/support you choose

Microsoft Hyper-V - \$999 for Windows Server 2008 Standard with Hyper-V

Citrix/Xen Server - \$780 for XensServer Standard

VMware Server - FREE

Microsoft Virtual Server - FREE

VMware Workstation - \$189

Microsoft Virtual PC - FREE

### **59. Will Microsoft overtake VMware as the market virtualization leader?**

Well this is the "billion dollar question", now isn't it? As Microsoft has a reputation for taking over companies and integrating or renaming those companies' products into their own, it is easy to speculate that Microsoft's Hyper-V will overtake VMware's ESX Server in the virtualization top spot.

However, VMware has, in my opinion, at least a 2-3 year technological lead in the number of features it offers and its general development. More importantly, VMware has developed a huge enterprise, and recently, a strong SMB customer base. VMware has 10 years of virtualization experience, every Fortune 100 company uses its products, 92% of the Fortune 1000 use ESX, VMware has 11 virtualization patents, and over 100,000 customers worldwide.

On the other hand, as of this month, Microsoft just released their first enterprise virtualization product (Hyper-V) and that product is missing many of the features that it was originally advertised to have. While those features may come in the next version, even with those features, they will still be far behind VMware in the functionality of their Enterprise virtualization product and their customer base.

### **60. How much money can my company save with Server consolidation using virtualization?**

There is no doubt that your company can save significant money by consolidating servers using virtualization.

If you haven't reviewed Virtualization FAQ #2, you should first read all the inherent benefits of virtualization.

When it comes to calculating the dollar savings from consolidating servers with virtualization, I recommend that you check out the following ROI calculators:

VMware ROI/TCO Calculator

Microsoft Integrated Virtualization ROI Tool

Intel Virtualization Calculator

With these calculators, you can help justify your server consolidation project. In the end, I know that you will be very satisfied with your savings, both in recurring costs and in administrative time savings.

### **61. What is the difference between a fixed and a dynamic virtual hard disk?**

Some virtualization products (like MS Virtual Server and VMware Server) support two types of virtual drives – fixed & dynamic. What is the difference between these two types of virtual hard drives?

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With both fixed and dynamic virtual hard drives, you set a maximum size that the virtual hard drive will appear to the guest virtual machine. What is different is that, with the fixed disk, the size of the disk is allocated when it is created. Thus, if you create a 100GB fixed virtual disk, 100GB in space is taken up by the host system when you create that disk.

On the other hand, when you create a dynamic virtual disk, only a tiny amount of space is taken up to create the disk. Over time, as the amount of space used in the dynamic virtual disk is increased, the size of the real disk used on the host is increased.

While a dynamic disk is better as it uses less real space on the host disk, it is also not as preferential performance as a dynamic virtual disk easily gets fragmented.

## 62. Where can I download pre-built virtual machines?

The quickest way to get started with virtualization is to download free pre-built virtual machines. These already have an operating system installed and usually already have a few applications installed. For example, you can download Microsoft evaluation virtual machines (actually VHD files) with some of their latest enterprise applications (like Exchange Server 2007 or Windows Server 2008).

Another excellent source with hundreds of VMs available for download is the VMware Virtual Appliance Marketplace. At this site, companies and individuals have contributed VMs that anyone can download for commercial evaluation of software or just for fun. You will, of course, need a virtualization product to run these VMs. I recommend the free VMware Server or Microsoft Virtual Server & PC.

## 63. What are virtual machine additions and integration components?

Just about every virtualization application offers some kind of "additions" or "integration components" that you install inside your virtual machine guests. These additions are usually device drivers that increase performance, enable features, or make the VMs easier to manage. With VMware products, these drivers are called the "Virtual Machine Additions". With Microsoft Hyper-V, these drivers are called "integration components".

## 64. What are some of the VMware ESX Server add-ons that I should consider?

Depending on which level of the VMware Infrastructure Suite that you purchase, you may or may not have access to a variety of add-ons for ESX Server (such as SVMotion, VCB, VMHA, and DRS). But what other add-ons are available for VMware ESX Server and the VMware Infrastructure Suite? As ESX Server is a very mature product, there are many 3rd party products available for ESX Server.

## 65. VMware Vsphere ESX 4 Best practice Configuration.

/	ext3	5.0GB	The root (/ or "root") partition stores the ESX system and all files not stored in another custom partition. If this partition is filled to capacity, the ESX host could crash. It is imperative to prevent this.
	swap	1600MB	The swap partition is used to supplement RAM if the service console runs out of physical memory.
/home	ext3	512MB	The /home partition is created as a failsafe to help prevent the root partition from filling up. Service console accounts (not vCenter) each have an associated /home folder. As a best practice, administrators should not use these folders for storage. If service console accounts are to be used and there are multiple users requiring access, the size of this partition may need to be increased. By default, /home is part of the root partition. By creating a custom partition for it the root partition will be protected if /home fills to capacity.
/tmp	ext3	2.0GB	The /tmp partition is also created as a failsafe to help prevent filling the root partition. /tmp is often used to untar support files, temporarily store copied logs and stage patches. By default, /tmp is part of the root partition. By creating a custom partition for it the root partition will be protected if /tmp fills to capacity.
/vmimages	ext3	512MB	Traditionally, /vmimages was used to store CD-ROM images (.ISOs) and Floppy Disk images (.flp, .img). However, most organizations following best-practices have moved this to a separate partition.

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from each individual host to a single shared-storage location. However by default ESX creates a /vmimages folder within /. This makes it dangerously easy for an Administrator to mistake it for the shared-storage repository and copy images into it that will fill /. As a failsafe to help prevent this, a small custom /vmimages partition can be created. If the local /vmimages folder is actually used, this size may need to be increased.

The /var partition stores most system logs. Creating a custom /var partition provides substantial, dedicated log storage space (/var/log) while protecting the / partition from being filled by log files. Normally /var is part of the / partition.

/var ext3 2.0GB /boot stores the files necessary to boot the service console.

/boot ext3 260MB The vmkcore partition temporarily stores log and error information should VMkernel crash.

#### **66.What is SWAP Partition?**

To replace pages or segments of data in memory. Swapping is a useful technique that enables a computer to execute programs and manipulate data files larger than main memory. The operating system copies data as possible into main memory, and leaves the rest on the disk. When the operating system needs more data from the disk, it exchanges a portion of data (called a page or segment) in main memory with a portion of data on the disk.

DOS does not perform swapping, but most other operating systems, including OS/2, Windows, and Unix do. Swapping is often called paging or Virtual memory.

##### **(1) Windows example**

Virtual memory has been a feature of Microsoft Windows since Windows 3.1 in 1991. 386SPART.PAR (WIN386.SWP on Windows 3.11 and Windows for Workgroups) is a hidden file created by Windows 3.1 as a virtual memory swap file. It is generally found in the root directory, but it may appear elsewhere (typically in the WINDOWS directory). Its size depends on how much virtual memory the system has under Control Panel - Enhanced under "Virtual Memory." If a user moves or deletes this file, Windows will BSOD (Blue Screen of Death) the next time it is started with "The permanent swap file is corrupt" and ask the user if they want to delete the file (It asks whether or not the file exists).

Windows 95 uses a similar file, except it is named WIN386.SWP, and the controls for it are located under Control Panel - System - Performance tab - Virtual Memory. Windows automatically sets the page file size to 1.5 x physical memory. This page file is located at C:\pagefile.sys on all NT - based versions of Windows (including Windows 2000 and Windows XP). If you run memory intensive applications on a low physical memory system it is preferable to manually set the size to a value higher than default. Additionally, if the size of the swap file will prevent it from being dynamically resized by Windows. This resizing causes the file to become fragmented, resulting in reduced performance. This page file cannot be defragmented by Windows' built-in defragmenting tools, such as ntfsdefrag.

##### **(2) Virtual Memory in Linux**

In Linux operating system, it is possible to use a whole partition of the HDD for virtual memory. Though still possible to use a file for swapping, it is recommended to use a separate partition, because this eliminates chances of fragmentation, which reduces the performance of swapping. A swap area is created using the command mkswap filename/device , and may be turned on and off using the commands swapon and swapoff, respectively, accompanied by the name of the swap file or the swap partition.

In order to additionally increase performance of swapping, it is advisable to put the swap partition at the beginning of the HDD, because the transfer speed there is somewhat higher than at the end of the disk. There were also some successful attempts to use the memory located on the videocard for swapping. Modern videocards often have 128 or even 256 megabytes of RAM.

#### **67.Minimum Requirements for vCenter Server**

##### **■CPU – 2 CPUs**

Processor – 2.0GHz or faster Intel or AMD processor. Processor requirements might be higher if the database runs on the same machine.

**■Memory – 3GB RAM.** Memory requirements might be higher if the database runs on the same machine.

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vCenter Server includes a service called VMware VirtualCenter Management Webservices. This service requires 128MB to 1.5GB of additional memory. The VirtualCenter Management Webservices process the required memory at startup.

■Disk storage – 2GB. Disk requirements might be higher if the database runs on the same machine.

Microsoft SQL Server 2005 Express disk requirements – Up to 2GB free disk space to decompress the

installation archive. Approximately 1.5GB of these files are deleted after the installation is complete.

■Networking – Gigabit connection recommended.

See your database documentation for the hardware requirements of your database. The database requirements are in addition to the vCenter Server requirements if the database and vCenter Server are on the same machine.

## **68.Minimum Requirements for the vSphere Client**

■CPU – 1 CPU

■Processor – 266MHz or faster Intel or AMD processor (500MHz recommended).

■Memory – 200MB RAM

■Disk Storage – 1GB free disk space for a complete installation, which includes the following components:

■Microsoft .NET 2.0

■Microsoft .NET 3.0 SP1

■Microsoft Visual J#

■vSphere Client 4.0

■vSphere Host Update Utility 4.0

You must also have 400MB free on the drive that has your %temp% directory.

If all of the prerequisites are already installed, 300MB of free space is required on the drive that has the %temp% directory, and 450MB is required for the vSphere Client 4.0.

■Networking – Gigabit connection recommended.

32-Bit or 64-Bit Operating System for vCenter Server

When you have up to 200 hosts, you can use a 32-bit Windows operating system, but a 64-bit Windows operating system is preferred. When you have 200–300 hosts, a 64-bit Windows operating system is required.

## **69.What is Vcenter Server?**

VMware vCenter Server, formerly known as VirtualCenter, is the centralized management tool for the suite. VMware vCenter Server allows for the management of multiple ESX servers and virtual machines from different ESX servers through a single console application.

## **70.Difference between HA and Vmotion?**

VMotion and HA are not related and are not dependants of each other. DRS has a dependency on vMotion but not HA. HA is used in the event that a host fails you can have your virtual machines restart on another host in the cluster. VMotion allows you to move a virtual machine from one host to another while it is running without service interruption. Ideally you will utilize VMotion, HA and DRS within your cluster to achieve balanced VI environment.

so HA fail over is not really seamless ? since you mentioned it has virtual machines restart on another host in the cluster?

no, your VM's will go down if there is a host failure and then HA will restart them on another ESX Host in the cluster. This is where DRS will take over and start to balance out the load across the remaining ESX hosts in the cluster using vmotion.

## **71. What is VMotion?**

VMware VMotion enables the live migration of running virtual machines from one physical server to another with zero downtime, continuous service availability, and complete transaction integrity. It is transparent to users.

VMotion lets you:

Automatically optimize and allocate entire pools of resources for maximum hardware utilization and availability.

Perform hardware maintenance without any scheduled downtime.

Proactively migrate virtual machines away from failing or underperforming servers.

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## 72. So how Does VMotion work?

First, the entire state of a virtual machine is encapsulated by a set of files stored on shared storage. The clustered Virtual Machine FileSystem (VMFS) allows multiple installations of ESX Server to access the virtual machine files concurrently.

Second, the active memory and precise execution state of the virtual machine is rapidly transferred over a high speed network. This allows the virtual machine to instantaneously switch from running on the source ESX Server to the destination ESX Server. VMotion keeps the transfer period imperceptible to users by keeping track of on-going memory transactions in a bitmap. Once the entire memory and system state has been copied over to the target ESX Server, VMotion suspends the source virtual machine, copies the state to the target ESX Server, and resumes the virtual machine on the target ESX Server. This entire process takes less than two seconds on a Gigabit Ethernet network.

Third, the networks used by the virtual machine are also virtualized by the underlying ESX Server. This ensures that even after the migration, the virtual machine network identity and network connections are preserved. VMotion manages the virtual MAC address as part of the process. Once the destination migration is activated, VMotion pings the network router to ensure that it is aware of the new physical location of the virtual MAC address. Since the migration of a virtual machine with VMotion preserves the precise execution state, the network identity, and the active network connections, the result is zero downtime and no disruption to users.

## 73. What is storage Vmotion?

Storage VMotion is similar to VMotion in the sense that "something" related to the VM is moved and there is no downtime to the VM guest and end users. However, with SVMotion the VM Guest stays on the server it resides on but the virtual disk for that VM is what moves. Thus, you could move a VM guest's virtual disk from one ESX server's local datastore to a shared SAN datastore (or vice versa) with no downtime for the users of that VM guest.

## 74. What is the requirement for Vmotion?

Shared Storage

Shared VMFS volume

Processor Compatability

The virtual machine configuration file for ESX Server hosts must reside on a VMFS.

VMotion does not currently support raw or undoable virtual disks or migration of applications clustered using Microsoft Cluster Service (MSCS).

VMotion requires a Gigabit Ethernet network between hosts.

VMotion requires a private Gigabit Ethernet migration network between all of the VMotion-enabled managed hosts. When VMotion is enabled on a managed host, configure a unique network identity object for the managed host and connect it to the private migration network.

## 75. Port used in VCenter Server?

HTTPS – 443

HTTP – 80

Vcenter Diagnostic Port(TCP/IP) – 8083

Vcenter Port(TCP/IP) – 902

Vcenter Heartbeat Port(UDP) – 902

## 76. Which version of tomcat used in Vcenter 4?

Its uses Tomcat 6

## 77. What port numbers must be open for SRM and VirtualCenter / vCenter Server?

VMware VirtualCenter / vCenter Server:

80 (HTTP)

443 (HTTPS)

22 (SSH)

902 (VMware)

8096 (Tomcat)

VMware Site Recovery Manager:

80 (HTTP)

8095 (SOAP Listen)

8096 (HTTP Listen)

9007 (API Listen)

9008 (HTTP Listen)

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78.

**NEW Topic: Snapshot timeouts and failures.**

Virtual machine snapshot deletion can fail for several reasons. However, the removal/deletion is called 'after' the 3rd party backup has completed. If a snapshot removal fails to respond to VC in the expected time, the VC will throw a 'timeout'. This will leave a "ConsolidatedHelper" snapshot on the VM and must be removed before another backup starts.

Possible reasons for snapshot failure.

**1) Busy VM I/O.**

Exchange Server, Databases, Domain Controller etc. Microsoft Knowledge

Base article 888794 (<http://support.microsoft.com/kb/888794>)

These VMs do not react well to have their I/O quiesced during snapshotting.

Disable LGTO\_SYNC driver <http://kb.vmware.com/kb/5962168>

Install the Microsoft VSS driver

[http://www.vmware.com/support/vi3/doc/vi3\\_vcb15\\_rel\\_notes.html#vss\\_quiescing](http://www.vmware.com/support/vi3/doc/vi3_vcb15_rel_notes.html#vss_quiescing)

VSS Quiescing Consolidated Backup now uses VSS for quiescing on ESX Server

3.5 Update 2 hosts when backing up Windows Server 2003, Vista, and Windows

Server 2008 virtual machines. To use this feature, VSS components must be

installed on the virtual machine as part of updated VMware Tools. The VSS

components in the tools perform application-level quiescing on Windows

Server 2003 and file system-level quiescing on Windows Vista and Windows

Server 2008 virtual machines.

Consolidated Backup continues to uses SYNC driver for quiescing on pre-ESX  
Server 3.5 Update 2 hosts.

**2) Space on volume.**

If a snapshot has grow too large during the backup, it can fail to remove  
because extra space is needed on removing 'layered' snapshots. This can  
happen if there is existing snapshots prior to another backup call.

**3) Busy vmfs volumes.**

If several Vms on the same volume are trying to remove their snapshots at  
the same time, then 'reservation' conflicts can occur and halt the removal.

VMware backup recommendations suggest staggering VM backup schedules to  
avoid to many snapshots on the same luns.

**4) Service Console Busy**

If the mgmt services memory on the ESX server is low, this can inhibit  
the snapshot removal process and either fail the removal or cause a long  
delay resulting in the timeout response from VC.

i) You can increase the Service Console memory to 800MB. Requires reboot.

<http://kb.vmware.com/kb/1003501>

ii) You can increase the VC timeout to 600. Edit>Client Settings. Use

Custom Value seconds 600

<http://kb.vmware.com/kb/1004790>

**5) SAN latency issues**

If luns are not responding or scsi commands are slow to reply, the ESX  
may fail to snapshot removal.

**6) Scripted**

Customized scripts that do not allow for scheduling, multiple vmfs

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snapshotting, or deletion. Edit the Remote Command Timeout in Client>Setting  
on the VC GUI to 600.

I would not quickly dismiss using VCB, as it is only a backup enabler. If any solution, be it manual or 3rd party leverages the ESX Snapshot mechanism, it has to concede/conform to the known snapshotting limitations.

## New Topic :- Troubleshooting Disk and Datastore Related Issues

### 1.Troubleshooting a VMFS resource volume that is corrupted

The event indicates the reported VMFS volume is corrupted.

#### Example

If 4976b16c-bd394790-6fd8-00215aaf0626 represents the UUID and san-lun-100 represents the ass volume label, you see:

For Event: vmfs.lock.corruptondisk

Volume 4976b16c-bd394790-6fd8-00215aaf0626 (san-lun-100) may be damaged on disk. Corrupt lc detected at offset 0

For Event: vmfs.resource.corruptondisk

Volume 4976b16c-bd394790-6fd8-00215aaf0626 (san-lun-100) may be damaged on disk. Resource metadata corruption detected

#### Impact

The scope of the corruption may vary. It might affect just one file or corrupt the whole volume. Do not use the affected VMFS any longer.

#### Solution

To recover from this issue:

Back up all data on the volume.

Run the following command to save the VMFS3 metadata region and provide it to VMware customer :  
dd if=/vmfs/devices/disks/<disk> of=/root/dump bs=1M count=1200 conv=notrunc

where <disk> is the partition that contains the volume. If you have a spanned volume, <disk> is the partition.

This provides information on the extent of the volume corruption and can assist in recovering the vol

### 2.VMFS Lock Volume is Corrupted

#### Details

You may observe the following events within the /var/log/vmkernel logs within your VMware ESX host:  
Volume 4976b16c-bd394790-6fd8-00215aaf0626 (san-lun-100) may be damaged on disk. Corrupt lc detected at offset 0

**Note:** In this example 4976b16c-bd394790-6fd8-00215aaf0626 represents the UUID of the VMFS data and san-lun-100 represents the name of the VMFS datastore.

You may observe the following events within the /var/log/vmkernel logs within your VMware ESX host:  
Resource cluster metadata corruption detected  
Volume 4976b16c-bd394790-6fd8-00215aaf0626 (san-lun-100) may be damaged on disk.

**Note:** In this example 4976b16c-bd394790-6fd8-00215aaf0626 represents the UUID of the VMFS data and san-lun-100 represents the name of the VMFS datastore.

#### Solution

The events indicate that the reported VMFS volume is corrupt. The scope and the cause of the corruption may vary. The corruption may affect just one file or the entire volume.

Create a new datastore and restore any information that may have been compromised to the new data from existing backups. Do not use the corrupt VMFS datastore any longer.

**Note:** If some information is still accessible on the datastore that is reportedly corrupt, you may attempt to migrate the information off of the datastore with the use of the vCenter migrate feature, vmkfstools, datastore browser. If you are able to migrate any information off of the corrupt datastore, validate the information to ensure that it has not been affected by the corruption.

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### Determining the cause of the corruption

If you would like assistance in determining the cause of the corruption, VMware technical support can assist in a best effort capacity.

To collect the appropriate information to diagnose the issue:

**Note:** More information about support service terms and conditions can be found here.

Log into the service console as root.

Find the partition that contains the volume. In the case of a spanned volume, this is the head partition. Use the following command to find the value of the partition:

```
vmkfstools -P /vmfs/volumes/<volumeUUID>
```

For example, run the following command to find the partition for 4976b16c-bd394790-6fd8-00215aa

```
# vmkfstools -P /vmfs/volumes/4976b16c-bd394790-6fd8-00215aaaf0626
```

File system label (if any): san-lun-1000

Mode: public

Capacity 80262201344 (76544 file blocks \* 1048576), 36768317440 (35065 blocks) avail

UUID: 49767b15-1f252bd1-1e57-00215aaaf0626

Partitions spanned (on "lvm"): naa.60060160b4111600826120bae2e3dd11:1

Make note of the first device listed in the output for the Partitions spanned list. This is the value for the partition. In the above example, the first device is:

naa.60060160b4111600826120bae2e3dd11:1

Using the value from step 3, run the following command to save the vmfs3 metadata region and provide to VMware customer support:

```
dd if=/vmfs/devices/disks/<disk:partition> of=/root/dump bs=1M count=1200 conv=noTrunc
```

**Note:** The variable <disk:partition> is the value recorded in step 3.

**Caution:** The resulting file is approximately 1200 MB in size. Ensure that you have adequate space at the destination. The destination in the above example is the /root/ folder. To compress the file, you can use the open source utility called gzip. The following is an example of the command:

```
# gzip /root/dump
```

**Note:** For more information on the gzip utility, type man gzip at the console.

Create a new support request. For more information, see How to Submit a Support Request. Upload the resulting file along with a full support bundle to VMware technical support.

## 3.Troubleshooting virtual machine performance issues

### Symptoms

The guest operating system boots slowly

Applications running in virtual machines perform poorly

Applications running in virtual machines take a long time to launch

Applications running in virtual machines frequently become unresponsive

Multi-user services have long transaction times or can handle less simultaneous users than expected

### Purpose

This article discusses identifying and resolving various issues that affect virtual machine performance running on VMware hosted products.

### Resolution

Validate that each troubleshooting step below is true for your environment. The steps will provide instructions or a link to a document, for validating the step and taking corrective action as necessary. The steps are ordered in the most appropriate sequence to isolate the issue and identify the proper resolution. Please skip a step.

Verify that the reduced performance is unexpected behavior. When a workload is virtualized it is common to see some performance reduction due to virtualization overhead. Troubleshoot a performance problem if you experience the following conditions:

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The virtual machine was previously working at acceptable performance levels but has since degraded

The virtual machine performs significantly slower than a similar setup on a physical computer

You want to optimize your virtual machines for the best performance possible

Verify that you are running the most recent version of the VMware product being used. For download information, see the VMware Download Center.

Check that VMware Tools is installed in the virtual machine and running the correct version. The version in the toolbox application must match the version of the product hosting the virtual machine. To access the toolbox, double-click the VMware icon in the notification area on the task bar, or run vmware-toolbox on Linux. Some VMware products indicate when the version does not match by displaying a message in the console view. For more information on installing VMware Tools

**4.** Review the virtual machine's virtual hardware settings and verify that you have provided enough resources to the virtual machine, including memory and CPU resources. Use the average hardware requirement typically used in a physical machine for that operating system as a guide. Adjustments to the setting are required to factor-in the application load: higher for larger loads such as databases or multi-user servers and lower for less intense usage such as casual single-user application like e-mail or web clients.

**5.** Ensure that any antivirus software installed on the host is configured to exclude the virtual machine from active scanning. Install antivirus software inside the virtual machine for proper virus protection. For more information, see Investigating busy hosted virtual machine files (1003849).

## **Investigating busy hosted virtual machine files**

### **Symptoms**

Unable to open file.

Insufficient permissions.

Virtual machine runs slowly.

Virtual machine becomes unresponsive.

Virtual machine crashes.

Virtual machine file corruption.

Guest operating system data corruption.

Cannot power on virtual machine.

Unable to successfully perform snapshot operations.

Unexpected behaviour in guest operating system.

### **Purpose**

This article guides you through determining if problems being experienced by a virtual machine are related to other software on your host trying to access virtual machine files. The article also offers means of avoiding this situation.

### **Resolution**

To ensure optimum performance and data integrity, VMware requires exclusive disk access to all of the files that comprise the resources of a virtual machine while it is powered on. If another program accesses these files at the wrong moment, unexpected results may occur.

For information on determining the location of virtual machine files, see Locating a hosted virtual machine file (1003880).

The following are the types of software and activities that may interfere with normal virtual machine operation, and the steps to take in order to ensure that they do not cause a conflict:

Antivirus software. Exclude all of the virtual machine files from manual, automatic, and real time scanning.

Limit antivirus scanning of virtual machines to the guest operating system inside the virtual machine. An antivirus scan of the virtual machine files is required ensure that the virtual machine is powered off prior to the scan.

Backup software. Exclude all virtual machine files from host file backups. If a virtual machine needs to be backed up it can be done from the guest operating system inside the virtual machine. If the virtual machine files themselves need to be backed up ensure that the virtual machine is powered off prior to the backup. Disk utility software. Do not run host disk integrity checks, defragmentation routines, or anything else that involves writing to the disk or otherwise accessing files, on any of the virtual machine's files while the virtual machine is powered on.

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Other software. This includes spyware, P2P applications, and anything else that may be accessing on virtual machine's files. Operations that make use of the files include reading, scanning, copying, and Exclude the virtual machine's files from any of these operations.

Editing of virtual machine files. Do not edit any of the virtual machine's files while it is powered on.

**6.** Check the storage sub-system on the host and verify that it is configured for optimal performance information, see Troubleshooting hosted disk I/O performance problems (1008885).

## Troubleshooting hosted disk I/O performance problems

### Symptoms

The virtual machine performs very slowly: applications start slowly or take a long time to appear, or operating system takes a long time to boot.

Virtual machines stop responding for long periods of time.

Windows guests fail with STOP 0x77 KERNEL\_STACK\_INPAGE\_ERROR, or the event log contains Error from the source: Disk.

Linux guests become nonresponse or lock-up.

The vmware.log file contains lines similar to:

Command WRITE(10) took 10.858 seconds (ok)

Command READ(10) took 1.173 seconds (ok)

SCSIO: RESET BUS

### Resolution

These symptoms may indicate that there is a disk performance issue on the underlying hardware. With VMware hosted products, consider that both the virtual machines and host operating system often share the same disk resources and hardware.

Below are some suggestions you can implement to improve disk I/O performance issues:

### Suggestion

#### Details

Using non-growable or preallocated VMDK disks

When creating a production virtual machine, VMware recommends that the virtual hard disk be configured in preallocated mode. If existing disks are not in preallocated mode, use the vmware-vdiskmanager tool to convert the disks. Consult the product's User Guide for more information.

Removing or reducing snapshots

When a snapshot is created, the VMware product produces an additional delta file. Each successive snapshot creates an additional file. When a disk operation is performed within the guest, the disk I/O is redirected through the host to the snapshot chain. The host must parse each snapshot delta file in the chain. This produces additional disk overhead on the host because more than one file must be opened and processed to recreate the I/O data for the guest operating system. For best performance, remove all snapshots in the guest operating system or store performance-sensitive data on an independent virtual disk. Consult the product's User Guide for information on configuring independent virtual disks.

Using separate physical and virtual hard disks

Install the host operating system onto a separate hard disk than the virtual machines. Also store the swap file or swap partition on a different drive than the host operating system.

Optimizing the drive

Run disk defragmentation software on the host and in the guest operating system. Fragmentation of VMDK files and within the guest can create a double the impact from fragmentation.

Using partitions

Implementing partitions inside the guest operating system or host can improve performance by creating fragmentation boundaries and can reduce further fragmentation. For example, consider storing the system and often modified files of the operating system away from large files such as database or Microsoft Exchange stores by using a separate partition. Also consider storing the virtual machine files (.VMDK files) on their own partition or disk on the host.

Using RAID or adjusting the RAID configuration or adding disks to the array

Certain RAID configurations can impact read or write performance positively and negatively. When using a RAID 5 configuration, consider adding more disks to the array. This generally improves the performance.

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the array. Using mirroring can improve read performance but may degrade write performance. If write performance is primarily impaired, consider a different RAID type to host the virtual machine.

#### Check for disk encryption

Disk encryption can reduce disk performance. Try moving the virtual machine to a non-encrypted volume if performance has improved.

Ensure the existing physical hardware is healthy and performing as expected

Often disk problems such as bad sectors or failing controllers can impact performance because I/O and cluster auto-recovery can cause sudden interruptions in I/O operations to the device. Perform a hard file system diagnostic to verify if this is impacting performance. For more information, see Performing a check (1004003).

#### Upgrade or choose different physical disk hardware

It is important to consider the performance characteristics of the physical disk hardware. In general, hardware RAID and independent disk controllers perform better than software RAID and integrated disk controllers. When an independent controller is used, often it is possible to configure or increase the cache memory to yield better performance. Consult the hardware vendor for more information. Typically older hardware performs slower than newer hardware. Hard disks used in laptop or notebook computers are far slower than drives used in desktop computers. SCSI hard disks typically perform much faster than drives used in regular desktops and notebooks. Hard disks connected over USB typically perform slower than attached local disks (such as IDE, SATA, and SCSI). Flash-based USB thumb drives typically perform slower than hard drives.

Review the performance specifications provided by the disk manufacturer on critical metrics such as spindle speed, and average seek time (latency), burst data transfer rates. Higher spindle speeds, lower seek times, and higher transfer rates perform better. When comparing flash-based drives, observe both the read and write transfer performance ratings.

#### Edit the virtual machine settings to reduce I/O usage by using more host memory

Adding the following settings to a virtual machine can reduce the I/O load on the hard disk, however these adjustments require additional memory on the host. Only add these settings if there is sufficient free memory on the host to accommodate all the memory allocated to the virtual machine, otherwise you may cause a memory starvation condition that can reduce performance of all the running virtual machines or possibly affect the host operating system. Use these settings with caution.

Open the .VMX file for the affected virtual machine while it is powered off. Add the following lines to the file using a text editor.

**Note:** If you are using VMware Server, you may need to restart the VMware Authorization Service (vmware-authd) for changes to take effect.

```
MemTrimRate = "0"  
mainMem.useNamedFile=false  
sched.mem.pshare.enable = "FALSE"  
prefvmx.useRecommendedLockedMemSize = "TRUE"
```

**7.** Verify that there are enough free resources on the host to satisfy the requirements of the virtual machine. In VMware hosted products resources must be shared by both the host operating system and all running guests. For more information, see Investigating hosted virtual machine resources (1003848).

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## Investigating hosted virtual machine resources

### Symptoms

A virtual machine:

Cannot be powered on.

Cannot be resumed.

Cannot be suspended.

Cannot perform a snapshot operation.

A guest operating system or a host operating system with powered on virtual machines:

Has stopped responding.

Has performance problems.

Is slow.

Is experiencing excessive disk use.

### Purpose

This article guides you through the process of determining if a lack of host resources is causing problems with virtual machine operation. A lack of host resources can also cause problems on a virtual machine's operating system and on a host computer where a VMware product is installed and virtual machines are powered on. The steps outlined here eliminate the possibility that the problem is related to insufficient resources.

### Resolution

To determine if your host has enough resources to support your virtual machines, consider memory, space, and CPU. For each of these resources:

**Note:** The following procedures must all be done when the affected virtual machine is powered off.

**Note:** If you perform a corrective action in any of the following steps, confirm if you are still experiencing the problem.

Total the amount of the resource assigned to all virtual machines that can be powered on at the same time. If different virtual machines can be powered on at different times use the highest total.

**Note:** The amount of disk space assigned to a virtual machine is the combined maximum size of all of its virtual drives. If you use snapshots with a virtual machine, take into account that each snapshot may require as much disk space as the combined size of all of the virtual machine's virtual drives. Each snapshot requires very little disk space but its disk space requirements increase over time.

**Note:** There is no direct way of modifying the amount of CPU assigned to a virtual machine. When considering virtual machine performance, evaluate the CPU needs of the guest operating system and applications.

Add to this the amount of the resource required by your host for its own operations.

If this results in a number that is not less than the amount of the resource available on your host, do the following:

Reduce the number of virtual machines powered on at the same time on this host.

Reduce the amount of this resource assigned to the virtual machines.

Increase the amount of this resource installed on the host.

**Note:** To adjust virtual CPU assignment if your host has multiple CPUs or CPU cores, it is possible to move processor affinity among virtual machines so that one or more CPUs are not used by any other virtual machine. For more information, see [Associating a Virtual Machine With a Particular Host Processor](#) (1). Alternatively, the host hardware must be upgraded to one with faster or more CPUs.

## Associating a Virtual Machine With a Particular Host Processor

### Details

I have a multiprocessor or hyperthreaded processor system, but my virtual machine shows only one processor. Why is that?

### Solution

VMware products run on symmetric multiprocessor (SMP) systems, also referred to as multiprocessor specification (MPS) systems. However, the environment provided within each virtual machine is a uniprocessor system.

If you have multiple virtual machines running at the same time, some use one processor and some use another, thus taking advantage of the multiple processors in the system.

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## Associating a Virtual Machine with a Particular Processor on a Multiprocessor/Hyperthreaded Processor Host

If your host is a multiprocessor system (multiple physical processors) or if the processor or processor is hyperthreaded (where each physical processor is split into two or more logical processors), you can associate each virtual machine with a specific processor on the host.

By default, each virtual machine is associated with all physical and logical processors on the host. The machine uses whichever processor is available at the time it needs to execute instructions.

To associate a virtual machine with a specific physical or logical processor on the host, do the following:

**Note:** These steps apply to virtual machines on Windows hosts and on Linux hosts with 2.6.x kernels. In a text editor, open the virtual machine's configuration file (.vmx).

Add the following line for each processor with which you do **not** want to associate the virtual machine:  
processor# .use = FALSE

where # is the number of the processor on the host, the count beginning at 0.

On a Windows host, processors are listed in the registry. To view the processors, complete the following steps.

Choose **Start>Run**, then type regedit32. The Windows registry opens.

In the registry, choose **HKEY\_LOCAL\_MACHINE>HARDWARE>DESCRIPTION>**

**System>CentralProcessor**. Each CPU on the host is listed here, numbered starting with 0.

On a Linux host, processors are listed in /proc/cpuinfo.

Typically, on a Windows or Linux 2.6.x kernel system with multiple hyperthreaded processors, the physical processors are numbered first, followed by the logical processors. Keep this numbering system in mind if you move the virtual machine to another host with a different number of physical or logical processors.

**Caution:** GSX Server 3.1 and earlier and Workstation for Linux do not honor the processor# .use option. Thus, a virtual machine cannot be associated with a specific CEC while on a Linux host, and the work discussed here does not work. Keep this in mind if you move a virtual machine from a GSX Server or Workstation Windows host to a Workstation or older GSX Server Linux host.

- For more information on checking free host memory, see Investigating operating system memory usage (1004014).

## Investigating operating system memory usage

### Purpose

This article describes how to determine memory usage. Memory usage information is useful in addressing problems encountered with an operating system as a result of a process taking up excessive memory in an operating system that has insufficient free memory for correct operation. Memory usage problems can cause slow operating system performance, slow application performance, and the inability of an application to continue to run. In some instances, these problems can include an operating system crashing or failing to respond.

### Resolution

The methods of determining memory usage differ between operating systems. Refer to the section that matches your operating system.

**Note:** If you determine that you have insufficient memory, you must limit the amount of concurrent processes or increase the amount of memory. If your operating system has been installed on a virtual machine, you can increase the amount of memory assigned to the virtual machine. For more information, see Increasing the amount of memory assigned to a virtual machine (1004059).

### Windows

To determine memory usage:

Run the Task Manager:

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Click **Start>Run**.

Type taskmgr.

Click **OK**.

**Note:** If you are running a version of Windows where this command does not work, you must find an alternate method of launching the Task Manager or determining the amount of free memory.

Click the **Performance** tab. The memory usage is displayed.

## Linux

**Note:** The exact procedure may differ between distributions of Linux. If the following commands do not work for you, consult the manual for your distribution of Linux.

To determine memory usage:

Open a shell prompt. For more information, see [Opening a command or shell prompt \(1003892\)](#).

Type free -mt and press Enter. The memory usage is displayed.

## Mac OS

To determine memory usage:

Press Shift + Command + U.

Double-click **Activity Monitor**.

Click the **System Memory** tab. The memory usage is displayed.

For more information on checking free disk space, see [Investigating operating system disk space \(1003892\)](#).

## Investigating operating system disk space

### Purpose

This article guides you through determining disk usage. Disk usage information is useful in addressing problems encountered with an operating system as a result of a lack of disk space. Problems related to disk usage can include slow operating system performance, slow application performance, and the inability of applications to load or continue to run. In some cases, these problems can include an operating system unexpectedly stopping or failing to respond.

### Resolution

The methods of determining disk usage differ between operating systems. Refer to the section below that matches your operating system.

**Note:** If you determine that you have insufficient disk space you must free up some space or increase the size of your hard disk. If your operating system has been installed on a virtual machine, you can increase the size of its virtual disk. For more information, see [Increasing the size of a virtual disk \(1004047\)](#).

## Windows

**Note:** The exact procedure differs between versions of Windows. If one procedure does not work try the other. If neither method works, consult the manual for your version of Windows.

To determine disk usage from the user interface:

Double-click the **My Computer** icon.

Right-click the entry for your local disk.

Click **Properties**. Disk usage is displayed graphically.

To determine disk usage from a command line:

Open a command prompt. For more information, see [Opening a command or shell prompt \(1003892\)](#).

Type dir c:\ and press Enter. Free disk space is displayed on the last line of output.

**Note:** If the local disk being investigated is not c:, replace c: with its drive letter.

## Linux

**Note:** The exact procedure may differ between distributions of Linux. If the following commands do not work for you, consult the manual for your distribution of Linux.

To determine disk usage from a shell prompt:

Open a shell prompt. For more information, see [Opening a command or shell prompt \(1003892\)](#).

Type df -vh and press Enter. Disk usage is displayed for each file system.

## Mac OS

To determine disk usage from the user interface:

Press Shift + Command + U.

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Double-click **Activity Monitor**.

Click the **Disk Usage** tab. Disk usage is displayed graphically.

To determine disk usage from a shell prompt:

Open a shell prompt. For more information, see [Opening a command or shell prompt \(1003892\)](#).

Type `df -H` and press Enter. Disk usage is displayed for each file system.

For more information on checking free host CPU, see [Investigating operating system CPU usage \(10](#)

## Investigating operating system CPU usage

### Purpose

This article guides you through determining CPU usage. CPU usage information is useful in addressing problems encountered with an operating system as a result of a process taking up excessive CPU cycles. CPU usage problems result in slow operating system performance.

### Resolution

The methods of determining CPU usage differ between operating systems. Refer to the section that applies to your operating system.

**Note:** If you determine that you have insufficient CPU you must limit the amount of concurrently running processes or increase the amount of CPU. If your operating system has been installed on a virtual machine running under an ESX Server host, see [Increasing the amount of CPU assigned to a virtual machine \(1004060\)](#). If this is a virtual machine running under a different product there is no direct way of increasing the amount of CPU assigned. If your host has multiple CPUs or CPU cores, it is possible to set processor affinity among virtual machines so that one or more CPUs are not used by any other virtual machine. For more information, see [Associating a Virtual Machine With a Particular Host Processor \(110\)](#). Alternative host hardware must be upgraded or the virtual machine moved to a different host.

If this is a virtual machine, you can increase the amount of memory assigned to the virtual machine. For more information, see [Increasing the amount of memory assigned to a virtual machine \(1004059\)](#).

### Windows

To determine CPU usage:

Run the Task Manager:

Click **Start > Run**.

Type `taskmgr`.

Click **OK**.

**Note:** If you are running a version of Windows where this command does not work, you must find an alternate method of launching the Task Manager or determining the CPU usage.

Click the **Performance** tab. The CPU usage is displayed.

**Note:** Click the **Processes** tab to get detailed information about the CPU usage of each process. Click the **CPU** column to sort the results by the amount of CPU each process is using.

### Linux

**Note:** The exact procedure may differ between distributions of Linux. If the following commands do not work, consult the manual for your distribution of Linux.

To determine CPU usage:

Open a shell prompt. For further information, see [Opening a command or shell prompt \(1003892\)](#).

Type `top` and press Enter. The CPU usage is displayed.

### Mac OS

To determine memory usage:

Press Shift + Command + U.

Double-click **Activity Monitor**.

Click the **CPU** tab. The CPU usage is displayed.

**Note:** Click the **% CPU** column to sort these results by the amount of CPU each process is using.

**8.** Disable the CPU power management features on the host. In some cases, these features can cause a performance issue with virtual machines. For more information, see [Virtual Machine Clock Reports Time Unpredictably on Multiprocessor Systems \(2041\)](#).

## Virtual Machine Clock Reports Time Unpredictably on Multiprocessor Systems

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### Details

The clocks in my virtual machines run in an unpredictable manner. Sometimes they run too quickly, sometimes they run too slowly, and sometimes they just stop. What is happening?

### Solution

If you are running VMware desktop virtualization products on a multiprocessor system in which the timestamp counters (TSCs) do not remain synchronized between all processors, the operating system clock in each virtual machine can perform unpredictably. In this context, "multiprocessor" includes systems with multiple cores but only one processor socket.

This problem can occur on some 64-bit AMD systems and on some Intel systems. See the relevant information described in the following sections:

64-bit AMD Systems      Intel Systems

### 64-bit AMD Systems

This problem can occur on some 64-bit AMD multiprocessor (including multicore) systems. If you run VMware desktop virtualization products on one of these systems and the clocks in your virtual machines are performing unpredictably, VMware recommends you apply the workaround described below.

Timestamp counters (TSCs) on 64-bit AMD systems should ideally remain synchronized because these systems run all CPUs from a common clock oscillator. However, some 64-bit AMD systems have power management features that can cause the TSCs on some processor cores to lose time in relation to other cores.

You might be able to disable these features:

In your system's BIOS setup windows, look for settings labeled **PowerNow** or **Cool'N'Quiet**, and disable them.

If you are running a Linux host operating system, look for a system daemon or applet called cpufreq, cpuspeed, powernowd, cpudyn, speedy, or cpufreq, and disable it. For example, on some systems the command service cpuspeed stop might work. The instructions to disable the daemon or applet found on your system vary. Refer to your system's documentation for more information.

If you require these features or you cannot find a way to disable them, you need to assign each of your virtual machines to a subset of processor cores on which the TSCs do remain synchronized. In some cases you may need to do this even after turning off power management in your system's BIOS; this occurs when the system only partially disables the power management features involved. See <http://kb.vmware.com/kb/1754> for more information.

## How to Run VMware Hosted Products on Systems on Which TSCs Are Not in Sync

### Details

How can I work around problems on multiprocessor systems on which the timestamp counters do not sync, such as IBM x-Series systems and some 64-bit AMD systems?

### Solution

You must perform two actions.

Disable a feature in some versions of VMware products that attempts to resynchronize the TSCs whenever a virtual machine is started. See the section Avoiding Forced TSC Resynchronization, below.

Assign each virtual machine to a subset of processors whose TSCs are synchronized with each other. See the section Assigning a Virtual Machine to Processors with Synchronized TSCs, below.

### Avoiding Forced TSC Resynchronization

On a Windows host operating system, you may encounter a problem with unwanted resynchronization of timestamp counters (TSCs) when a virtual machine starts. The workaround is to add the following line to the global configuration file:

host.TSC.noForceSync = TRUE

The global configuration file is normally found at:

C:\Documents and Settings\All Users\Application Data\VMware\VMware Workstation\config.ini for VM Workstation

C:\Documents and Settings\All Users\Application Data\VMware\VMware GSX Server\config.ini for GSX Server. If this file does not exist, see <http://kb.vmware.com/kb/1754>.

## Creating and editing config.ini on Windows Hosts

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### Details

Some knowledge base articles tell me to edit the config.ini file, but I can't find it. Where is it? How do I fix it if it doesn't exist? <br style=""> <br style="">

### Solution

The config.ini file may not exist if you have not changed the default configuration setting from the **Edit Preferences** menu.

To see if the file already exists, look for it at C:\Documents and Settings\All Users\Application Data\VMware\VMware ProductName, where VMware ProductName is the name of the product you are using.

### Notes:

Make sure you are looking on the Windows **host** on which you have installed the VMware software. You should not look for this file in your virtual machine. On Vista and newer versions of Windows, look for it at C:\Program Data\VMWare\<VMWare Product>\Config.ini

**Note:** On Vista and Windows 7 type systems, the C:\Program Data\VMware\<VMware Product>\ folder is normally hidden by default. You will need to go to Control Panel >> Appearance and Personalization >> Folder Options >> Show hidden files and folders, and then check the "Show hidden files, folders and drives" button in order to make this folder viewable/accessible.

To create the file if it does not exist, do one of the following:

Create a new, empty text file named config.ini in the location above.

**Caution:** Use a text editor like Notepad. Do not use Word or Wordpad, because these editors create characters in the text file that render the configuration settings that you add unreadable.

Make a configuration change from the menu.

From the **Edit** menu of your virtual machine, choose **Preferences > Memory**.

Note the current value that appears for **Reserved Memory**.

Enter a new value for **Reserved Memory** and click **OK**.

Confirm that a config.ini file now exists in the location above.

Repeat steps 1-3 and change **Reserved Memory** back to its original value.

**Note (8/15/07):** "Avoiding Forced TSC Resynchronization" is no longer necessary for current versions of VMware products, because the default value for that option is now TRUE. But it doesn't hurt if you have set the option explicitly.

### Assigning a Virtual Machine to Processors with Synchronized TSCs

When a system has processors that have timestamp counters which are not all synchronized, the host operating system may move a virtual machine between two processors on which the timestamp counters are out of sync. This can cause the virtual machine clock to perform unpredictably. The clock may run too fast or too slowly, or may even stop at times.

On an affected IBM x-Series system or its derivatives, each NUMA node (or CEC, in IBM terminology) has processors whose TSCs are synchronized with each other, but the TSCs of different NUMA nodes are not synchronized. So this issue can be solved by assigning each virtual machine to run only on the processor of a single NUMA node.

On affected 64-bit AMD systems, depending on which power management features are in use, every processor core's TSC may be out of sync with the others. (In other cases, the two cores in each dual-processor may remain in sync.) If disabling power management does not solve this issue for you, it is necessary to assign each virtual machine to only one processor core.

The details of how to assign a virtual machine to a subset of processors depend upon whether you are running GSX Server 3.2 or Workstation 5.5, or an earlier version of GSX Server or Workstation.

### For Virtual Machines Running on a GSX Server 3.2, VMware Server 1.0, or Workstation 5.5 (and later versions)

These VMware products assign each virtual machine to a single NUMA node on an x440-class server based on one of the following host operating systems:

Windows Server 2003

Any Linux 2.6.x kernel

Linux 2.4.21 or later kernel

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When you power on a virtual machine, the VMware software by default assigns it to a NUMA node at

You can configure a virtual machine to run on a specific NUMA node if you prefer.

To assign a virtual machine to a specific NUMA node, complete the following steps.

Make sure the virtual machine is powered off.

In a text editor, open the virtual machine's configuration file (.vmx file).

Look for a line that starts with processors.NUMANode =. If the line does not exist, add it.

Change or set the value after the equal sign (=) to the number of the desired NUMA node. Put the quotation marks. For example, to assign the virtual machine to NUMA node 2, add the following line to the configuration file:

```
processors.NUMANode = "2"
```

To return this virtual machine to the default behavior, in which the VMware software assigns the virtual machine to a NUMA node at random, complete the following steps.

Make sure the virtual machine is powered off.

In a text editor, open the virtual machine's configuration file (.vmx file).

Delete the line that starts with processors.NUMANode =.

Also delete any lines that start with processor<n>.use (where <n> is any number). These lines may present if you previously applied the older workaround from GSX Server 3.1 and earlier or Workstation 5.0 and earlier, as described below.

In general, do not use the processor<n>.use option described below together with the processors.NL option. If both options are present in the configuration file, any processor<n>.use options are ignored.

If you are using GSX Server, VMware Server, or Workstation on a 64-bit AMD multiprocessor system, the VMware product does not assign each virtual machine to a subset of processor cores by default. If you want to limit this assignment to be done on your 64-bit AMD system, choose a specific processor core to which to assign each virtual machine, using the processor<n>.use options as described in the next section.

#### **For Virtual Machines Running on a Workstation 5.0 or Earlier Host, or on a GSX Server 3.1 or Earlier Host**

To work around this problem for systems running on Workstation 5.0 or earlier, or GSX Server 3.1 or earlier, choose one NUMA node for each virtual machine and associate the virtual machine with the processor assigned to that NUMA node. You can associate different virtual machines with different NUMA nodes; just make sure that no single virtual machine runs on multiple NUMA nodes. To associate a virtual machine with processors in one NUMA node, complete the following steps.

Make sure the virtual machine is powered off.

In a text editor, open the virtual machine's configuration file (.vmx file).

Add the following line for each processor with which you do not want to associate the virtual machine (where <n> is the number of the processor on the host):

```
processor<n>.use = FALSE
```

For example, you have an eight-processor host with processors 0 through 3 on NUMA node 0 and processors 4 through 7 on NUMA node 1, and there are two virtual machines on the host. To associate the first virtual machine with NUMA node 0, add the following lines to that virtual machine's configuration file:

```
processor0.use = FALSE  
processor1.use = FALSE  
processor2.use = FALSE  
processor3.use = FALSE
```

To associate the second virtual machine with NUMA node 1, add the following lines to that virtual machine's configuration file:

```
processor0.use = FALSE  
processor1.use = FALSE  
processor2.use = FALSE  
processor3.use = FALSE
```

If your host has four processors, they may either be located all in one NUMA node or be split between two NUMA nodes. If all the processors are located on the same NUMA node, this problem does not occur. If the processors are split between two NUMA nodes, add the following lines to the virtual machine's configuration file to associate it with NUMA node 0:

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processor2.use = FALSE

processor3.use = FALSE

Then add the following lines to the virtual machine's configuration file to associate it with NUMA node

processor0.use = FALSE

processor1.use = FALSE

**Caution:** On a Linux host, GSX Server 3.1 (and earlier) and Workstation 5.0 (and earlier) do not honor processor<n>.use option. You should not run GSX Server 3.1 and earlier, or Workstation 5.0 and earlier on a machine that uses Linux as the host operating system and that has multiple NUMA nodes on the TSCs are not synchronized. You need to upgrade to GSX Server 3.2 or Workstation 5.5.

**Caution:** The above examples assume that the GSX Server or Workstation host does not have hyperthreading enabled for its processors. For information about how hyperthreading affects which physical processor a virtual machine uses, read the next section.

#### **How Hyperthreading Affects the Way in Which a Virtual Machine Is Associated with a Processor on a NUMA Node**

When you enable hyperthreading on a host, the processor<n>.use option associates the virtual machine with a logical CPU <n>, which is now a logical processor.

Continuing with the example above, if you enable hyperthreading on an eight-processor host with two NUMA nodes, and you want to associate a virtual machine with NUMA node 0, add the following lines to the virtual machine's configuration file:

processor4.use = FALSE

processor5.use = FALSE

processor6.use = FALSE

processor7.use = FALSE

processor12.use = FALSE

processor13.use = FALSE

processor14.use = FALSE

processor15.use = FALSE

When hyperthreading is enabled, an eight-processor Windows host has sixteen logical processors, numbered as follows:

Physical CPU 0: logical CPU 0, 8

Physical CPU 1: logical CPU 1, 9

Physical CPU 2: logical CPU 2, 10

Physical CPU 3: logical CPU 3, 11

Physical CPU 4: logical CPU 4, 12

Physical CPU 5: logical CPU 5, 13

Physical CPU 6: logical CPU 6, 14

Physical CPU 7: logical CPU 7, 15

Each NUMA node includes the following logical processors:

NUMA node 0 includes logical CPUs 0, 1, 2, 3, 8, 9, 10, 11

NUMA node 1 includes logical CPUs 4, 5, 6, 7, 12, 13, 14, 15

In enabling or disabling hyperthreading, use caution when associating virtual machines with processors. When you enable hyperthreading on the host, you should modify each virtual machine's configuration file to associate the virtual machine with a logical processor for all the logical processors on the host.

However, disabling hyperthreading does not require you to modify the virtual machines' configuration files, as long as you do not make hardware changes to the host (such as adding or removing NUMA nodes or physical processors, or moving processors between NUMA nodes). GSX Server and Workstation ignore any processor<n>.use option where <n> is greater than the highest numbered processor available to the host. Thus, with hyperthreading disabled, the options that you added for the first hyperthread on each physical processor (CPUs 0 through 7 above) now apply to the physical processor itself, while the options that you added for the second hyperthread (CPUs 8 through 15) are now ignored.

**Caution:** You must consider the change to the CPU numbering scheme when you add or remove NUMA nodes or physical processors to or from the host. With hyperthreading enabled, the number for each second hyperthread changes when you add or remove a NUMA node or physical processor. Adding or removing a NUMA node or physical processor to or from a host requires you to re-associate virtual machines with the correct logical processors on each NUMA node.

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**Note:** Knowledge base articles 2039, 2040, and 2041 replace knowledge base article 1236.

**Note:** If you are running Windows XP Service Pack 2 as the host operating system on a multiprocessor AMD host that supports processor power management features, you also need to apply the hotfix described in Microsoft knowledge base article 896256 at <http://support.microsoft.com/?id=896256>. According to Microsoft knowledge base article, the hotfix is needed for the following operating systems:

Microsoft Windows Server 2003, Standard and Enterprise x64 Editions

Microsoft Windows XP Service Pack 2, when used with Microsoft Windows XP Home and Professional |

Microsoft Windows XP Tablet PC Edition 2005

No hotfix is needed for Microsoft XP Media Center.

**Note:** VMware knowledge base articles 2039, 2040, and 2041 replace knowledge base article 1236.

### **Intel Systems**

This problem can occur on some Intel multiprocessor (including multicore) systems. After a Windows host performs a "stand by" or "hibernation", the TSCs may be unsynchronized between cores.

The hotfix described in Microsoft knowledge base article 896256 addresses this issue. See <http://support.microsoft.com/kb/896256>.

**9.** Confirm that the networking drivers installed in the virtual machine are the performance optimized or match the networking mode set on the host for that virtual machine. Typically, installing VMware " installs the correct network drivers.

**10.** Verify that host networking issues are not impacting the performance of the virtual machine. For information, see Verifying host networking speed (1009527).

### **Verifying host networking speed**

#### **Symptoms**

Applications running in virtual machines perform poorly

It takes a long time to log into a network

It takes a long time to copy a file from a network share

Multi-user services have long transaction times or can handle less simultaneous users than expected

#### **Purpose**

This article assists you in determining if a computer running a VMware hosted product is affected by networking. Slow host networking results in slow guest operating system networking.

#### **Resolution**

Evaluate these points for validity. A positive result may indicate a networking problem on the physical host that needs to be corrected to ensure optimum virtual machine performance.

If corrective action is taken on the host, test virtual machine networking performance again.

It takes longer to copy a file from a network location to this host than it does to copy the same file to a different host

Logging into a network from the host takes the same amount of time as it does when logging into the network from the guest operating system

There are multiple virtual machines running on the host and they are all equally slow

Running an application that is slow when run from the guest operating system is just as slow when run from the host

The networking settings of host network adapters have been manually set to a speed or duplex lower than their capability

The firmware and driver versions for host network adapters are not current

There is a firewall, network shaping software, or network monitoring software on the host affecting network speed

There is software running on the host that makes extensive use of networking traffic, like a heavily used server or file share

**11.** Verify that the host operating system is working properly and is in a healthy state. When the host is working correctly it may draw excessive resources from the guests. For more information, see Verifying the health of an operating system (1003956).

### **Verifying the health of an operating system**

#### **Symptoms**

A guest or host operating system:

Has stopped responding and displayed a blue screen with a stop code

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Has experienced a core dump  
Has experienced a kernel panic  
Has stopped responding  
Keeps rebooting for no apparent reason  
Has performance problems  
Is slow  
Has an application that is not working properly  
Is experiencing network problems

#### Purpose

This article guides you through the process of determining if problems encountered on a virtual machine guest operating system or on a host computer where a VMware product is installed, are related to VM. The steps outlined here eliminate the possibility that the problem is related to the operating system itself, another application installed to the operating system, or to the physical hardware of the host computer. **Note:** While this article addresses problems related to the guest operating system of a virtual machine running on an ESX Server host, it does not address problems related to the ESX Server host itself. For information about ESX Server issues, see Verifying the health of an ESX Server operating system (1003892).

#### Resolution

A VMware product may behave unexpectedly if the operating system on which it is installed is experiencing problems. Follow the section that matches your operating system.

**Note:** If you perform a corrective action in any of the following steps, determine if the problems initially encountered are still being experienced.

#### Common Windows Problems

Verify there are no problems with the filesystem by performing a disk check on your hard drives. For information, see Performing a disk check (1004003).

#### Performing a disk check

##### Symptoms

VMware Workstation unrecoverable error: (vcpu-0)  
Exception 0xc0000006 (disk error while paging) has occurred.

##### Purpose

This article describes how to perform a disk check. This is required to address problems encountered with the operating system as a result of file system errors. Problems can include data loss, virtual machine crashes, slow performance, virtual machine resume and suspend failures, and other unexpected behaviour.

##### Resolution

Determine if there are problems with your file system by performing a disk check. A disk check can be performed by using a 3rd party application or by using tools native to your operating system.

The method of performing a disk check differs between operating systems. Refer to the section below that matches your operating system.

##### Windows

**Note:** The exact procedure differs between versions of Windows. If one procedure below does not work, try the other. If neither method works, consult the manual for your version of Windows.

To perform a disk check from the user interface:

Double-click the **My Computer** icon.

Right-click the entry for your local disk.

Click **Properties**.

Click the **Tools** tab.

Click **Check Now**.

Select **Scan for and attempt recovery of bad sectors**.

Click **Start**.

To perform a disk check from a command line:

Open a command prompt. For more information, see Opening a command or shell prompt (1003892).

Type chkdsk c: /r and press Enter.

**Note:** If the local disk being scanned is not c:, replace c: with its drive letter.

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**Note:** A scan of the system drive requires that the operating system be rebooted.

#### Linux

**Note:** The exact procedure may differ between distributions of Linux. If the following commands do not work for you, consult the manual for your distribution of Linux. The following commands may also fail if you are not logged in as a user with root access.

Open a shell prompt. For more information, see Opening a command or shell prompt (1003892).

Type touch /forcefsck and press Enter.

Type shutdown -r now and press Enter.

**Note:** Issuing the shutdown command restarts your operating system.

#### Mac OS

To perform a disk check:

Press Shift + Command + U.

Double-click **Disk Utility**.

Click the entry for the disk or volume to check.

Click **Verify Disk**.

**Note:** You cannot use this utility to verify the integrity of the startup volume. Instead, use Safe Boot for more information, see Using Safe Boot (1004017).

**Note:** You can also click on **Verify Disk Permissions** to confirm that there are no problems being experienced due to incorrect permissions. If you find that there are permission problems, they can be corrected by clicking on **Repair Disk Partitions**.

2. Verify that there is no disk fragmentation on your hard drive. For more information, see Defragmenting a disk (1004004).

## Defragmenting a disk

### Purpose

This article describes how to defragment a disk. Defragmenting a disk is required to address problems encountered with an operating system as a result of file system fragmentation. Fragmentation problems result in slow operating system performance.

### Resolution

Determine if fragmentation of your file system is causing problems by defragmenting.

**Note:** Linux file systems do not require disk defragmentation and Mac OS performs disk defragmentation as required. To manually defragment a disk in either of these operating systems, a 3rd party application is required.

### Defragmenting a disk under Windows

This can be done by using a 3rd party application or by using tools native to Windows. If you have more than one hard drive, perform the defragmentation on each hard drive.

**Note:** The exact procedure differs between versions of Windows. If one procedure does not work, try another. If both do not work, consult the manual for your version of Windows.

To defragment a disk from the user interface:

Double-click the **My Computer** icon.

Right-click the entry for your local disk.

Click **Properties**.

Click the **Tools** tab.

Click **Defragment Now**.

Click **Defragment**.

To defragment a disk from a command line:

Open a command prompt. For more information, see Opening a command or shell prompt (1003892).

Type defrag c: and press Enter.

**Note:** If the local disk being defragmented is not c:, replace c: with its drive letter.

3. Check if there are sufficient resources in the following areas:

Memory

For more information, see Investigating operating system memory usage (1004014).

Disk

For more information, see Investigating operating system disk space (1004007).

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For more information, see [Investigating operating system CPU usage \(1004016\)](#).

**Note:** If your operating system is installed to a virtual machine, and you have determined that there insufficient resources, you need to increase the resource that is lacking:

For more information, see [Increasing the amount of memory assigned to a virtual machine \(1004059\)](#)

For more information, see [Increasing the size of a virtual disk \(1004047\)](#).

If this is a virtual machine running under an ESX Server host, see [Increasing the amount of CPU assigned to a virtual machine \(1004060\)](#).

**Note:** If this is a virtual machine running under any other product, there is no direct way of increasing the amount of assigned CPU. If your host has multiple CPUs or CPU cores, it is possible to set processor affinity among virtual machines so that one or more CPUs are not used by any other virtual machine. For more information, see [Associating a Virtual Machine With a Particular Host Processor \(110\)](#). Alternatively, the hardware must be upgraded or the virtual machine moved to a different host.

4.If a virtual machine with multiple CPUs is performing poorly, see [Determining if multiple virtual CPUs are causing performance issues \(1005362\)](#).

### **Determining if multiple virtual CPUs are causing performance issues**

#### **Symptoms**

You may experience these performance issues with a multiple CPU virtual machine running on an ESX host:

Poor transfer speeds when copying data to or from a virtual machine

Backup jobs time out or are very slow

A virtual machine performs poorly

#### **Purpose**

This article helps you determine if multiple virtual CPUs (vCPUs) are causing performance issues.

#### **Resolution**

To determine if multiple vCPUs assigned to your virtual machine is causing poor performance:

Open a console prompt on the ESX host or initiate an SSH connection to it. For more information, see [Opening a command or shell prompt \(1003892\)](#).

Type esxtop and press Enter.

On the CPU screen, check the %CSTP value. If this number is higher than 100, the performance issue may be caused by the vCPU count. Try lowering the vCPU count of the virtual machine by 1.

**Note:** The %CSTP value represents the amount of time a virtual machine with multiple virtual CPUs is scheduled to be on multiple cores on the physical host. The higher the value, the longer it waits and the worse its performance. Lowering the number of vCPUs reduces the scheduling wait time.

To lower the vCPU count:

**Note:** The virtual machine must be powered off to perform these steps.

Right-click on the virtual machine and click **Edit Settings**.

Click **CPUs**.

Use the **Number of virtual processor** drop-down to lower the vCPU count by 1.

Click **OK**.

If your virtual machine still experiences performance issues, and if its kernel or HAL can handle switching to a single vCPU, lower the vCPU count to 1.

**Warning:** If your virtual machine's kernel or HAL cannot handle switching to a single vCPU, unexpected behaviour may occur.

5.Confirm that there is no virus compromising the operating system. For more information, see [Detecting viruses \(1004008\)](#).

### **Detecting viruses**

#### **Symptoms**

A guest or host operating system:

Stops responding.

Keeps rebooting for no apparent reason.

Has performance problems.

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Is slow.

Has an application that isn't working properly.

Has applications that keep closing.

Has network problems.

Experiences excessive disk access for no apparent reason.

#### Purpose

This article guides you through the process of determining if problems encountered on a virtual machine guest operating system, or on a host computer where a VMware product is installed, are related to a virus infection.

#### Resolution

If an operating system is suddenly behaving unexpectedly it may be because of a virus. VMware recommends that a virus scan be performed to confirm a virus infection as the cause of this behaviour.

VMware does not provide a virus scanner. You must obtain from a virus scanner from the operating system vendor or through a third party application. Examples of third party utilities include:

Confirm that there is no spyware interfering with the operating system. For more information, see Detecting spyware (1004009).

A guest or host operating system:

Stops responding.

Has performance problems.

Is slow.

Has an application that isn't working properly.

Has browser pop-ups or application windows appear randomly.

Has network problems.

Experiences excessive disk access for no apparent reason.

#### Purpose

This article guides you through the process of determining if problems encountered on a virtual machine guest operating system or on a host computer where a VMware product is installed, are related to spyware.

#### Resolution

**Note:** Having some Spyware removal software installed can cause unpredictable connectivity issues in environments.

If an operating system is suddenly behaving unexpectedly it may be because of spyware. VMware recommends that a spyware scan be performed to confirm spyware as the cause of this behaviour.

VMware does not provide a spyware scanner. Spyware scanners must be obtained from the operating system vendor or through a third party utility.

Use the Windows System Configuration (msconfig) utility to eliminate software and processes as possible causes. For more information, see Using the Windows System Configuration utility (1004010).

**Note:** Depending on your problem, following this procedure may remove a software environment that is required to test the health of your operating system.

A guest or host operating system:

Fails.

Stops responding.

Stops responding and displays a blue screen with a stop code.

Keeps rebooting for no apparent reason.

Has performance problems.

Performs slowly.

Has applications that are not working properly.

Is experiencing network problems.

#### Purpose

This article describes how to use the Windows System Configuration utility. The Windows System Configuration utility helps determine if a service or application being loaded into Windows is causing unexpected operating system behaviour. This utility allows services and applications to be selectively disabled. If the unexpected behaviour stops after disabling a service or application then the source of the problem is identified. <br style=""> <br style="">

#### Resolution

To launch the Windows System Configuration utility:

**Note:** Not all versions of Windows include this utility. If you have a version of Windows where the following steps do not work, try the following alternative steps.

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procedure does not work, you must use a third party utility to selectively disable services and applications. Windows 2000 does not include this utility, but you can use the version that comes with Windows XP. If you have a Windows XP computer and copy the file msconfig.exe from the C:\WINDOWS\pchealth\helpctr\bina directory to the Windows 2000 computer.

Click **Start > Run**.

Type msconfig and click **OK**.

To use the Window's System Configuration utility to disable services and applications:

Click the **Services** tab.

Click **Hide all Microsoft services**.

Click **Disable all**.

Click **OK**.

Reboot the computer.

If the issue no longer occurs, it is likely that one of the service or startup applications was the source of the problem. To selectively disable individual services from the Window's System Configuration utility select the Services tab. To selectively disable individual startup applications, select the Applications tab. Deselect each service from the Services tab. To selectively disable individual startup applications, select the Applications tab and deselect each application from the Applications tab.

**Note:** Depending on your problem, following this procedure may remove a software environment that is required to test the health of your operating system.

8. Boot into Safe Mode to eliminate software and processes as possible causes. For more information see [Booting into Safe Mode \(1004011\)](#).

## Booting into Safe Mode

### Symptoms

A guest or host Windows operating system:

Has failed.

Has stopped responding and displayed a blue screen with a stop code.

Has stopped responding.

Keeps rebooting for no apparent reason.

Has performance problems.

Is slow.

Has an application that is not working properly.

Is experiencing network problems.

### Purpose

This article describes how to boot any version of a Windows operating system in Safe Mode. Safe Mode disables all third party applications and non-essential Windows services. If the symptoms are resolved using Safe Mode then the source of the symptoms are related to a third party application or nonessential Windows service, not Windows itself.

### Resolution

To boot any version of a Windows operating system in Safe Mode:

**Caution:** Depending on your problem, following this procedure may remove a software environment required to test the health of your operating system.

Restart the operating system or power off and power on the computer.

When the computer starts, press and hold F8.

**Note:** You may see a series of messages that display information about hardware and memory. This is POST information. If you see POST information, you do not need to press F8 until the screen goes blank. Make sure the mouse focus is inside the virtual machine, by clicking inside the console window.

You are presented with a text menu of boot options.

**Note:** If you do not see this text menu and Windows boots normally, repeat steps 1-2.

Select a safe mode and press enter.

If the operating system issues involve networking, select Safe Mode with Networking.

If the operating system issues do not involve networking, select Safe Mode.

If the symptoms are resolved when using Safe Mode then the source of the symptoms are related to a third party application or nonessential Windows service, not Windows itself. You can try selectively disabling individual services and startup applications to narrow the cause of the problem. For more information see [Using the Windows System Configuration utility \(1004010\)](#). If the problem reoccurs, you may have to investigate uninstalling third party software and Microsoft applications.

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**Note:** Safe Mode eliminates more software and processes than the System Configuration utility, but further reduces operating system functionality. Depending on your problem, following this procedure remove a software environment that is required to test the health of your operating system.

9 .Confirm that the problem is not linked to your username by logging in as a different user. Additionally verify that the problem is not linked to your username having or lacking administrator rights by logging in as a user whose rights are the opposite.

10. Verify that the memory on the host computer is healthy. For more information, see [Validating host memory \(1004012\)](#).

## Validating host memory

### Symptoms

A guest or host operating system:

Has failed

Has stopped responding and displays a blue screen with a stop code

Has experienced a core dump

Has experienced a kernel panic

Has stopped responding

Keeps rebooting for no apparent reason

### Purpose

This article guides you through the process of determining if problems encountered on a virtual machine or guest operating system or on a host computer where a VMware product is installed are related to a problem on the physical host.

**Note:** This article does not address memory problems unique to an ESX host.

### Resolution

VMware products may behave unexpectedly if there is a problem with the memory being used on the host computer.

To ensure that host memory is healthy:

**Note:** If you perform a corrective action in any of the following steps, determine if the problems initially encountered are still being experienced.

Ensure that the RAM in the host computer is seated correctly.

**Note:** The computer must be powered down and its case removed. Proper maintenance procedures listed in the manual provided by the hardware vendor must be followed.

Verify that the memory has not been overclocked. Overclocking is the process of forcing a computer component to run at a higher clock rate than it was designed for by its manufacturer. Overclocking improves performance but may result in instability. VMware does not recommend overclocking.

Conform to memory compatibility guidelines provided by the server or system vendor. Where the server or system vendor does not provide specific guidance, or in the case of a user-assembled system, VMware recommends that all memory be from the same manufacturer to ensure compatibility and maximum performance.

Run a memory diagnostic utility that was provided by the hardware vendor.

Run a third party memory diagnostic utility:

**Note:** This is required if the computer is a clone system or a computer where a memory diagnostic utility was not provided by the hardware vendor.

**Note:** VMware cannot endorse or recommend any particular third party utility, nor can it take responsibility for anything that may occur as a result of its use.

**Note:** This list is not meant to be exhaustive. Any inclusion or exclusion of a particular third party utility in this list is not an implicit or explicit indication of VMware's recommendation or lack of recommendation for that utility.

10. Verify that the hardware devices on the host computer are healthy and supported. For more information, see [Performing hardware diagnostics \(1004013\)](#).

## Performing hardware diagnostics

### Symptoms

A guest or host operating system:

Has failed

Has stopped responding and displayed a blue screen with a stop code

Has experienced a core dump

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Has experienced a kernel panic  
Has stopped responding  
Keeps rebooting for no apparent reason

#### Purpose

This article guides you through the process of determining if problems encountered on a virtual machine's guest operating system or on a host computer where a VMware product is installed, are related to a problem on the physical host.

**Note:** This article does not address hardware problems unique to an ESX Server host.

#### Resolution

VMware may behave unexpectedly if there is a problem with the hardware being used on the physical host.

To ensure that host hardware is healthy:

**Note:** For more information about problems related specifically to memory, see [Validating host memory \(1004012\)](#).

### Validating host memory

#### Symptoms

A guest or host operating system:

Has failed  
Has stopped responding and displays a blue screen with a stop code  
Has experienced a core dump  
Has experienced a kernel panic  
Has stopped responding  
Keeps rebooting for no apparent reason

#### Purpose

This article guides you through the process of determining if problems encountered on a virtual machine's guest operating system or on a host computer where a VMware product is installed are related to a problem on the physical host.

**Note:** This article does not address memory problems unique to an ESX host.

#### Resolution

VMware products may behave unexpectedly if there is a problem with the memory being used on the host computer.

To ensure that host memory is healthy:

**Note:** If you perform a corrective action in any of the following steps, determine if the problems initially encountered are still being experienced. Ensure that the RAM in the host computer is seated correctly.

**Note:** The computer must be powered down and its case removed. Proper maintenance procedures listed in the manual provided by the hardware vendor must be followed.

Verify that the memory has not been overclocked. Overclocking is the process of forcing a computer component to run at a higher clock rate than it was designed for by its manufacturer. Overclocking improves performance but may result in instability. VMware does not recommend overclocking.

Conform to memory compatibility guidelines provided by the server or system vendor. Where the server or system vendor does not provide specific guidance, or in the case of a user-assembled system, VMware recommends that all memory be from the same manufacturer to ensure compatibility and maximum performance.

Run a memory diagnostic utility that was provided by the hardware vendor.

Run a third party memory diagnostic utility:

**Note:** This is required if the computer is a clone system or a computer where a memory diagnostic utility was not provided by the hardware vendor.

**Note:** VMware cannot endorse or recommend any particular third party utility, nor can it take responsibility for anything that may occur as a result of its use.

**Note:** This list is not meant to be exhaustive. Any inclusion or exclusion of a particular third party utility in this list is not an implicit or explicit indication of VMware's recommendation or lack of recommendation for that utility.

**Note:** If you perform a corrective action in any of the following steps, determine if the problems initially encountered are still being experienced.

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Ensure that all of the components are seated and attached correctly.

**Note:** The computer must be powered down and its case removed. Proper maintenance procedures listed in the manual provided by the hardware vendor must be followed.

Verify that none of the components have been overclocked. Overclocking is the process of forcing a component to run at a higher clock rate than it was designed for by its manufacturer. Overclocking improves performance but may result in instability. VMware does not recommend overclocking.

Run a diagnostic utility that was provided by the hardware vendor.

Run a third party diagnostic utility.

**Note:** This is required if the computer is a clone system or a computer where a diagnostic utility was provided by the hardware vendor.

**Note:** VMware cannot endorse or recommend any particular third party utility, nor can it take responsibility for anything that may not occur as a result of its use.

**Note:** This list is not meant to be exhaustive. Any inclusion or exclusion of a particular third party utility in this list is not an implicit or explicit indication of VMware's recommendation or lack of recommendation for that utility.

CheckIt Diagnostics

[http://www.smithmicro.com/default.tpl?group=product\\_full&sku=CKDWINEE](http://www.smithmicro.com/default.tpl?group=product_full&sku=CKDWINEE)

DIAG

<http://www.diagnoseprogramm.de/indexe.htm>

EVEREST

<http://www.lavalys.com/>

Fresh Diagnose

<http://www.pc-certified.com/>

Sandra

<http://www.sisoftware.net/>

Test My Hardware

<http://www.testmyhardware.com/>

TuffTEST

<http://tufftest.com/>

Ultra-X QuickTechPRO

<http://www.udx.com/qtpro.shtml>

·11. If the operating system having the problem has been installed to a virtual machine, power on the machine from a different host. If the problem continues, the issue is with the virtual machine itself. Consider step 11. If the problem disappears, the issue is with the original host. Repeat steps 1-11 for the host operating system.

· 12. If none of the above steps resolved the problem, reinstall the operating system to confirm if there is something about the particular installation that is causing the problem.

13. If none of the above steps resolved the problem, it is recommended that the operating system be reinstalled to confirm if there is something about the particular installation that is causing the problem.

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## Common Linux Problems

**Verify there are no problems with the filesystem by performing a disk check on your hard drive.** For further information, see [Performing a disk check \(1004003\)](#).

Check if there are sufficient resources in the following areas:

Memory

For more information, see [Investigating operating system memory usage \(1004014\)](#).

Disk

For more information, see [Investigating operating system disk space \(1004007\)](#).

CPU

For more information, see [Investigating operating system CPU usage \(1004016\)](#).

**Note:** If your operating system is installed to a virtual machine, and you have determined that there are insufficient resources, you need to increase the resource that is lacking:

Memory

For more information, see [Increasing the amount of memory assigned to a virtual machine \(1004059\)](#).

Disk

For more information, see [Increasing the size of a virtual disk \(1004047\)](#).

CPU

If this is a virtual machine running under an ESX Server host, see [Increasing the amount of CPU assigned to a virtual machine \(1004060\)](#).

**Note:** If this is a virtual machine running under any other product, there is no direct way of increasing the amount of assigned CPU. If your host has multiple CPUs or CPU cores, it is possible to set processor affinity among virtual machines so that one or more CPUs are not used by any other virtual machine. For more information, see [Associating a Virtual Machine With a Particular Host Processor \(110\)](#). Alternatively, the hardware must be upgraded or the virtual machine moved to a different host.

3. If a virtual machine with multiple CPUs is performing poorly, see [Determining if multiple virtual CPUs are causing performance issues \(1005362\)](#).

4. Confirm that there is no virus compromising the operating system. For more information, see [Determining if viruses are compromising the operating system \(1004008\)](#).

5. Confirm that there is no spyware interfering with the operating system. For more information, see [Determining if spyware is interfering with the operating system \(1004009\)](#).

6. Switch to run level 3 to eliminate software and processes as possible causes. For more information, see [Changing Linux run levels \(1004015\)](#).

## Changing Linux run levels

### Purpose

This article describes how to change Linux run levels. Changing Linux run levels is useful in troubleshooting problems where it is suspected that there is a daemon or application being loaded into Linux that may be causing unexpected operating system behavior. Examples of such unexpected behavior include crash, operating system failing to respond or being slow, and network problems. If the unexpected behavior occurs after disabling a service or application then the source of the problem is identified. Other reasons for changing the run level include not having a requirement for an X-Windows environment and needing to perform maintenance.

### Resolution

To change the run level of a Linux operating system:

**Note:** If the run level is being changed to troubleshoot a problem with the operating system or an application, do not change the run level back to the original level until the problem is resolved.

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application, following this procedure may remove a software environment that is required to test the your operating system.

Ensure that you are logged in as a user with root privileges.

Edit the file /etc/inittab in the text editor of your choice.

**Note:** To perform this from a shell prompt using the VI text editor, refer to the Additional Information at the end of this document.

Look for the line of text id:X:initdefault: where X is replaced by a number. This number represents the Linux run level.

Edit the line of text and replace X with the run level you want to change to:

1

Single User Mode

3

Full multiuser

5

X-Windows (X11)

**Note:** The above is a list of run levels that are generally used. If the full list is not displayed at the top of the inittab file and you need to change to a level not listed, refer to the manual for your distribution of Linux.

**Warning:** Do not set X to 0 or 6.

Save the edited file.

Reboot the operating system.

**Note:** Linux boots into the new run level each time it is started. To return it to its former behavior, repeat steps 1-6 and edit the file to use the original value of X.

**Note:** It is possible to change the run level without rebooting the operating system and without affecting the run level the operating system defaults to when it is started:

Open a shell prompt. For more information, see [Opening a command or shell prompt \(1003892\)](#).

Type init X and press Enter, where X is replaced by the run level you want to change to.

**Note:** If this command does not work, refer to the manual for your distribution of Linux.

**Caution:** This command exits all running applications. Save all work before entering this command.

**Note:** Depending on your problem, following this procedure may remove a software environment that is required to test the health of your operating system.

7. Switch to Single User Mode to eliminate software and processes as possible causes. For more information, see [Changing Linux run levels \(1004015\)](#).

**Note:** Single User Mode eliminates more software and processes than run level 3 does, but it also fully disables the operating system. Depending on your problem, following this procedure may remove a software environment that is required to test the health of your operating system.

8. Confirm that the problem is not linked to your username by logging in as a different user. Additionally, verify that the problem is not linked to your username having or lacking root privileges by logging in as a user whose rights are the opposite.

9. Verify that the memory on the host computer is healthy. For more information, see [Validating host memory \(1004012\)](#).

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10 Verify that the hardware devices on the host computer are healthy and supported. For more information see Performing hardware diagnostics (1004013).

11. If the operating system having the problem has been installed to a virtual machine, power on the machine from a different host. If the problem continues, the issue is with the virtual machine itself. Continue to step 11. If the problem disappears, the issue is with the original host. Repeat steps 1-11 on the host operating system.

13. If none of the above steps resolved the problem, reinstall the operating system to confirm if there is something about the particular installation that is causing the problem.

**New Topic:- Troubleshooting FC SAN storage in ESX**

All the information is given in the below link

<http://www megaupload.com/?d=QR3EH0Y0>

**NEW TOPIC:- Using vmkfstools**

The vmkfstools command supports the creation of a VMware ESX Server file system (VMFS) on a SCSI disk. Use vmkfstools to create, manipulate and manage files stored in VMFS volumes. You can store multiple disk images on a single VMFS volume.

**Note:** You can also do most of the vmkfstools operations through the VMware Management Interface.

**vmkfstools Command Syntax** **Note:** You must be logged in as the root user to run the vmkfstools command.

**vmkfstools Syntax When Specifying a SCSI Device** The format for the vmkfstools command, when specifying a SCSI device, is:

```
vmkfstools <options> <device_or_VMFS_volume>[:<file>]
```

where <device\_or\_VMFS\_volume> specifies a SCSI device (a SCSI disk or a partition on a SCSI disk) to be manipulated or a VMFS volume, and <options> specifies the operation to be performed.

If <device\_or\_VMFS\_volume> is a SCSI device, then it is specified in a form such as:

```
vhba1:2:0:3
```

Here, vhba1 specifies the second SCSI adapter activated by the command vmkload\_mod .../XXX.o (See VMkernel Module Loader for details on vmkload\_mod.) The second number specifies the target adapter, the third number specifies the LUN (logical unit number) and the fourth number specifies the partition. Partition 0 (zero) implies the whole disk; otherwise, the number specifies the indicated part.

<device\_or\_VMFS\_volume> may also be a VMFS volume label, as set in the management interface configuration file, or the vmkfstools --setfsname command.

<file> is the name of a file stored in the file system on the specified device.

**vmkfstools Syntax When Specifying a VMFS Volume or File** The format for the vmkfstools command, when specifying a VMFS volume or file, is:

```
vmkfstools <options> <path>
```

where <path> is an absolute path that names a directory or a file under the /vmfs directory.

For example, you can specify a VMFS volume by a path such as:

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/vmfs/vmhba1:2:0:3

You can also specify a single VMFS file:

/vmfs/lun1/rh9.dsk

**vmkfstools Options** This section includes a list of all the options used with the vmkfstools command.

Some of the tasks in this section include options that are suggested for advanced users only. These options are not available through the VMware Management Interface.

**Note:** The long and short (single letter) forms of options are equivalent. For example, the following commands are identical:

vmkfstools --createfs vmfs2 --blocksize 2m --numfiles 32 vmhba1:3:0:1

vmkfstools -C vmfs2 -b 2m -n 32 vmhba1:3:0:1

If the vmkfstools command fails, and you don't know why, then check the log files in /var/log/vmkernel.log or use the management interface to view the latest warning.

Log in to the VMware Management Interface as root. The Status Monitor page appears.

Click the **Options** tab. The Options page appears.

Click **System Logs**.

**Basic vmkfstools Options** Basic options are common tasks that you may perform frequently. You may perform them through the management interface.

**Creates a VMFS on the specified SCSI device** -C --createfs [vmfs1|vmfs2]

-b --blocksize #[gGmMkK]

-n --numfiles #

This command creates a VMFS version1 (vmfs1) or version 2 (vmfs2) file system on the specified SCSI device.

For advanced users:

Specify the block size by using the -b option. The block size must be 2x (a power of 2) and at least 1 MB. The default file block size is 1MB. You can specify the size in kilobytes, megabytes, or gigabytes by adding a suffix of k (kilobytes), m (megabytes), g (gigabytes) respectively.

Specify the maximum number of files in the file system with the -n option. The default maximum number of files is 256 files.

**Lists the attributes of a VMFS volume or a raw disk mapping** -P --querypartitions

<VMFS\_volume\_name>

-P --querypartitions <VMFS\_volume:fileName>

For a VMFS\_volume\_name, the listed attributes include the VMFS version number (VMFS-1 or VMFS-2), the number of physical extents (partitions) comprising the specified VMFS volume, the volume label (if any), the UUID (if any), and a listing of the SCSI device names of all the physical extents comprising the VMFS volume.

For a VMFS\_volume:fileName, the listed attributes include the vmhba name of the raw disk or partition corresponding to the mapping referenced by fileName, and any identification information for the raw disk.

**Creates a file with the specified size on the file system of the specified SCSI device** -c --createfile #[gGmMkK]

The size is specified in bytes by default, but you can specify the size in kilobytes, megabytes, or gigabytes by adding a suffix of k (kilobytes), m (megabytes), g (gigabytes) respectively.

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**Exports the contents of the specified file on the specified SCSI device to a virtual disk on the system of the service console** -e --exportfile <dstFile>

After the export, you may transfer the virtual disk to another server machine and import it to a SCSI on the remote machine.

If your virtual disk has redo logs, you have the following options:

If you use the exportfile option on the base virtual disk, only the base virtual disk is exported. Any uncommitted redo logs are not exported, but can be copied out separately.

If you use the exportfile option on a ESX Server redo log, the exported virtual disk contains the redo previously created redo logs, and the base virtual disk. That is, the newly created exported virtual disk appears as if the redo log(s) was committed to its base virtual disk. **Note:** However, your original redo log(s) and base virtual disk remain unchanged.

If you want to export your redo logs and base virtual disk separately, then use the exportfile option on the base virtual disk, and the cp command to export each redo log separately.

Use the combination of exportfile and importfile together to copy VMFS files to remote machines. The disk should take less space than the full size of the VMFS file, since the virtual disk does not include the sectors of the VMFS file.

**Imports the contents of a VMware virtual, plain, or raw disk on the service console to the specified file on the specified SCSI device** -i --importfile <srcFile>

This command is often used to import the contents of a VMware Workstation or VMware GSX Server disk onto a SCSI device. You may also run this command to import a virtual disk, that was created by exporting the contents of a disk from another SCSI device.

**Note:** The destination device must have space for the entire size of the virtual disk, even if it is most space, as the complete contents of the source disk are copied.

**Caution:** The vmkfstools command may fail when attempting to import plain disks created with versions earlier of GSX Server. If vmkfstools returns an error when importing a plain disk, see Path Name F When Importing GSX Server Virtual Machines.

**Lists the files on the file system on the specified device** -l --list

-h --human-readable  
-M --verbose mappings

The output includes permissions, sizes and the last modification time for redo logs, virtual disk files, and files. You can use the -h option to print the sizes in an easier-to-read format; for example, 5KB 12.1M so on.

(Advanced users only) The -M option lists the vmhba name that corresponds to each raw disk mapping.

**Sets the name of the VMFS on the specified SCSI device** -S --setfsname <fsName>

You can see the VMFS name by running the vmkfstools command with the -l option, vmkfstools -l.

**Advanced vmkfstools Options** Advanced options are tasks that you may perform infrequently. These options are not available through the management interface, or are available in a limited form, and are suggested for advanced users only.

**Commits the redo log of the specified file, making the associated changes permanent** -m --commit

If a virtual machine is in undoable or append mode, then the redo log is created automatically. The name of the redo log is derived by appending .REDO to the name of the file that contains the base disk image. Commit the changes to the disk that are stored in the redo log by using the commit option or eliminating the redo log.

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changes by using the rm command to delete the redo-log file.

#### **Sets the VMFS on the specified SCSI device to the specified mode -F --config [public|shared|w**

**Note:** In ESX Server 2.1, private VMFS volumes are deprecated. If you have existing VMFS version 1 (1) or VMFS version 2 (VMFS-2) private volumes, then change the access to public.

**Public** — With public VMFS-2 volumes, multiple ESX Server computers can access the same VMware Server VMFS volume concurrently. VMware ESX Server file systems with a public access mode use automatic per-file locking to ensure file system consistency.

With a public VMFS-1 volume, multiple ESX Server computers have the ability to access the VMware Server VMFS volume, as long as the VMFS volume is on a shared storage system (for example, a VM storage area network). However, only one ESX Server can access the VMFS-1 volume at a time.

**Note:** ESX Server creates VMFS volumes as public by default.

**Shared** — The shared access mode allows virtual machines on multiple servers to access the same volume on a VMFS-2 volume simultaneously. (In public mode, virtual machines can only access the same volume, never the same virtual disk, at the same time.)

**Note:** A VMFS volume that is used for failover-based clustering should have its mode set to shared.

**Writable** — When virtual machines access a file on a shared VMFS, the file system metadata becomes only. That is, no virtual machine or user command can create, delete or change the attributes of a fil

If you need to create, remove, or change the length of a file (vmkfstools -X), then you need to change volume to "writable". First, be sure that no virtual machines are accessing the VMFS volume (all virtual machines are powered off or suspended), then change the file system metadata to writable with the command, vmkfstools --config writable. Once you power on or resume a virtual machine, the file system metadata reverts to being read-only.

#### **Extends an existing logical VMFS-2 volume by spanning multiple partitions -Z --extendfs <extension-SCSIDevice>**

-n --numfiles #

This option adds another physical extent (designated by <extension-SCSIDevice>), starting at the specified SCSI device. By running this option, you lose all data on <extension-SCSIDevice>.

**Note:** A logical VMFS-2 volume can have at most 32 physical extents.

This operation is not supported on the VMFS-1 file system and in fact, returns an error if the specified device is formatted as VMFS-1. Each time you use this option and extend a VMFS-2 volume with a physical extent, the VMFS volume supports, by default, an additional 64 files. You can change this default number of files by using the -n option.

#### **Maps a Raw Disk or Partition to a File on a VMFS-2 Volume -r --maprawdisk <raw-SCSI-device**

Once this mapping is established, you can access the raw disk like a normal VMFS file. The file length mapping is the same as the size of the raw disk or partition. The mapping can be queried for the raw device name by using the -P option.

By mapping a raw disk or partition to a file, you can manipulate this raw disk or partition as any other file. In addition, this mapping enables you to have undoable, append, and nonpersistent "raw disks".

All VMFS-2 file-locking mechanisms apply to raw disks.

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**Displays Disk Geometry for a VMware Workstation or GSX Server Virtual Disk** -g -- geometry <virtual-disk>

The output is in the form: Geometry information C/H/S is 1023/128/32, where C represents the number of cylinders, H represents the number of heads, and S represents the number of sectors.

When importing VMware Workstation or VMware GSX virtual disks to VMware ESX Server, you may see a geometry mismatch error message. A disk geometry mismatch may also be the cause if you have previously loaded a guest operating system, or running a newly created virtual machine.

View the events log through the VMware Management Interface (Users and Events page for the virtual machine) or through the service console (the vmware.log file, found, by default, in the <user>/vmware/<guest\_operating\_system> directory). Look for C/H/S and compare this with the output of the vmkfstools -g command.

If the disk geometry information is different, then specify the correct information, from the output of vmkfstools -g command, in the configuration file of the newly created virtual machine.

See Migrating VMware Workstation and VMware GSX Server Virtual Machines for complete details on specifying the disk geometry in a virtual machine's configuration file.

**Extends the specified VMFS to the specified length** -X --extendfile #[gGmMkK]

Use this command to extend the size of a disk allocated to a virtual machine, after the virtual machine has been created. The virtual machine that uses this disk file must be powered off when you enter this command. Also, the guest operating system must be able to recognize and use the new size of the disk, for example, by updating the file system on the disk to take advantage of the extra space.

You specify the size in kilobytes, megabytes, or gigabytes by adding a suffix of k (kilobytes), m (megabytes), or g (gigabytes) respectively.

**Manages SCSI reservations of physical targets or LUNs** -L --lock [reserve|release|reset]

**Caution:** Be careful when using these commands. The reserve, release, and reset commands can interrupt the operations of other servers on a storage area network (SAN), so use these commands with great care.

The -L reserve command reserves the specified raw disk, or the disk containing the specified VMFS volume. After the reservation, other servers will get a SCSI reservation error if they attempt to access that disk. Only the server that did the reservation will be able to access the disk normally.

The -L release command releases the reservation on the specified disk, or disk containing the specified volume. Any other server can access the disk again.

The -L reset command does a SCSI reset to the specified disk. Any reservation held by another server is released.

**Recover a VMFS** -R --recover

This command enables you to recover a VMFS (accessible by multiple ESX servers) when other vmkfstools commands indicate that the file system is locked by another ESX Server machine, but, in fact, no other server is currently accessing this file system. This situation may occur if the VMFS was being accessed by a server (for example, running a virtual machine) and that server crashed.

**Note:** You should only use this command if you are certain that no other ESX Server is still accessing the system.

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**Scans the specified vmhba adapter for devices and LUNs -s --scan <FC\_SCSI\_adapter>**

This option is particularly useful for adapters connected to storage area networks, particularly if you are reconfiguring your SAN. If a new device or LUN becomes accessible through the adapter, then ESX Server registers this new virtual device for use by virtual machines. If an existing device or LUN is no longer present and appears to be gone, then it is removed from use by virtual machines.

**Note:** Only use this -s option for Fibre Channel adapters.

You can see the results of the scan by using ls /vmfs or looking at the contents of /proc/vmware/scsi

**Create or Resize a Swap File in a VMFS Volume of the specified SCSI device -k --createswapfile #\*[gGmMkK]**

The size is specified in bytes by default, but you can specify the size in kilobytes, megabytes, or gigabytes by adding a suffix of k (kilobytes), m (megabytes), or g (gigabytes), respectively.

**Note:** You must be logged in to the Service Console with root user permissions to create a swap file.

You can resize an existing swap file by specifying the new file size as an argument to the -k option:

Deactivate the swap file, if it is active, with vmktools -y.

Resize the swap file with the -k option.

Activate the swap file with vmktools -w filename.

If you try to resize an active swap file, ESX Server returns an error message.

ESX Server does not automatically activate a swap file after it is created. Use vmkfstools with the -w option to activate a swap file. You can set a swap file to be activated automatically after a system reboot with the **Activation Policy** option of the **Swap Management** section in the **Options** tab of the Management Interface.

Activate a Swap File -w --activateswapfile

This command activates the specified swap file.

**Note:** You must be logged in to the Service Console with root user permissions to activate a swap file.

Deactivate a Swap File -y --deactivateswapfile <fileID>

ESX Server assigns a fileID tag to a swap file when it is activated. You must identify a swap file by its fileID tag when specifying which swap file to deactivate with the -y option.

**Note:** You must be logged in to the Service Console with root user permissions to deactivate a swap file.

You can find the fileID tag assigned to a swap file in the swap status file, /proc/vmware/swap/stats.

**Note:** You must shutdown all virtual machines before deactivating a swap file. Entering a vmkfstools command returns an error message if any virtual machines are powered on.

**Migrate a VMFS from VMFS-1 to VMFS-2 -T --tovmfs2**

This command converts the VMFS volume on the specified partitions from VMFS-1 to VMFS-2, while preserving all files in the volume. ESX Server's locking mechanism attempts to ensure that no remote or local process is accessing the VMFS volume that is being converted.

**Note:** If you have an active swap partition, you must deactivate it before running this command. Deactivate it with vmkfstools -y.

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swap through the VMware Management Interface and reboot your server. Once this vmkfstools -T command completes, you can reactivate your swap file.

This conversion may take several minutes. When your prompt returns, the conversion is complete.

**Note:** In ESX Server 2.1, private VMFS volumes are deprecated. If you have an existing VMFS version 1 (VMFS-1) private volume, then the newly created VMFS-2 volume's access mode is automatically changed to public.

Before starting this conversion, check the following:

Back up the VMFS-1 volume that is being converted

Be sure there are no virtual machines powered on using this VMFS-1 volume

(SAN only) Be sure no other ESX Server is accessing this VMFS-1 volume

(SAN only) Be sure this VMFS-1 volume is not mounted on any other ESX Server

**Caution:** The VMFS-1 to VMFS-2 conversion is a one-way process. Once the VMFS volume is converted to VMFS-2, you *cannot* revert it back to a VMFS-1 volume.

**Note:** The first time you access a newly converted VMFS-2 volume, the initial access will be slow, because of internal volume consistency checking.

**Examples Using vmkfstools** This section includes examples using the vmkfstools command with the different options described previously.

**Create a new file system** vmkfstools -C vmfs2 -b 2m -n 32 vmhba1:3:0:1

This example illustrates creating a new VMFS version 2 (vmfs2) on the first partition of target 3, LUN 0 SCSI adapter 1. The file block size is 2MB and the maximum number of files is 32.

**Extends the new logical volume by spanning two partitions** vmkfstools -Z vmhba0:1:2:4 vmhba1:3:0:1

This example illustrates extending the new logical file system by adding the 4th partition of target 1 (LUN 2) of vmhba adapter 0. The extended file system supports a maximum of 64 (2 X 32) files, and spans across two partitions — vmhba1:3:0:1 and vmhba0:1:2:4.

You can address the file system by using the name of its head partition; for example, vmhba1:3:0:1.

**Names a VMFS volume** vmkfstools -S mydisk vmhba1:3:0:1

This example illustrates assigning the name of mydisk to the new file system.

**Creates a new VMFS virtual disk file** vmkfstools -c 2000m mydisk:rh6.2.dsk

This example illustrates creating a 2GB VMFS file with the name of rh6.2.dsk on the VMFS volume named mydisk. The rh6.2.dsk file represents an empty disk that may be accessed by a virtual machine.

**Imports the contents of a virtual disk to the specified file on a SCSI device** vmkfstools -i ~/vms/nt4.dsk vmhba0:2:0:0:nt4.dsk

The example illustrates importing the contents of a virtual disk (that contains Windows NT 4.0) from the service console's file system to a file named nt4.dsk on target 2 of SCSI adapter 0.

You can configure a virtual machine to use this virtual disk by adding the following lines to its configuration file:

```
scsi0.virtualDev = vmxibuslogic
```

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scsi0:0.present = TRUE

scsi0:0.name = vmhba0:2:0:0:nt4.dsk

### Migrate virtual machines to VMware GSX Server or VMware Workstation, then back to VMw

**Server Note:** The following example, illustrating the -e and -i options, result in the export or import virtual disk.

This example illustrates migrating a virtual machine's virtual disk file from ESX Server to VMware GS or VMware Workstation, then migrating the virtual disk back to ESX Server.

```
vmkfstools -e winXP.vmdk vmhba0:6:0:1:winXP.dsk
```

The preceding command exports the winXP.dsk virtual disk file to one or more .vmdk files, maximum 2GB, that you can use as a virtual disk in a virtual machine on GSX Server or Workstation. The result winXP.vmdk file(s) can reside on a VMFS volume, or an /ext2, /ext3, or NFS file system.

The following example imports a GSX Server or Workstation virtual disk file into the VMFS volume on specified SCSI device.

```
vmkfstools -i winXP.vmdk vmhba0:6:0:1:winXP.dsk
```

By contrast, if you are importing directly into a raw partition, the example becomes:

```
vmkfstools -i winXP.vmdk vmhba0:6:0:1
```

### Lists the files on the VMFS of the specified device

```
vmkfstools -l vmhba0:2:0:0
```

This command illustrates listing the contents of the file system, including redo logs, virtual disk files, swap files on target 2 of SCSI adapter 0.

**Scans a vmhba adapter** This example illustrates scanning the vmhba1 adapter for any new or remote targets or LUNs.

```
vmkfstools -s vmhba1
```

## New Topic :- Admission Control Policy

Interview Question :- what is admission control in esx

Admission Control Policy VMware ESX Server uses an admission control policy to ensure that sufficient unreserved memory and swap space are available before powering on a virtual machine. Memory must be reserved for the virtual machine's guaranteed minimum size; additional overhead memory is required for virtualization. Thus the total required for each virtual machine is the specified minimum plus overhead.

The overhead memory size is determined automatically; it is typically 54MB for a single virtual CPU virtual machine, and 64MB for a dual-virtual CPU SMP virtual machine. Additional overhead memory is reserved for virtual machines larger than 512MB.

Swap space must be reserved on disk for the remaining virtual machine memory — that is the difference between the maximum and minimum settings. This swap reservation is required to ensure the system preserves virtual machine memory under any circumstances. In practice, only a small fraction of the swap space may actually be used.

Similarly, while memory reservations are used for admission control, actual memory allocations vary dynamically, and unused reservations are not wasted.

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The amount of swap space configured for the system limits the maximum level of overcommitment. A swap file size equal to the physical memory size of the computer is recommended in order to support reasonable 2x level of memory overcommitment. You may configure larger or smaller swap files or additional swap files.

If you do not configure a swap file, memory may not be overcommitted. You may configure the swap using the VMware Management Interface (**Swap Configuration** in the **Options** page) or from the service console using the vmkfstools command.

You can create additional swap files using the vmkfstools command. You should consider adding additional swap files if you want to run additional virtual machines but you're unable to do so because of the lack of swap space. See Using vmkfstools.

**Q1) Can we use EMC PowerPath together with VMware NMP (Native Multi-pathing Plug-in)**

It is not recommended to use both at the same time, we usually either use PowerPath or VMware NMP. Refer to "EMC PowerPath VE With VSphere" documentation for more details.

**Q2) Can we use VMware Update Manager (VUM) to schedule upgrading of VMware tools or VMs to meet latest ESX hardware version ?**

Yes, this is possible with VMware Update Manager 4. We do not need to create a new baseline, there's a default baseline that does this task.

**Q3) Does Storage Vmotion use the Service Console to migrate running VMs live from one storage to another storage ?**

Storage VMotion migrates VM via the Service Console network, this means that there's no additional load on the other Virtual Machine connection network.

**Q4) Can we implement VMware Fault Tolerance on a VM with an existing VMware Snapshot of VM ?**

No, VMware FT does not support VM with existing snapshots. We have to merge or discard the snapshots before enabling VMware FT to protect that VM.

**Q5) What is the protocol used by vCenter Linked Mode to link to other Virtual Center Server ?**

vCenter Management Server 4 uses LDAP via port 386 by default.

**Q6) Does VMware supports installation of vCenter Server 4 on Windows Server 2008 R2 or any other system platform ?**

No, Windows Server 2008 R2 is not a supported platform for installing vCenter Server 4. Refer to "[vSphere Compatibility Matrix](#)" for details.

**Q7) Is it possible to configure both thin provisioned virtual disk and thick provision virtual single VM, thus, creation of a VM with multiple virtual disks which have different provision modes virtual disk ?**

Yes, this is possible.

**Q8) When deploying thin provisioned virtual disk for VM, the virtual disk is expand on demand which creates many fragments which could be scattered across our datastore, what's the way to defrag a VM with thin provisioned virtual disk ?**

When performing Storage Vmotion migrating the VM to a different LUN and migrating the VM back to its original datastore, the VM's file will be fragmented.

**Q9) During Scripted Installation of ESX Server 4, is it possible create local directory on the host and run scripts to install third party utilities from other vendors such as HP or Dell ?**

Yes, it is possible to create a local directory to load packages then configure scripts to run pre or post installation of ESX Server. Refer to "[Scripted Installation of ESX](#)" for more information.

**Q10) What's the major difference between virtual network adapter E1000 and VMXNET3 ?**

VMXNET3 is the third generation of paravirtual network adapter by VMware. Includes features such as MSI/MSI-X support, Receive Side Scaling, IPv6 checksum and TCP Segmentation Offloading (TSO) and VLAN off-loading and Large TX/RX ring sizes. Refer to "[vSphere Networking](#)" guide and "[E1000 and VMXNET3](#)" discussion for more details.

**Q11) Are we able to configure vCenter Server Heartbeat to keep replication and synchronization while disabling automatic failover and enabling only the option for a manual switch over ?**

No, that is not possible with current version of vCenter Server Heartbeat.

**Q12) If the local Windows OS running vCenter Server Heartbeat restarts after applying a security patch, will the Primary vCenter Server trigger a failover to the Secondary vCenter Server ?**

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As the default ping for the channel network is 3 pings with 20 seconds interval between each ping, the failover will occur and Secondary vCenter Server will take control and start protected services. However we are able to configure the ping intervals in the vCenter Server Heartbeat manage server console.

**Q13) Can we import host profiles created on our master vCenter Server located in our main datacenter to the vCenter Servers running in remote sites or branch offices ?**

Yes, vCenter host profile configuration allows us to import host profiles created in virtual machine format .vpf into existing vCenter Servers that we wish to apply the host profiles.

**Q14) Is it possible to configure a schedule task to stage ESX Server patching with VMware Manager ?**

No, this is not possible with the current version of VMware Update Manager 4.

**Q15) When migrating VMs with Storage VMotion, could we choose different datastore LUN for single VM has multiple virtual disks ?**

Yes, when performing Storage Vmotion of a running VM live from one storage to another storage, at screen when we are prompted to select datastore, we could click on "advanced" tab to select different datastores for our virtual disks.

**Q16) Does vCenter Server Heartbeat works across LAN and WAN ?**

Yes, it works both across LAN and WAN. Refer to "[vCenter Server Heartbeat Reference Guide](#)" for more details.

**Q17) What's the main benefit of deploying ESXi 4.x Servers as compared to ESX 4 Servers in datacenter production environment ?**

There's significantly less patches required for an ESXi Server as compared to ESX Server. As ESXi does not have a service console, it is relatively more secure and less vulnerable to attacks.

**Q18) Is it advisable to run anti virus software on the Service Console on ESX Servers in production environment ?**

Running anti virus softwares in Service Console will generally take up resources which might affect performance of the ESX Server as the anti virus software requires resources to run.

**Q19) In terms of hardening the ESX Server from a security aspect, what's the solution for managing root accounts on ESX Server hosts ?**

We could restrict root user account logins and password only to datacenter administrators. We could create linux user accounts inside Service Console and then enable sudo permissions to grant these user access. We could also join ESX Server to Active Directory authentication.

**Q20) Is there a new VMFS version with VMware vSphere ?**

No, vSphere is still running on VMFS3 version. However, there is a change in virtual machine hardware version 7.

**Q21) What's the maximum number of vCenter Servers we can configured in a linked mode ?**

We can configure a total of 10 vCenter Servers in a vCenter Server linked mode. vCenter linked mode manages up to 1000 ESX/ESXi Servers and 10000 virtual machines across 10 vCenter Servers in a single console.

**Q22) What's the main functions and capabilities when deploying vCenter Server linked mode ?**

vCenter Server linked mode gives administrators a single pane of glass view, it allows administrators to manage global roles and licenses across vCenter Servers.

**Q23) What's the rollback option tab when configuring vCenter Server Heartbeat ?**

As vCenter Server Heartbeat uses Microsoft Virtual Shadow Copy Service (VSS) we could configure a refer to help guide on the local vCenter Server after installation and configuration of vCenter Server Heartbeat for details.

**Q24) What are the supported Microsoft SQL version that can be protected by vCenter Server Heartbeat 5.5 update 1 ?**

vCenter Server Heartbeat is currently able to protect only Microsoft SQL Server 2005 SP1-SP3 and Microsoft SQL Server 2008 versions.

**Q25) Can we use vCenter Server 4 to manage legacy ESX 3.x and 2.x Servers ?**

Yes, vCenter Server 4 can only manage legacy ESX Servers if we configure connectivity to an existing license server as vCenter Server 4 does not manage the licenses for legacy host directly.

**Q26) After joining ESX Servers to Active Directory domain, can we use distribution groups of user accounts ?**

VMware does not support the add of AD groups but it does support the adding of individual users and groups module. Refer to "[ESX Authentication AD](#)"

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**Q27) Will vCenter Server Heartbeat works together with vCenter Linked Mode ?**

Yes, vCenter Server Heartbeat and vCenter linked mode is compatible with the most current version 2. Adam components will be replicated active and passive, therefore, full functionality is available when target mode. Refer to "[forum discussion](#)" for more details.

**Q28) Does vSphere 4 supports Microsoft Clustering VMs whose file resides on iSCSI LUN ?**

No, this version of vSphere 4 is not compatible with iSCSI SAN for MSCS configuration. Refer to "[Setting up Failover Clustering and MSCS](#)" for more details.

**Q29) When running resxtop command in vMA to view performance output, how do I view current and not other worlds ?**

After entering the resxtop command, we can enter "V" which will output displaying only VMs on that particular ESX Server.

**Q30) If we set a memory limit of a VM to 400 MB and available memory to 512 MB, what will happen after the VM reaches the limit ?**

Based on the POC done in the class, the ballooning vmmemctl kicks in after the VM hits the 400MB limit. Thus, the remaining 112 MB of memory is not used.

**Q31) Can we create a vmdk greater than 256 GB when configuring a block size of 1MB ?**

No this is not possible, we will have to increase the block size before the vmdk size will be increased. For example, a block size of 2MB will allow us to create a 512GB vmdk and a block size of 4MB will allow us to create a vmdk that's 1024GB. Refer to "[Forum discussion](#)" for more details.

**Q32) Where can I create the session file within the vMA ?**

Session file creation can be found within the vMA when we access \$ cd /usr/lib/vmware-vcli/apps/session

**Q33) Does vCLI supports running on Linux and Windows OS ?**

Yes, vCLI is supported and can be run from both Windows and Linux OS.

**Q34) When can we use explicit failover on a vSwitch ?**

We can select "use explicit failover" when we want vSwitch to always use the highest order uplink from the list of Active adapters which passes failover detection criteria such as link state only and beacon probing. Refer to "[virtual switch policies](#)" for more details.

**Q35) What is the difference between consumed memory and active memory ?**

Consumed memory is when there is no contention and active memory refers to the memory used when there is contention.

### VMware View Frequently Asked Questions

**Q1) What is the difference between desktop recomposition and desktop refresh ?**

Desktop recomposition is used to update changes such as application updates, patches, service packs and Vista upgrades to the source image. Desktop refresh is returning the image back to its original state when you first deployed it.

**Q2) During installation of View Connection Server, installation halted due to IIS using port 80, what should I do ?**

There are 2 options, either you can stop the IIS service on the Windows OS you are installing the View Connection Server or you can change the port from 80 to 8000. This is because the installation requires the use of port 80.

**Q3) If I have an SQL Server Application running in my 6gb VM and I decide to check it out, will the application be checked out as well ?**

Yes, View client with offline desktop will checkout the entire VM including everything inside so that you can use your VM offline even without network connectivity.

**Q4) What is the recommendation to protect VMware View Connection Server to ensure high availability ?**

The way to build high availability is to configure replica View connection servers, the sessions information is replicated between View connection servers using ADAM.

**Q5) If the user were to checkout an offline desktop and the online equivalent were to get updated by administrators, when the users update their offline desktop or run the backup will their desktops receive the patches as well ?**

Update will not be possible as this kind of operations is not available.

**Q6) Is the link clone technology used in VMware View Composer similar to the one used in VMware Lab Manager ?**

No. When using VMware View Composer link clone technology to create multiple desktops or pool of desktops.

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using the Automated Desktop Delivery option, the virtual machines being created are reflected in the Center Server via VI Client.

**Q7) Besides integration with AD, what other directory services does VMware View integrate?**

As of present, it is only able to integrate with AD and no other services.

**Q8) Is there a way to enhance the security level on my View Connection Server ?**

Yes. We can integrate VMware View Connection Server with RSA Secur ID.

**Q9) Name me a key difference between VMware View and Citrix Xen desktop virtualization**

Citrix is a forward looking technology which supports W2k3 OS and above. Whereas, VMware View gives the flexibility of looking at a wider range of OS ranging from legacy OS to the latest OS available in the market.

**Q10) Does VMware View's VMs support printer drivers and usb devices on the client ?**

Yes. There is support for all printer drivers as it is using virtual drivers and usb devices on the VMs are supported.

**Q11) What is the benefit of using VMware ThinApp for packaging an application ?**

It packs the application into an exe file which means you do not have to install the application into your system drive. The exe file can be run from any location including network shares, usb drives and cd roms. This helps save space and increases performance of user's desktop.

**Q12) What is the default maximum caching time for offline desktop ?**

The default maximum cache life is 7 days but we can choose to change this number to a higher number of days. This setting can be changed when you login to your view administrator via browser -> desktop pools -> global policies -> offline desktop policies -> edit -> change the number of days.

**Q13) What is the purpose of the cache lifetime setting for the offline desktop ?**

The data on each offline system is encrypted and has a cache lifetime controlled through policy, if the user loses contact with the View Connection Server, the cache lifetime is the period in which the user can still use the desktop before they are refused access; this countdown is reset once the connection is re-established.

**Q14) Does Offline Desktop support tunneled or non-tunneled communications ?**

Offline Desktop supports tunneled or non-tunneled communications for LAN-based data transfers. If tunneling is enabled, all traffic is routed through the View Connection Server.

When tunneling is not enabled, data transfers take place directly between the online desktop host system and the offline client.

**Q15) Is it true that by passing the tunnel increases the data transfer speed ?**

Yes, but do note that bypassing the tunnel and using an unencrypted connection increases data transfer speed at the expense of secure data communication. The encryption setting has no effect on the off-line connection which is always encrypted on the client system.

**Q16) When users are logon to their Virtual Machines via View Client, when they wish to end their session, should they choose "disconnect" or "disconnect and log off" option ?**

The first option is Disconnect. With Disconnect, the user remains logged on. Any programs that the user was running continue to run and no other users (except for an Administrator) can connect to this desktop. If the administrator chooses, they may log into the desktop, but will automatically log the user out and force any programs the user was running to end. The second option is Disconnect and Log off. This option allows the user to log off and it allows other users to access this desktop.

**Q17) What is estimated size of a linked clone system disk ?**

For a 20GB system disk with OS and application, the estimated linked clone size would be 100mb, though it will typically grow to the size of the system disk and then a refresh would return it back to the original size. Refer to "[Introduction To View](#)" for more details.

**Q18) How does VMware charge for VMware View licenses ?**

Licenses are based on per concurrent connection user. Refer to "[View 4 licensing](#)" for more information.

**Q19) Can we integrate VMware View Connection Server with 3rd party Secure Access box**

Yes, it is possible for such setup. Refer to "[Juniper SA box with VMware View](#)" for secure access.

**Q20) Does the View Security Servers in the DMZ zone do their own load balancing ?**

VMware View does not provide load balancing features, we have to rely on 3rd party load balancing solutions such as NLB.

**Q21) Does the virtual desktops support serial com ports ?**

Yes, virtual desktops support serial, parallel, HID and usb ports. Refer to "[View Peripherals](#)" for more information.

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**Q22) Can VMware View client be installed on Linux OS ?**

Yes, View Client can be installed on Linux OS. Refer to "[View Client Compatibility Guide](#)" for more info

**Q23) Does the ADAM database scheme change ?**

No, the schema does not change.

**VMware vSphere 4.x Install Configure Manage FAQ**

**Q1) Are we able to add odd number virtual CPUs to our virtual machines, for example 3 or as compared to VI3 version when virtual SMP only supports 2 or 4 VCPU per virtual machir**

Yes, we can now add odd number VCPU to our virtual machines.

**Q2) What is the limitation for configuring VMware Fault Tolerance for a virtual machine ?**

Virtual machine selected for VMware FT must be provisioned with thick disk and not thin disk, if it wa provisioned with thin disk, there will be a prompt to inflate the existing disk size.

**Q3) What is the disadvantage of configuring VM direct path I/O for a virtual machine ?**

If we configured VM direct path I/O, the virtual machine gains significant performance improvement; provided direct access through the adapter, however, it loses its virtualization features and the adap cannot be used by other virtual machines.

**Q4) Does vSphere provide support for the currently version of VMware Site Recovery Mana version 1.0 ?**

vSphere has does not support SRM version 1.0 at this present moment.

**Q5) What is the benefit of using a Distributed vSwitch as compared to a Standard vSwitch**

With a distributed virtual switch, the network statistics and policies of the virtual machine that has been vmotion to another ESX Server will migrate with the VM. This provides the ability for network vmotion useful for implementing inline intrusion detection systems and firewalls.

**Q6) Does ESX 4 and ESXi 4 support jumbo frames and TSO ?**

Yes, both ESX 4 and ESXi 4 provides support for jumbo frames as well as TSO, these can now be configured in the GUI as compared to VI3 where administrators could only do it via command lines.

**Q7) What is the different between VMware Data Protection as compared to the traditional Consolidated Backup ?**

VMware Data Protection supports all storage architecture for backup and restore via LAN and SAN. It supports full, incremental and differential file level backup options.

**Q8) What is the key driving factor for users adopting VMware vCenter Data Recovery ?**

It's an API that runs in a virtual machine within your vCenter, it provides agentless backup and can be used across virtual machines even when they are being vmotion to a different host.

**Q9) Can we perform Storage Vmotion now via the GUI inside vCenter ?**

Yes, Storage Vmotion feature is now available in the vSphere Client connected to vCenter Server. It provides full support for FC SAN and NFS.

**Q10) When using vCenter Linked Mode feature, what are the functions that could be shared across the vCenters in this link ?**

vCenter Linked Mode allows administrator to centrally manage all the vCenter within a single view, resources and licenses can be shared across the vCenters configured in a link.

**Q11) Do I still require a Flexnet License Server if all my ESX Servers are ESX 4 and ESXi 4 ?**

No, you no longer require a license server for the to manage the new ESX Servers. All licenses are managed within the vCenter Server.

**Q12) If my customer has a hybrid environment where they still have ESX 3 and ESX 3.5, can vCenter communicate with the existing Flexnet License Server ?**

Yes, vCenter can communicate with existing license servers so as to allow it to manage legacy ESX Servers. vCenter will pull the licenses for legacy hosts from the flexnet license server.

**Q13) Why am I unable to hot add CPU and memory to virtual machine ?**

You are required to enable this function under the virtual machine settings in order to use it. Therefore it is advisable to enable it before you start your virtual machine for the very first time.

**Q14) Is it true we can now use the new VMware Update Manager to upgrade our legacy ES Servers (For example: ESX 3.5) to ESX 4.0 version ?**

Yes, the new VUM has the ability to upgrade your legacy ESX Server hosts for you. However, if you are upgrading a standalone host, you will be required to power off all virtual machines running on that host.

**Q15) How come we are unable to use our existing VI Client to manage our ESX 4 and vCenter ?**

No, the legacy VI Client is unable to manage newer ESX Server Hosts and vCenter. You will need to use vSphere Client to manage newer ESX Server Hosts and vCenter as well as legacy ESX Hosts.

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**Q16) In vSphere, can we configure bidirectional CHAP authentication for iSCSI ?**

Yes, we can now configure bidirectional CHAP authentication for iSCSI software. It is fully supported. Previously, we could only configure unidirectional CHAP authentication.

**Q17) Do we still need to configure a Service Console port for iSCSI initiator ?**

No, we no longer need a Service Console for software iSCSI initiator. The vmkiscsid no longer runs in Service Console. There have been improvements made to the new iSCSI stack in the kernel and also use of TCP/IP2 which has multi threading capabilities.

**Q18) What is the maximum number of CPU and maximum amount of memory a virtual machine can scale ?**

In vSphere, a virtual machine can now be configured with a maximum of 8 virtual CPUs and 255 GB of memory.

**Q19) What is the maximum amount of logical CPUs and memory per ESX Server 4 host can ESX Server 4 now supports a maximum of 64 logical CPUs and 1 TB of memory.**

**Q20) What actions allow us to configure thin disk provisioning for a virtual machine ?**

When we create a new virtual machine, clone an existing virtual machine, clone a template or perform Storage Vmotion on an existing virtual machine.

**Q21) What is the benefit of configuring thin disk provisioning as compared to thick disk provisioning for a virtual machine ?**

When we configure thin disk provisioning the virtual machine only uses the space that it requires and entire disk size, this allows the remaining unused space for other virtual machines. This enables us to Storage Over-commitment and use the storage more efficiently.

**Q22) Will my virtual machines still have connection if the virtual center that stores my Distributed vSwitch configuration goes down ?**

Yes, this is because the Distributed vSwitch has a control plane which sits at the vCenter Server level I/O plane which are the form of hidden vSwitches sitting at the ESX level. Therefore, even if the vCenter goes down, virtual machines continue to have connectivity through the I/O plane at the ESX level.

**Q23) What is the maximum number of ESX Hosts we can connect to a single distributed switch ?**

We can connect up to 64 ESX hosts per distributed switch and vCenter 4 can support up to a maximum of 16 distributed switches. Which means we can have up to 1024 hosts on these 16 distributed switches. Refer to "[Configure Maximums](#)" for more details.

**Q24) What is the version of the 64 bit Service Console running in ESX 4 ?**

The Service Console is a 2.6 linux kernel compatible with Red Hat Enterprise Linux 5.2 or CentOS 5.2

**Q25) What is the maximum number of uplinks or ports per ESX 4 or ESXi 4 Host ?**

The maximum number of uplinks per ESX 4 or ESXi 4 Host is 32 uplinks. Refer to "[Configure Maximums](#)" for more details.

**Q26) Can we install vCenter Server on a 64 bit Windows OS ?**

Yes, vCenter Server can be installed on both 32-bit and 64-bit Windows OS. Refer to "[Compatibility Guide](#)" for more details.

**Q27) Does ESX/ESXi 4 supports round robin multipathing policy ?**

Yes besides fixed (preferred) and most recently used (MRU), ESX/ESXi 4 now supports round robin multipathing policy and it has to be configured on the storage level.

**Q28) Can vCenter 4 support a cluster which includes ESX 3.x and ESX 4 hosts ?**

Yes, we can cluster legacy ESX 3.x hosts and ESX 4 hosts together in the same cluster. vCenter will license to the flexnet license server to manage the licenses for the legacy hosts. However, new features such as hot add and PCI pass through may not be available to the VMs on legacy hosts. Refer to "[Upgrade Guide](#)" for more details.

**Q29) When upgrading from virtual center 2.x to vCenter 4, is there downtime for the hosts we need to re add the ESX hosts back into the inventory ?**

No, there's no time for the hosts and existing hosts will remain in the inventory. However, there will be downtime for virtual center. Remember to backup the databases as during the upgrade process, the schemas are changed and in the event of a upgrade failure, you will not be able to roll back and you will have to do a restore. Refer to "[Upgrade Guide](#)" for more details.

**Q30) When we hot add memory to a powered on VM, will the swap file get dynamically increased ?**

When we hot add memory to a powered on VM, the swap file size will get dynamically increase.

**Q31) When we hot add memory to a powered on VM and the swap file get dynamically increased what happens if there is not enough disk space to meet the growing vswap file size ?**

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You will not be able to add memory to that VM that has not enough memory for the swap file to grow  
will receive an error.

**Q32) Can we add USB controllers to our VM in ESX/ESXi 4 ?**

Yes, we now have the ability to hot plug USB controller into our VMs while they are running. However device has to be connected to the ESX Server and not the client local machine.

**Q33) When installing convertor plug-in, I get a 404 error and the installation halts ?**

During installation of vCenter Convertor you will have to enter the FQDN instead of the IP address or name as this may cause you to receive the 404 error when installing the vCenter convertor plug-in later.

**Q34) Where is Distributed Power Management configured and what are the protocols it uses?**  
DPM is configured and managed at the DRS cluster level. It uses IPMI, ILO and Wake On LAN protocols. You can use DPM to put under utilized hosts into standby modes to save power consumption.

**Q35) What is new with vCenter 4 user access and role management as compared to the vCenter 2.5 ?**

vCenter 4 allows us the ability to assign administrators to inventory objects such as networks and datastores which were not available with the previous virtual center version.

**Q36) What are the new tasks we can schedule in vCenter 4 task scheduler ?**

vCenter 4 task scheduler allows us the ability to schedule a task to increase the resources in a resource or virtual machine. This would be good to cater to the needs of virtual machines that will require add ad-hoc resources such as finance department doing month end closing which may result in resources for their machines.

**Q37) How does VMware HA on an ESXi Server sends out heart beat if ESXi does not have a console ?**

VMware HA clusters configured for ESXi Servers uses the vmkernel present on all ESXi Servers to send and receive heart beats. Whereas, on ESX Servers the heartbeat is sent and receive through the service. Therefore, we may not want to cluster ESX and ESXi Servers together in the same cluster.

**Q38) Can we create a cluster with ESX and ESXi Servers ?**

Yes. However, VMware HA may not work as both servers uses different port groups to send out heartbeats. Vmotion and DRS may still work. This is not a supported practise.

**Q39) What is the limitation for configuring VMware Fault Tolerance for a virtual machine ?**

Virtual machine selected for VMware FT must be provisioned with thick disk and not thin disk, if it was provisioned with thin disk, there will be a prompt to inflate the existing disk size.

**Q40) How can I grow an existing VMFS LUN without creating an extent or physical partition ?**

We can use the grow function to grow an existing VMFS LUN. If the LUN is out of space, first we must contact storage administrator to grow the same LUN on the storage level with storage array management utility within the vCenter Server, we can then select the LUN and grow it.

**Q41) How come the hot add CPU and hot add memory option is greyed out for my VM ?**

This feature is currently available only on supported guest OS such as Windows Server 2003 enterprise edition and Windows 2008 datacenter edition. The type of license also plays a part on the availability of this feature for the VM.

**Q42) What does the channel number stands for in vmhba#:T:C:L?**

The only real example that I've seen in vSphere so far, is the software iSCSI initiator. If you give the VMkernel multiple VMkernel ports, and each port can reach (over its own subnet) different targets, they are listed with different "channel" numbers, to indicate whether they use the first VMkernel port, the second or the third.

**Q43) Can we install VMware Consolidated Backup VCB in a virtual machine ?**

Yes, VCB can now be installed in a VM and it can be used to backup VMs running on iSCSI and NFS. However if you wish to backup VMs whose files reside on an FC San LUN, VCB must be installed on a physical host.

**Q44) Does VMware View 3 work with VMware vSphere 4 ?**

No, currently VMware View 3 is only supported on VI 3.5 infrastructure and it is not supported to work in vSphere 4 environment.

**Q45) Is the Service Console root file system still running on ext3 file system ?**

No, the SC root file system is now running on VMDK and this is automatically created during initial installation of ESX Servers.

**Q46) Is it possible to configure VMware Update Manager 4 to point to WSUS to grab windows updates ?**

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No, this is not possible as the VUM Server is unable to communicate with the WSUS Server.

**Q47) Can vCenter 4 perform Storage Vmotion on a legacy ESX 3.x Host and convert the VM disk from thick to thin disk ?** Yes, vCenter 4 is able to convert a VM's virtual disk from thick to thin storage vmotion. Refer to this "[ESX 3.x and vCenter 4 SVmotion](#)" for more detail discussion.

**Q48) I understand that Oracle databases licensed by per CPU, how does that translate to t number of license I have to purchase if I port it over to VM ?**

In order for you to run your Oracle DB within a VM on that ESX Server, you have to purchase license physical CPU on that ESX Server box. Refer to this "[Oracle Licensing Per Processor](#)" for more detail d

**Q49) How come there is no standalone boot CD for VMware Converter 4.0 for me to download use for cold cloning ?**

VMware vCenter Converter Standalone 4.0.1 does not support cold cloning, you must use an earlier ( edition boot CD 3.0.x Enterprise Edition. Refer to this "[VMware Converter User Guide](#)" for more infor

**Q50) When we convert a VM from thin disk to thick disk, which state must the VM be in to the request ?**

The VM must be in the powered off state in order to be converted from thin to thick disk.

**Q51) What is the default multipathing policy for ESX 4 ?**

The hypervisor determines whether to use MRU or Fixed based on the type of arrays it detects. If array is active\passive, it would be treated as MRU. If array is active\active, it would be treated as fixed. Refer to "[Multipathing Policies in ESX 4](#)" for more details.

**Q52) What is the difference between Enhanced vmxnet and vmxnet3 ?**

Vmxnet3 is an improved version of enhanced vmxnet, some benefits and improvements are MSI/MSI support, Side Scaling, checksum and TCP Segmentation Offloading (TSO) over IPv6, off-loading and TX/RX ring sizes. Refer to "[Vmxnet3 tips and tricks](#)" for more details.

**Q53) When we replicate the LUNs over resignaturing only occurs for VMFS LUNs and not RDMs do we get the replicated RDM to work ?**

You can replicate the RDM to a new array, but the mapping file that is configured on the vm itself will longer be pointing to the same location it was previously, so the RDM has to be re-mapped to the VM scenario.

**Q54) After installing plug-in inside the VC, I am unable to enable the plug-in and it always as disabled.**

Go to services.msc ensure that the Virtual Center Management Webservices is running and then reload vSphere Client and enable the plug-in.

**Q55) What is the difference between ephemeral and dynamic binding on a distributed virtual switch ?**

Ephemeral a new port on every power-on. The port is destroyed when the VM disconnects from the port. Dynamic assign a port when the VM is powered on, it uses a concept similar to DHCP in that if the same IP is available then it will renew that one. Refer to "[Networking Deep Dive](#)" for more details.

**Q56) What is the difference between a thick virtual disk and eager zeroed thick virtual disk ?**

Thick virtual disk does not format the VMDK at the time of deployment. This means that data, which will be written, must pause while the blocks required to store the data are zeroed out. An eager zeroed thick virtual disk actually formats all of its data blocks at the time of deployment.

**Q57) What kind of permissions do we need to provide when configuring a NAS Server ?**

We need to configure permission for the administrator group account rights on the NAS Server so that the ESX Server can access the NAS Server.

**Q58) Storage View tabs in the SAN storage datastore is blank and does not show anything**

Start the vCenter Mount Service and virtual disk service, then restart the vCenter Server service on the Windows OS. Then click on refresh for the storage view tabs.

**Q59) Can we migrate VMs running on ESX host with VMware Hardware Version 7 to ESX host with VMware Hardware Version 4 ?**

No we cannot migrate VMs running on hardware version 7 back to hardware version 4. VMware hardware version 7 only exists on ESX4 and greater. However, it is possible to migrate VMs running on ESX host with hardware version 4 to ESX host running on hardware version 7.

**Q60) Does VMware have an online page where we can search for all the technical white papers ?**

Yes. Please kindly refer to "[Technical Resource Center](#)" for more information.

**Q61) Does VCB supports Windows Server 2008 ?**

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## **Identifying shared storage issues with ESX 3.x**

### **Purpose**

This article is designed to assist in identifying problems related with the storage subsystem of ESX 3.

### **Resolution**

Troubleshooting ESX host storage issues begins with identifying how far reaching (the scope) the problem is. In many cases, a detected problem may be misidentified until the scope has been ascertained.

To identify the scope of the problem:

I Verify that the storage device cannot be seen by any or a subset of the ESX cluster. If so, select the appropriate storage technology:

For Fibre channel, see [Troubleshooting fibre channel storage connectivity \(1003680\)](#).

### **1.Troubleshooting fibre channel storage connectivity**

#### **Symptoms**

No targets from an array can be seen by:

All of the ESX hosts

All of the ESX hosts on a specific fabric or connected through an ISL link

One ESX host

ESX host initiators are not logging into the array

You receive any of the following errors:

Unknown inaccessible

SCSI: 4506: "Cannot find a path to device vmhba1:0:8 in a good state"

### **Purpose**

This article guides you through the most common steps to identify a connectivity problem to a shared device.

### **Resolution**

Please validate that each troubleshooting step below is true for your environment. Each step will provide instructions or a link to a document, in order to eliminate possible causes and take corrective action if necessary. The steps are ordered in the most appropriate sequence to isolate the issue and identify the proper resolution. Please do not skip a step.

#### **These are common items for troubleshooting connectivity issues to the storage array.**

#### **1.a Verify that none of the hosts can see the shared storage. For more information, see [\\_LUN Pathing information for ESX Server 3 \(1003973\)](#).**

Obtaining LUN pathing information for ESX hosts

#### **Purpose**

This article explains using tools to determine LUN pathing information for ESX hosts.

#### **Resolution**

There are two methods used to obtain the multipath information from the ESX host:

Using the ESX command line. Use the command line to obtain the multipath information when performing troubleshooting procedures.

Using VMware Infrastructure (VI) Client. Use VI Client option when you are performing system maintenance

Using the ESX command line to obtain multipathing information

To obtain LUN multipathing information from the ESX host command line:

Log in to the ESX host console.

Type esxcfg-mpath -l and press Enter.

The output appears similar to the following:

```
Disk vmhba2:1:4 /dev/sdh (30720MB) has 2 paths and policy of Most Recently Used  
FC 10:3.0 210000e08b89a99b<->5006016130221fdd vmhba2:1:4 On active preferred  
FC 10:3.0 210000e08b89a99b<->5006016930221fdd vmhba2:3:4 Standby
```

```
Disk vmhba2:1:1 /dev/sde (61440MB) has 2 paths and policy of Most Recently Used
```

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FC 10:3.0 210000e08b89a99b<->5006016130221fdd vmhba2:1:1 On active preferred

FC 10:3.0 210000e08b89a99b<->5006016930221fdd vmhba2:3:1 Standby

In this example, two LUNs are presented.

The following is an analysis of the first LUN:

Canonical name

Disk vmhba2:1:4 /dev/sdh (30720MB) has 2 paths and policy of Most Recently Used

FC 10:3.0 210000e08b89a99b<->5006016130221fdd vmhba2:1:4 On active preferred

FC 10:3.0 210000e08b89a99b<->5006016930221fdd vmhba2:3:4 Standby

This is the canonical device name the ESX host used to refer to the LUN.

**Note :** When there are multiple paths to a LUN, the canonical name is the first path that was detected by this HBA.

vmhba**2**:1:4 is one of the Host Bus Adapters (HBAs).

vmhba**2**:1:4 is the second storage target (numbering starts at 0) that was detected by this HBA.

vmhba**2**:1:**4** is the number of the LUN on this storage target. For multipathing to work properly, each HBA must present the same LUN number to all ESX hosts.

**Note:** If the vmhba number for the HBA is a single digit number, it is a physical adapter. If the address is vmhba40 or vmhba32, it is a software iSCSI device for ESX 3.0 and ESX 3.5 respectively.

Linux device name

Disk vmhba2:1:4 /dev/sdh (30720MB) has 2 paths and policy of Most Recently Used

FC 10:3.0 210000e08b89a99b<->5006016130221fdd vmhba2:1:4 On active preferred

FC 10:3.0 210000e08b89a99b<->5006016930221fdd vmhba2:3:4 Standby

This is the associated Linux device handle for the LUN. You must use this reference when using utilities like fdisk.

LUN capacity

Disk vmhba2:1:4 /dev/sdh (30720MB) has 2 paths and policy of Most Recently Used

FC 10:3.0 210000e08b89a99b<->5006016130221fdd vmhba2:1:4 On active preferred

FC 10:3.0 210000e08b89a99b<->5006016930221fdd vmhba2:3:4 Standby

The disk capacity of the LUN. In the example, the LUN capacity is 30GB.

Failover policy

Disk vmhba2:1:4 /dev/sdh (30720MB) has 2 paths and policy of Most Recently Used

FC 10:3.0 210000e08b89a99b<->5006016130221fdd vmhba2:1:4 On active preferred

FC 10:3.0 210000e08b89a99b<->5006016930221fdd vmhba2:3:4 Standby

This is the policy the ESX host uses when it determines which path to use in the event of a failover.

The choices are:

Most Recently Used: The path used by a LUN is not be altered unless an event (user, ESX host, or array controller) initiates the path to change. If the path changes because of a service interruption along the path, the path does not fail-back when service is restored. This policy is used for Active/Passive arrays and many pseudo active/active arrays.

Fixed: The path used by a LUN is always the one marked as preferred, unless that path is unavailable. As soon as the path becomes available again, the preferred becomes the active path again. This policy is used for Active/Active arrays. An Active/Passive array should never be set to Fixed unless specifically instructed so. This can lead to path thrashing, performance degradations and crashes.

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Round Robin: This is experimentally supported in ESX 3.x. It is fully supported in ESX 4.x

**Note:** See the additional information section for references to the arrays and the policy they are using  
LUN disk type

Disk vmhba2:1:4 /dev/sdh (30720MB) has 2 paths and policy of Most Recently Used  
FC 10:3.0 210000e08b89a99b<->5006016130221fdd vmhba2:1:4 On active preferred  
FC 10:3.0 210000e08b89a99b<->5006016930221fdd vmhba2:3:4 Standby

There are three possible values for LUN disk type:

FC: This LUN is presented through a fibre channel device.

iScsi: This LUN is presented through an iSCSI device.

Local: This LUN is a local disk.

PCI slot identifier

Disk vmhba2:1:4 /dev/sdh (30720MB) has 2 paths and policy of Most Recently Used  
FC 10:3.0 210000e08b89a99b<->5006016130221fdd vmhba2:1:4 On active preferred  
FC 10:3.0 210000e08b89a99b<->5006016930221fdd vmhba2:3:4 Standby

PCI slot identifier indicates the physical bus location this HBA is plugged in to.

HBA World Wide Port Numbers (WWPN)

Disk vmhba2:1:4 /dev/sdh (30720MB) has 2 paths and policy of Most Recently Used  
FC 10:3.0 210000e08b89a99b<->5006016130221fdd vmhba2:1:4 On active preferred  
FC 10:3.0 210000e08b89a99b<->5006016930221fdd vmhba2:3:4 Standby

These numbers are the hardware addresses (much like the MAC address on a network adapter) of the Storage processor port World Wide Port Numbers (WWPN)

Disk vmhba2:1:4 /dev/sdh (30720MB) has 2 paths and policy of Most Recently Used  
FC 10:3.0 210000e08b89a99b<->5006016130221fdd vmhba2:1:4 On active preferred  
FC 10:3.0 210000e08b89a99b<->5006016930221fdd vmhba2:3:4 Standby

These numbers are the hardware addresses of the ports on the storage processors of the array.  
True path address

Disk vmhba2:1:4 /dev/sdh (30720MB) has 2 paths and policy of Most Recently Used  
FC 10:3.0 210000e08b89a99b<->5006016130221fdd vmhba2:1:4 On active preferred  
FC 10:3.0 210000e08b89a99b<->5006016930221fdd vmhba2:3:4 Standby

This is the true name for this path. In this example, there are two possible paths to the LUN (vmhba2:1:4 and vmhba2:3:4).

Path status

Disk vmhba2:1:4 /dev/sdh (30720MB) has 2 paths and policy of Most Recently Used  
FC 10:3.0 210000e08b89a99b<->5006016130221fdd vmhba2:1:4 On active preferred  
FC 10:3.0 210000e08b89a99b<->5006016930221fdd vmhba2:3:4 Standby

Path status contains the status of the path.

There are six attributes that comprise the status:

On: This path is active and able process I/O. When queried, it returns a status of READY.

Off: The path has been disabled by the administrator.

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Dead: This path is no longer available for processing I/O. This can be caused by physical medium error or array misconfiguration.

Standby: This path is inactive and cannot process I/O. When queried, it returns a status of NOT\_REA

Active: This path is processing I/O for the ESX Server host.

Preferred: This is the path that is preferred to be active. This attribute is ignored when the policy is set to Most Recently Used (mru).

Using VI Client to obtain multipathing information

To obtain multipathing information from VI Client:

Click on an ESX host.



Click the **Configuration** tab.

Getting Started Summary Virtual Machines Performance Configuration Tasks & Events Alarms Permissions Maps

Click **Storage**.

Click the VMFS-3 datastore you are interested in.

Identification	Device	Capacity	Free	Type	Actions
LUN-0	vmhba2:1:0:1	31.75 GB	1.29 GB	vmfs3	
openfiler-nfs	10.21.48.10:/mnt...	73.12 GB	14.90 GB	NFS	
openfiler-iscsi	vmhba1:1:0:1	39.25 GB	5.98 GB	vmfs3	
LOCAL006	vmhba0:0:0:6	119.00 GB	16.08 GB	vmfs3	
NetApp iSCSI - sh...	vmhba1:0:0:1	124.75 GB	31.54 GB	vmfs3	
4794c6ab-5bca17...	vmhba0:0:0:10	2.75 GB	2.14 GB	vmfs3	
LUN-1	vmhba2:1:1:1	59.75 GB	7.07 GB	vmfs3	

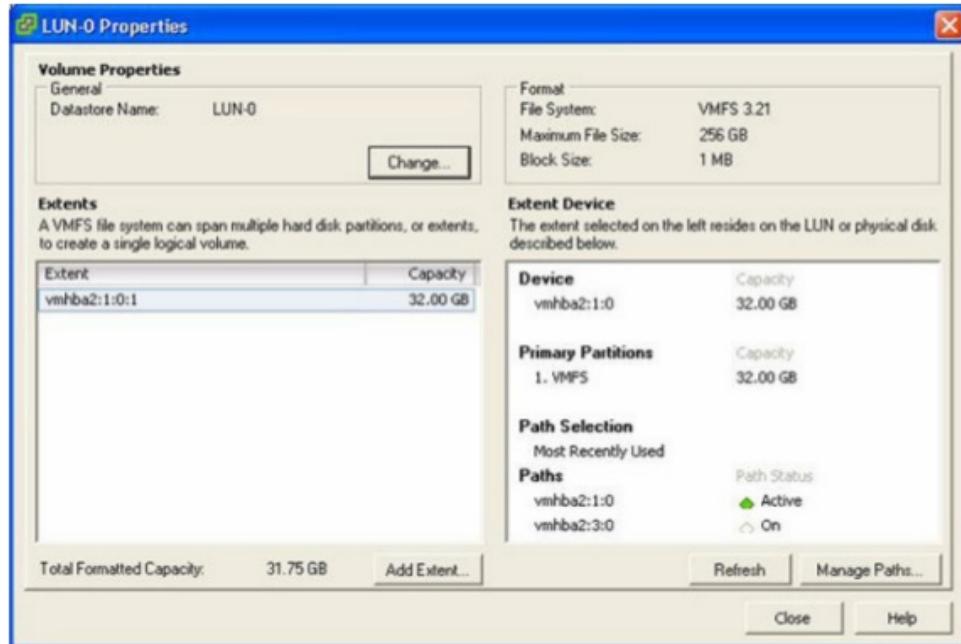
Click **Properties**.

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**Details**

<b>LUN-0</b>	31.75 GB Capacity
Location: /vmfs/volumes/4612b48e-b...	30.46 GB Used 1.29 GB Free
<b>Path Selection</b>	
Most Recently Used	vnmba2:1:0:1
Properties	Volume Label: LUN-0 Datastore Name: LUN-0
Extents	vnmba2:1:0:1 32.00 GB
<b>Paths</b>	Total: 2 Broken: 0 Disabled: 0
Formatting	Total Formatted Capacity: 31.75 GB
File System:	VMFS 3.21
Block Size:	1 MB

The following dialog appears:

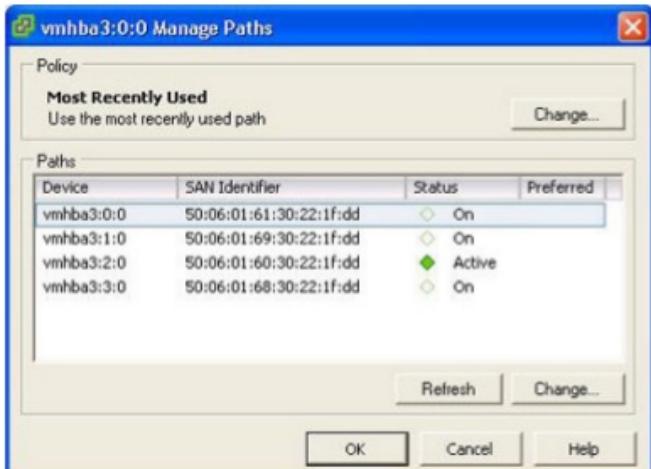


From this example, you can see that the canonical name is vmhba2:1:0 and the true paths are vmhb and vmhba2:3:0 .  
The active path is vmhba2:1:0 and the policy is Most Recently Used.

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Click **Manage Paths**. The Manage Paths dialog appears:



To change the policy, click **Change** in the Policy section. The Manage Paths - Selection Policy dialog :



Click **OK** to return to the Manage Paths dialog.

To enable or disable a path, select it and click **Change**.



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As the policy for this LUN is Most Recently Used, the **Preferred** option is unavailable. If you disable t currently active path, it forces a path failover.

Click **OK** to return to the Manage Paths dialog.

**1.b Verify that a rescan does not bring the LUNs back. For more information, see [Performing a rescan of the storage \(1003988\)](#).**

Performing a rescan of the storage

Purpose

This article explains how to perform a rescan of the storage devices. A rescan of the storage devices needed when a storage device has been added, removed, or changed from the array.

Resolution

You can perform a rescan in two ways:

Using the ESX Server command line.

Using the Virtual Infrastructure Client (VI Client).

Using the ESX Server command line to perform a rescan

There are two stages to a complete rescan process.

Search for new LUNs and remove retired LUNs.

Search for new VMFS data stores and mount the data stores.

Search for new LUNs and remove retired LUNs

To perform a rescan from the ESX Server host command line:

Log in to the ESX Server host console.

Type the following command: esxcfg-rescan <vmkernel SCSI adapter name>

Where <vmkernel SCSI adapter name> is the vmhba# to be rescanned.

Expected output when rescanning a fibre channel Host Bus Adapter (HBA) or local storage:

Rescanning vmhba2...done.

On scsi3, removing: 0:0 1:0 1:1 1:2 1:3 1:4.

On scsi3, adding: 0:0 1:0 1:1 1:2 1:3 1:4.

Expected output when rescanning an iSCSI HBA:

Doing iSCSI discovery. This can take a few seconds ...

Rescanning vmhba1...done.

On scsi2, removing: 0:0 0:10 1:0.

On scsi2, adding: 0:0 0:10 1:0.

**Note:** You do not need to rescan local storage.

**Note:** Performing a rescan does not cause a service interruption.

Although the first pass states that it is removing LUNs, no LUN is removed until after the adding phase is complete. Any LUN that was not marked as adding is removed.

The rescan must be performed on each HBA that is attached to the storage that changed.

Search for new VMFS data stores and mount them

To search for new VMFS data stores:

Log in to the ESX Server host console.

Type the following command: vmkfstools -V

This command does not generate any output.

If a new data store has been detected, it is mounted in /vmfs/volumes using its friendly name (if it has one) or its UUID.

Using the Virtual Infrastructure Client to perform a rescan

From the VI Client:

Click on the ESX Server host that you want to perform the rescan on.

Click the **Configuration** tab.

Click **Storage Adapters**.

Click the **Rescan** link.

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Click **OK** to begin the Rescan.

**Note:** This performs a rescan of every HBA, regardless of the HBA that is selected in the Storage Adapters windows.

You can monitor the progress of the rescan by opening an SSH session to the service console and executing the following command:

```
tail -f /var/log/vmkernel
```

Press CTRL+C to exit the tail command.

The Rescan in the VI Client, by default, combines the rescan for new LUNs (and removal of retired or removed LUNs) with the detection of new VMFS data stores, depending on which check boxes are selected when the rescan is initiated.

**Caution:** The rescan and data store detection are asynchronous processes. This means that the detection process for new data stores may complete before the detection process for new LUNs is complete. You may need to perform the rescan twice if the newly added LUN has a VMFS data store on it.

**1.c** Verify that the fibre switch zoning configuration permits the ESX host to see the storage array. Contact your switch vendor if you require assistance.

**1.D** Verify that the fibre switch propagates RSCN messages to the ESX hosts. For more information, see [Configuring fibre switch so that ESX Server doesn't require a reboot after a zone set change \(1003916\)](#)

Configuring fibre switch so that ESX Server doesn't require a reboot after a zone set change

Details

A change was made to the active zone set of the fabric switches. After a rescan from the Virtual Infrastructure Client or the ESX Server command line, all targets affected by the zoning configuration changes are now visible. These targets become visible after the ESX Server has been rebooted.

Solution

When a change occurs on an active zone set of a fabric switch, most fibre channel switches issue a Registered State Change Notification (RSCN) event to the devices attached to them, such as ESX Servers and storage arrays. The Host Bus Adapter (HBA) drivers used on ESX Server register with the fabric switch to receive RSCN events. However, the fabric switch may be configured to not issue these events, preventing the ESX Server from receiving these events. This causes target visibility and failover problems on the ESX Server.

The following activities are examples of zone set changes:

Adding a zone

Removing zones

Modifying zones

Activating zone sets

Deactivating zone sets

Enabling and disabling the default zone set

The following switches can be configured to suppress RSCN events:

Brocade SilkWorm 4100 series switch (re-branded McData Spheron-3232 series switch).

EMC connectrix ED-140M switch.

To enable RSCN events, configure the Switch Operating Parameters so that the Suppress Zoning RSCN Zone Set Activations is disabled.

Other fibre switches may also be configured to suppress or allow RSCN events. For more information on configuring the fabric switch operating parameters, please contact your switch vendor.

**1.e** Verify that the storage array is listed on the Storage/SAN Compatibility Guide for ESX 3.x found at [Verifying ESX Server hardware \(System, Storage and I/O\) devices are supported \(1003916\)](#).

Verifying that ESX host hardware (System, Storage, and I/O) devices are supported

Details

This article provides links to ESX host Hardware Compatibility Documents (HCLs) so that you can verify that System, Storage, and I/O devices are on the VMware Certified and Supported Hardware Compatibility List.

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Additionally, you can also verify if your systems and hardware require specific BIOS and firmware versions to support your System, Storage, or I/O devices. If your System, Storage, or I/O devices are not listed or no specific BIOS or firmware versions are listed, contact your OEM or third party vendor for further verification and support.

#### Solution

##### Confirm Hardware Compatibility

To confirm hardware compatibility:

Check the ESX host logs (/var/log/vmkernel or /var/log/dmesg) for system identifier information.

Run the following command on the ESX host service console as root:

```
cat /var/log/dmesg |less
```

Type /Vendor and press Enter when the contents of the dmesg file are displayed to the console.

The output appears similar to:

```
BIOS Vendor: Dell Computer Corporation
```

```
BIOS Version: A05
```

```
BIOS Release: 01/09/2006
```

```
System Vendor: Dell Computer Corporation
```

```
Product Name: PowerEdge 2850
```

```
Version:
```

```
Serial Number: BMQRLB1
```

```
UUID 44454c4c4d0010518052c2c04f4c4231
```

```
Board Vendor: Dell Computer Corporation
```

```
Board Name: 0NJ023
```

Identify the SCSI shared storage devices by doing the following:

For ESX 3.x, run the command:

```
cat /proc/vmware/scsi/vmhba#/:#:#
```

**Note:** The vmhba#/:#:# represents the canonical name for the path. For more information, see [Identifying disks when working with VMware ESX \(1014953\)](#).

ESX 3.X

Use these commands to collect disk and LUN information from within ESX.

The command esxcfg-mpath -l generates a compact list of the LUNs currently connected to the ESX host.

The output appears similar to:

```
Disk vmhba32:0:0 /vmfs/devices/disks/vml.02000000060060160c0521501065cacf13f9fdd1152414  
(512000MB) has 2 paths and policy of Most Recently Used  
iScsi sw iqn.1998-01.com.vmware:esxhost-41e85afe<->iqn.1992-04.com.iscsi:a0 vmhba32:0:0 Sta  
preferred  
iScsi sw iqn.1998-01.com.vmware:esxhost-41e85afe<->iqn.1992-04.com.iscsi:b0 vmhba32:1:0 On
```

The command esxcfg-vmhba -m generates a compact list of the LUNs currently connected to the host.

The output appears similar to:

```
vmhba1:0:0:3 /dev/sda3 48f85575-5ec4c587-b856-001a6465c102  
vmhba2:0:4:1 /dev/sdc1 48fb08e5-c04f6d90-1edb-001cc46b7a18  
vmhba2:0:3:1 /dev/sdb1 48fb08be-b9638a60-aa72-001cc46b7a18  
vmhba32:0:1:1 /dev/sde1 48fe2807-7172dad8-f88b-0013725ddc92  
vmhba32:0:0:1 /dev/sdd1 48fe2a3d-52c8d458-e60e-001cc46b7a18
```

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The command ls -alh /vmfs/devices/disks lists the possible targets for certain storage operations.

The output appears similar to:

```
Irwxrwxrwx 1 root root 58 Oct 16 12:54 vmhba2:0:3:0 ->
vml.0200030000600805f300124a90ca40a0bcd05c00294d5341313030
Irwxrwxrwx 1 root root 60 Oct 16 12:54 vmhba2:0:3:1 ->
vml.0200030000600805f300124a90ca40a0bcd05c00294d5341313030:1
Irwxrwxrwx 1 root root 58 Oct 16 12:54 vmhba2:0:4:0 ->
vml.0200040000600805f300124a9006d5bbdeb08b002a4d5341313030
Irwxrwxrwx 1 root root 60 Oct 16 12:54 vmhba2:0:4:1 ->
vml.0200040000600805f300124a9006d5bbdeb08b002a4d5341313030:1
Irwxrwxrwx 1 root root 58 Oct 16 12:54 vmhba2:1:3:0 ->
vml.0200030000600805f300124a90ca40a0bcd05c00294d5341313030
Irwxrwxrwx 1 root root 60 Oct 16 12:54 vmhba2:1:3:1 ->
vml.0200030000600805f300124a90ca40a0bcd05c00294d5341313030:1
Irwxrwxrwx 1 root root 58 Oct 16 12:54 vmhba2:1:4:0 ->
vml.0200040000600805f300124a9006d5bbdeb08b002a4d5341313030
Irwxrwxrwx 1 root root 60 Oct 16 12:54 vmhba2:1:4:1 ->
vml.0200040000600805f300124a9006d5bbdeb08b002a4d5341313030:1
The following are definitions for some of the identifiers and their conventions:
vmhba<Adapter>:<Target>:<LUN>
```

This identifier can be used to identify either a LUN or a path to the LUN. When ESX detects that path is associated to one LUN, each path is assigned this identifier. The entire LUN then inherits the same name as the first path. When using this identifier for an entire LUN, the identified is called the canonical name. When this identifier is used for a path it is called the path name. These naming conventions may vary from host to ESX host, and may change if storage hardware replaced. This identifier is generally used for operations with utilities such as vmkfstools.

Example: vmhba1:0:0 = Adapter 1, Target 0, and LUN 0.

vmhba<Adapter>:<Target>:<LUN>:<Partition>

This identifier is used in the context of a canonical name and is used to identify a partition on the LUN. In addition to the canonical name, there is a :<Partition> appended to the end of the identifier. The <Partition> represents the partition number on the LUN or Disk. If the <Partition> is specified as 0, it identifies the entire disk instead of only one partition. These naming conventions may vary from ESX host to ESX host, and may change if storage hardware replaced. This identifier is generally used for operations with utilities such as vmkfstools.

Example: vmhba1:0:0:3 = Adapter 1, Target 0, LUN 0, and Partition 3.

vml.<VML> or vml.<VML>:<Partition>

The VML Identifier can be used interchangeably with the canonical name. Appending the :<Partition> in the same way described above. This identifier is generally used for operations with utilities such as vmkfstools.

/dev/sd<Device Letter> or /dev/sd<Device Letter><Partition>

This naming convention is not VMware specific. This convention is used exclusively by the service console and open source utilities which come with the service console. The <Device Letter> represents the LUN or disk and is assigned by the service console during boot. The optional <Partition> represents the partition number on the LUN or disk. These naming conventions may vary from ESX host to ESX host, and may change if storage hardware replaced. This identifier is generally used for operations with utilities such as fdisk and dd.

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**Note:** VMware ESXi does not have a service console; disks are referred to by the **VML Identifier**.

<UUID>

The <UUID> is a unique number assigned to a VMFS volume upon the creation of the volume. It may be included in syntax where you need to specify the full path of specific files on a datastore.

ESX 4.X

Use these commands to collect disk and LUN information from within ESX:

The command esxcfg-mpath -b generates a compact list of LUNs currently connected to the ESX host

The output appears similar to:

```
naa.6090a038f0cd4e5bdaa8248e6856d4fe : EQLOGIC iSCSI Disk
(naa.6090a038f0cd4e5bdaa8248e6856d4fe)
vmhba33:C0:T1:L0 LUN:0 state:active iscsi Adapter: iqn.1998-01.com.vmware:bs-tse-i137-35c1bf1
IQN=iqn.2001-05.com.equallogic:0-8a0906-5b4ecdf03-fed456688e24a8da-bs-tse-vc40-250g Alias=
Session=00023d000001 PortaITag=1
```

The command esxcfg-scsidevs -l generates a list of LUNs currently connected to the ESX host.

The output appears similar to:

```
mpx.vmhba0:C0:T0:L0
Device Type: Direct-Access
Size: 139890 MB
Display Name: Local ServeRA Disk (mpx.vmhba0:C0:T0:L0)
Plugin: NMP
Console Device: /dev/sdb
Devs Path: /vmfs/devices/disks/mpx.vmhba0:C0:T0:L0
Vendor: ServeRA Model: 8k-I Mirror Revis: V1.0
SCSI Level: 2 Is Pseudo: false Status: on
Is RDM Capable: false Is Removable: false
Is Local: true
Other Names:
vml.0000000000766d686261303a303a30
```

The command ls -alh /vmfs/devices/disks lists the possible targets for certain storage operations.

The output appears similar to:

```
lrwxrwxrwx 1 root root 19 Oct 16 13:00 vml.0000000000766d686261303a303a30 -> mpx.vmhba0:l0
lrwxrwxrwx 1 root root 21 Oct 16 13:00 vml.0000000000766d686261303a303a30:1 ->
mpx.vmhba0:C0:T0:L0:1
lrwxrwxrwx 1 root root 21 Oct 16 13:00 vml.0000000000766d686261303a303a30:2 ->
mpx.vmhba0:C0:T0:L0:2
lrwxrwxrwx 1 root root 21 Oct 16 13:00 vml.0000000000766d686261303a303a30:3 ->
mpx.vmhba0:C0:T0:L0:3
lrwxrwxrwx 1 root root 21 Oct 16 13:00 vml.0000000000766d686261303a303a30:5 ->
mpx.vmhba0:C0:T0:L0:5
lrwxrwxrwx 1 root root 36 Oct 16 13:00
vml.020000000006060160b4111600624c5b749c7edd11524149442035 ->
naa.60060160b4111600624c5b749c7edd11
lrwxrwxrwx 1 root root 38 Oct 16 13:00
vml.020000000006060160b4111600624c5b749c7edd11524149442035:1 ->
naa.60060160b4111600624c5b749c7edd11:1
```

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The following are definitions for some of identifiers and their conventions:

naa.<NAA> or eui.<EUI>

NAA stands for Network Addressing Authority identifier. EUI stands for Extended Unique Identifier. TI number is guaranteed to be unique to that LUN. The NAA or EUI identifier is the preferred method of identifying LUNs and the number is generated by the storage device. Since the NAA or EUI is unique LUN, if the LUN is presented the same way across all ESX hosts, the NAA or EUI identifier remains the same. For more information on these standards, see the SPC-3 documentation from the [International Committee for Information Technology Standards \(T10\)](#).

naa.<NAA>:<Partition> or eui.<EUI>:<Partition>

The <Partition> represents the partition number on the LUN or Disk. If the <Partition> is specified as it identifies the entire disk instead of only one partition. This identifier is generally used for operation utilities such as vmkfstools.

Example: naa.6090a038f0cd4e5bdaa8248e6856d4fe:3 = Partition 3 of LUN  
naa.6090a038f0cd4e5bdaa8248e6856d4fe.

mpx.vmhba<Adapter>:<Channel>:<Target>:<LUN> or  
mpx.vmhba<Adapter>:<Channel>:<Target>:<LUN>:<Partition>

Some devices do not provide the NAA number described above. In these circumstances, an MPX Id is generated by ESX to represent the LUN or disk. The identifier takes the form similar to that of the name of previous versions of ESX with the mpx. prefix. This identifier can be used in the exact same way as the NAA Identifier described above.

vml.<VML> or vml.<VML>:<Partition>

The VML Identifier can be used interchangeably with the NAA Identifier and the MPX Identifier. Appending <Partition> works in the same way described above. This identifier is generally used for operations utilities such as vmkfstools.

vmhba<Adapter>:<Channel>:<Target>:<LUN>

This identifier is now used exclusively to identify a path to the LUN. When ESX detects that paths exist to one LUN, each path is assigned this Path Identifier. The LUN also inherits the same name as the file but it is now used as a Runtime Name, and not used as readily as the above mentioned identifiers as it may be different depending on the host you are using. This identifier is generally used for operations with such as vmkfstools.

Example: vmhba1:C0:T0:L0 = Adapter 1, Channel 0, Target 0, and LUN 0.

**Note:** Generally, multi-port fiber channel adapters are equipped with dedicated controllers for each connection, and therefore each controller is represented by different vmhba#. If the adapter supports multiple connections to the same controller, it is represented by a different channel number. This representation is directly dependent on the capability of the adapter.

/dev/sd<Device Letter> or /dev/sd<Device Letter>:<Partition>

This naming convention is not VMware specific. This convention is used exclusively by the service console and open source utilities which come with the service console. The <Device Letter> represents the LUN or disk and is assigned by the service console during boot. The optional <Partition> represents the partition number on the LUN or disk. These naming conventions may vary from ESX host to ESX host and may change if storage hardware is replaced. This identifier is generally used for operations with utilities such as fdisk and dd.

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**Note:** VMware ESXi does not have a service console; disks are referred to by the VML Identifier.

The output for ESX 3.x is similar to:

Vendor: DGC Model: RAID 5 Rev: 0324

For ESX 4.x, run the command:

```
esxcfg-scsidevs -l | grep -i 'display name|vendor'
```

The output for ESX 4.0 is similar to:

Display Name: Local ServeRA Disk (mpx.vmhba0:C0:T0:L0)

Vendor: ServeRA Model: 8k-l Mirror Revis: V1.0

Run the following command from the ESX host service console to find additional peripherals and devi

```
Ispci -v
```

The output appears similar to:

02:0e.0 RAID bus controller: Dell Computer Corporation PowerEdge Expandable RAID Controller 4E/S (rev 06)

Subsystem: Dell Computer Corporation Unknown device 016d

Flags: bus master, stepping, 66Mhz, medium devsel, latency 64, IRQ 24

Memory at d80f0000 (32-bit, prefetchable) [size=64K]

Memory at dfdc0000 (32-bit, non-prefetchable) [size=256K]

Expansion ROM at dfe00000 [disabled] [size=128K]

Capabilities: [c0] Power Management version 2

Capabilities: [d0] Message Signalled Interrupts: 64bit+ Queue=0/1 Enable-

Capabilities: [e0] PCI-X non-bridge device.

06:07.0 Ethernet controller: Intel Corporation 8254NXX Gigabit Ethernet Controller (rev 05)

Subsystem: Dell Computer Corporation Unknown device 016d

Flags: bus master, 66Mhz, medium devsel, latency 32, IRQ 25

Memory at dfae0000 (32-bit, non-prefetchable) [size=128K]

I/O ports at ecc0 [size=64]

Capabilities: [dc] Power Management version 2

Capabilities: [e4] PCI-X non-bridge device.

07:08.0 Ethernet controller: Intel Corporation 8254NXX Gigabit Ethernet Controller (rev 05)

Subsystem: Dell Computer Corporation Unknown device 016d

Flags: bus master, 66Mhz, medium devsel, latency 32, IRQ 26

Memory at df8e0000 (32-bit, non-prefetchable) [size=128K]

I/O ports at dcc0 [size=64]

Capabilities: [dc] Power Management version 2

Capabilities: [e4] PCI-X non-bridge device.

Compare your hardware information to the VMware ESX Server Systems, I/O, and SAN Compatibility

**1.f** Verify that the initiator is registered on the array. You may need to contact your storage vendor instructions on this procedure.

**1.g** Verify the physical hardware:

The storage processors on the array.

The fibre switch and the Gigabit Interface Converter (GBIC) units in the switch.

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The fibre cables between the fibre switch and the array.

The array itself.

**Note:** A rescan is required after any change is made to see if the targets are detected.

**Note:** If your problem still exists after trying the steps in this article, please:

**II.**  Verify that no more than a single ESX host cannot see the shared storage. If so, select the appropriate storage technology:

**2.  For Fibre channel, see [Troubleshooting ESX Server connectivity to a fibre channel array \(1003682\)](#)**

### Troubleshooting ESX and ESXi connectivity to fibre channel arrays

#### Symptoms

One ESX host or ESXi host cannot see any targets from all storage arrays.

The storage array does not report the HBA of the ESX or ESXi as being logged in.

#### Purpose

This article is designed to guide you through the most common steps to identify a connectivity problem between an ESX or ESXi to a shared storage device.

#### Resolution

Please validate that each troubleshooting step below is true for your environment. Each step will provide instructions or a link to a document, in order to eliminate possible causes and take corrective action if necessary. The steps are ordered in the most appropriate sequence to isolate the issue and identify the proper resolution. Please do not skip a step.

To troubleshoot connectivity issues to a fibre channel array:

Verify that ESX or ESXi cannot see any targets in a shared storage environment. For more information, see [Using esxcfg-mpath on the command line and the Virtual Infrastructure Client to obtain LUN pathing information \(1003973\)](#).

Verify that a rescan does not restore visibility to all the targets. For more information, see [Using esxrescan on the command line and the Virtual Infrastructure Client to perform a storage rescan \(1003916\)](#).

Verify that the Host Bus Adapter (HBA) firmware is at the certified level and is listed on the I/O Component Guide for ESX Server 3.x found in the [Hardware Compatibility List \(HCL\) index \(1003916\)](#).

Verify that the initiator is registered on the storage array. You may need to contact your storage vendor for instructions on this procedure.

Verify all the fibre channel physical hardware:

The fibre switch and the Gigabit Interface Converter (GBIC) units in the switch.

The fibre cables between the SAN and the ESX Server.

The Host Bus Adapter (HBA).

**Note:** You may need to contact your hardware vendor for more information about verifying correct functionality.

**Note:** If your problem still exists after trying the steps in this article, please:

**III** Verify that the LUN is presented and available. For more information, see [Troubleshooting LUN connectivity issues \(1003955\)](#).

### Troubleshooting LUN connectivity issues

#### Symptoms

Targets on the storage array are visible but one or more LUNs are not.

LUN not visible

LUN cannot connect

LUN is missing

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Purpose

This document assists you in troubleshooting a scenario where LUNs are missing.

Resolution

The following steps assist you in identifying a LUN connectivity issue.

Verify that the ESX Server host can see the LUN(s). For more information, see [Using esxcfg-mpath on command line and the Virtual Infrastructure client to obtain LUN pathing information \(1003973\)](#).

Verify that a rescan restores visibility to the LUN(s). For more information, see [Using esxcfg-rescan on command line and the Virtual Infrastructure Client to perform a storage rescan \(1003988\)](#).

Verify SCSI reservation conflicts are not in excess. See:

[Resolving SCSI Reservation Conflicts \(1002293\)](#)

[SCSI Reservation Issue with Fibre Channel HBAs \(4365932\)](#)

[Insight Manager may cause excessive SCSI reservation conflicts \(1004771\)](#)

[Unable to create a VMFS3 partition on a LUSE LUN \(1000286\)](#)

[Storage LUNs on NetApp 960 become unresponsive during GFiler takeover/giveback operation \(1002\)](#)

Verify that the LUN is presented to the ESX Server. You may need to contact your array vendor for assistance.

Verify that the LUN is in the same storage group as all the ESX Servers (if applicable to the array).

Verify that the LUN is configured correctly for use with ESX Server.

Note: Consult the appropriate SAN configuration guide for your array, listed below in the Additional information section.

Verify that the LUN is not set to read-only on the array.

**IV** Verify that the ESX host cannot see the datastore.

Troubleshooting VMFS-3 datastore issues

Symptoms

LUN is visible but the datastore is not available in /vmfs/volumes

Virtual machines fail to power on

Running virtual machines may stop responding, fail, or generate a Blue Screen

ESX Server host becomes disconnected from VirtualCenter

The following warnings are displayed:

WARNING: LVM: 4844: [vhbaH:T:L:P] detected as a snapshot device. Disallowing access to the LU! resignaturing is turned off.

<Date> esx vmkernel: 10:19:07:07.881 cpu3: 10340 SCSI: 5637: status SCSI LUN is in snapshot st rstatus 0xc0de00 for vhba1:0:6. residual R 999, CR 8-, ER3.

<Date> esx vmkernel: 10:19:07:07.881 cpu3: <world ID> SCSI 6624: Device vhba1:0:6. is a dea snapshot.

Purpose

This article is designed to assist with troubleshooting issues where the VMFS-3 datastore does not m

Resolution

To identify the source of datastore issues:

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4.a Verify that the LUN is presented to ESX Server host. For more information, see [Troubleshooting LUN connectivity issues \(1003955\)](#).

4.b Verify that the LUN is not being detected as a deactivated snapshot. For more information, see:

**4.b.1 Cannot access LUN as it is marked as deactivated snapshot (1003641)**.

Cannot access LUN as it is marked as deactivated snapshot

Symptoms

If you are using a EMC CLARiiON storage array and your ESX host is rebooted, you may experience t symptoms:

You cannot access LUNs

The LUNs are marked as deactivated snapshots

All affected LUNs show up in the multipath output:

VMFS-3 datastores do not mount.

RDM LUNs are inaccessible to the guest operating system they are presented to. They are reported a Unallocated in the computer management view.

The following messages are found in the log /var/log/vmkernel for every LUN that is having the problem:

In ESX 3.5:

```
Aug 1 03:12:53 esx vmkernel: 10:19:07:07.881 cpu3:1034) SCSI: 8043: vmhba1:0:6:0 status = 2, 0x25 0x1
Aug 1 03:12:53 esx vmkernel: 10:19:07:07.881 cpu3:1034) SCSI: 8120: vmhba1:0:6:0 is a deactivated snapshot.
Aug 1 03:12:53 esx vmkernel: 10:19:07:07.881 cpu3:1034) WARNING: SCSI: 5637: status SCSI LL snapshot state, rstatus 0xc0de00 for vmhba1:0:6. residual R 999, CR 80, ER 3
Aug 1 03:12:53 esx vmkernel: 10:19:07:07.881 cpu3:1034) SCSI: 6624: Device vmhba1:0:6 is a deactivated snapshot
```

In ESX 4.0:

```
Sep 24 05:05:07 system-name vmkernel: 0:00:01:25.953 cpu1:4097)NMP:
nmp_CompleteCommandForPath: Command <##>
(0x4100070dfa40) to NMP device "naa.60060160d56e1b000e696c75b9a8de11"
failed on physical path "vmhba1:C0:T0:L22" H:0x0
D:0x2 P:0x0 Valid sense data: 0x5 0x25 0x1.
The option LVM.DisallowSnapshotLun is set to 1 (the default). Changing it to 0 and performing a resc not return visibility to the content of the LUNs.
For more information, see VMFS Volume Can Be Erroneously Recognized as a Snapshot \(6482648\).
```

The Navisphere manager reports that there are snapshots sessions of a source LUN in place and some of them are currently inactive.

Those inactive sessions match the UUID of the missing data stores/RDMs.

In ESX 3.5, you can find these at /proc/vmware/scsi/vmhba1/X:Y.

In ESX 4.0, run this command:

```
esxcfg-scsidevs -l
```

**4.b.2 LUN detected as a snapshot because LUN presentation settings were incorrect (1002351)**.

LUN detected as a snapshot because LUN presentation settings were incorrect

Details

Unable to see available datastores.

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Logs in /var/log/vmkwarning :

LVM: 5670: Device vmhbaH:T:LP is a snapshot:  
LVM: 5676: disk ID: <type Y1, len Y2, lun Y3, devType Y4, scsi Y5, h(id) Y6>  
LVM: 5678: m/d disk ID: <type X1, len X2, lun X3, devType X4, scsi X5, h(id) X6>  
WARNING: LVM: 4844: [vmhbaH:T:L:P] detected as a snapshot device. Disallowing access to the LU  
resignaturing is turned off.

A rescan of the storage does not bring the missing data stores back.

Solution

The presentation settings for the LUN are incorrect for use with an ESX host. Consult the *Setting Up : Storage Devices with ESX Server* section of the [SAN Configuration guide](#) or contact your array vendor appropriate settings.

A rescan after implementing the correct settings mounts the volume. A reboot is not required.

As a workaround, you can set the LVM.DisallowSnapshotLUN to 0. A rescan after this will restore visibility to the data store.

□

**4.c** □ Verify that the data store is not being detected as a snapshot. For more information, see [VMFS Can Be Erroneously Recognized as a Snapshot \(6482648\)](#).

VMFS Volume Can Be Erroneously Recognized as a Snapshot

Details

In some configurations, a VMFS-3 volume can be recognized as a snapshot even when it is not.

The problem was tracked to the following scenario:

Server A is presented LUNs 1, 2, and 3

The same LUNs are then presented to server B as LUNs 5, 6, and 7.

When a VMFS-3 volume is created on LUNs 1, 2, and 3 via server A, rescanning the SAN from server B in the latter complaining that volumes on LUNs 5, 6, and 7 are snapshots of those on LUNs 1, 2, and 3. The vmkernel logs on server B show:

```
Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.787 cpu13:1046)LVM: 5670: Device vmhba1:0:5:1 |  
snapshot:  
Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.787 cpu13:1046)LVM: 5676: disk ID: <type 2, len 2  
devType 0, scsi 5, h(id) 10179760818951437974>  
Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.787 cpu13:1046)LVM: 5678: m/d disk ID: <type 2,  
lun 1, devType 0, scsi 5, h(id) 10179760818951437974>  
Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.790 cpu13:1046)LVM: 5670: Device vmhba1:0:6:1 |  
snapshot:  
Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.790 cpu13:1046)LVM: 5676: disk ID: <type 2, len 2  
devType 0, scsi 5, h(id) 11552037668126695191>  
Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.790 cpu13:1046)LVM: 5678: m/d disk ID: <type 2,  
lun 2, devType 0, scsi 5, h(id) 11552037668126695191>  
Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.794 cpu13:1046)LVM: 5670: Device vmhba1:0:7:1 |  
snapshot:  
Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.794 cpu13:1046)LVM: 5676: disk ID: <type 2, len 2  
devType 0, scsi 5, h(id) 13372428508588014685>  
Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.794 cpu13:1046)LVM: 5678: m/d disk ID: <type 2,  
lun 3, devType 0, scsi 5, h(id) 13372428508588014685>
```

If the Storage Processors are not configured as required for use with ESX Server (see corresponding for detailed configuration documents), it can result in this behavior.

Sample array misconfiguration that could result in this issue include:

**Symmetrix:**

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LUNs presented to two FA ports as 1, 2, and 3  
Same LUNs presented to two other FA ports as 5, 6, and 7  
Server A is zoned to the first two FAs  
Server B is zoned to the second two FAs

**Clarilon:**

ESX Server A is in Storage Group X  
ESX Server B is in Storage Group Z  
LUNs are assigned to Storage Group X as LUNs 1, 2, and 3  
The same LUNs are assigned to Storage Group Z as LUNs 5, 6, and 7  
Solution  
The LUNs presented to a set of servers must be presented with the same set of LUN numbers to all hosts.

For the above sample configurations, do the following:

**Symmetrix:** Present the LUNs to all FAs to use the same LUN numbers.

**Clarilon:** Use a single Storage Group and add to it all ESX host that will access the LUNs assigned to Storage Group. This always presents the same HLU (Host Logical Unit) number to all hosts in the SAN Storage Group.

**Other Arrays:** Use an equivalent process to maintain the same LUN numbers presented to all hosts share it.

If this is not possible, see the [SAN Configuration Guide](#) for a solution. This solution is presented below your convenience, with updates from August 9, 2006 that correct some issues in the original text.

**Issues with Offline VMFS Volumes on Certain Arrays**

On some arrays, it may not be possible to display the LUN with the same LUN ID across hosts. As a result, the ESX Server system incorrectly detects the LUN as a snapshot and places it offline. Examples of storage arrays for which the same LUN ID may not be visible for a given LUN across hosts are Clarilon AX100 and IBM TotalStorage Enterprise Storage Systems (previously Shark Storage systems).

**Note:** If you use Clarilon AX100 with Navisphere Express, you cannot configure the same LUN ID across storage groups. You must instead use a version of Navisphere software that has more comprehensive management capabilities. For more information regarding Navisphere, please consult EMC support documentation. For IBM TotalStorage 8000, you need to recreate these LUNS. For more information regarding IBM TotalStorage, please consult IBM support and documentation.

To resolve issues with invisible LUNs on certain arrays:

In VMware Infrastructure Client, select the host in the inventory.

Click the **Configuration** tab and click **Advanced Settings**.

Select **LVM** in the left panel and set **LVM.DisallowSnapshotLUN** to 0 in the right panel.

**Warning:** When **LVM.DisallowSnapshotLUN** is set to 0, no snapshot LUNs should be presented to the host. Otherwise, data corruption may result. For details, see *State 3 - EnableResignature=no, DisallowSnapshotLUN=no* in the [SAN Configuration Guide](#).

Rescan all VMFS volumes.

After the rescan, all VMFS volumes are available.

**Note:** A resignature may have occurred leaving certain ESX Server hosts believing that the LUN is no longer a snapshot. If you decide to perform a resignature, plan a major outage window to do this. For more information, see [Resignaturing VMFS3 Volumes That Are Not Snapshots \(9453805\)](#).

Resignaturing VMFS3 volumes from VMware Infrastructure Client

**Details**

You recently changed the Host Mode setting on a Hitachi Data System (HDS) storage array.

VMFS3 volumes are seen as snapshot volumes.

Volumes are disabled or missing unexpectedly.

Datastores are missing after SAN upgrade.

Datastores are missing unexpectedly.

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You recently set the SPC-2 flag on the EMC Symmetrix storage array

You recently downgraded the Perc 4e/Di firmware and local datastores are now missing

/var/log/vmkernel contains the entry:

vmhba0:0:0:1 may be snapshot

You recently performed the steps contained in [On ESX Server Systems with Multiple PERC 4 Controllers Become Temporarily Inaccessible After Upgrading the PERC 4 Firmware \(5966817\)](#)

Solution

**Note:** This article is for ESX 3.x hosts. If you have an ESX 4.x host, see [ESX 4.x handling of LUNs detected as snapshot \(1011387\)](#).

ESX 4.x handling of LUNs detected as snapshot

Purpose

This article discusses differences with how ESX 4.x handles LUNs detected as a snapshot when compared to ESX 3.x.

Resolution

Prior to ESX 4.0

Historically, the EnableResignature and DisallowSnapshotLUN were applied server wide and applied to all volumes on an ESX. The new Resignature and Force-Mount are volume specific. This offers much greater granularity in the handling of snapshots.

Changes in ESX 4.0

The handling of Snapshot LUNs has changed dramatically in ESX 4.x:

*Resignature* is equivalent to *EnableResignature* = 1 in ESX 3.x.

*Force-Mount* is equivalent to *DisallowSnapshotLUN* = 0 in ESX 3.x.

The advanced configuration options *EnableResignature* and *DisallowSnapshotLUN* have been replaced in ESX 4 with a new CLI utility:

ESX 4.x and ESXi 4.x: esxcfg-volume

RCLI: vicfg-volume

Mounting and resignaturing from the command line

The *esxcfg-volume* command can be used in this way:

Execute the following command to list the volumes that are detected as snapshots:

```
# esxcfg-volume -l
```

Execute the following command to mount the volume "Name" without performing a resignaturing of the volume (this volume will not be mounted when the ESX host is rebooted):

```
# esxcfg-volume -m "Name"
```

Execute the following command to mount the volume "Name" without performing a resignaturing of the volume (this volume will be mounted when the ESX host is rebooted):

```
# esxcfg-volume -M "Name"
```

Execute the following command to resignature the volume "Name" (the volume will be mounted immediately after the resignature):

```
# esxcfg-volume -r "Name"
```

Mounting and resignaturing using the vSphere Client

It is no longer necessary to handle snapshots via the CLI. Resignature and Force-Mount operations have GUI support and vCenter Server does VMFS rescans on all hosts after a resignature operation. This functionality is now built into the Add Storage wizard in vSphere Client. Through the GUI, the Add Storage Wizard now displays the VMFS label. Therefore, if a device is not mounted, but it has a label associated with it, you can make the assumption that it is a snapshot, or to use ESX 4.x terminology, a Volume Copy. When you use the GUI to force-mount a VMFS volume, it makes it a persistent mount which remains in place through reboots of the ESX host. vCenter Server does not allow this volume to be resignatured.

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For more detailed information, see [Managing Duplicate VMFS Datastores in the ESX Configuration Guide](#)

Making this type of change on the storage array results in assigning a new LUN ID (UUID or Serial Number) to all LUNs presented via the modified ports/FAs.

VMFS3 metadata identifies the volumes by several properties which include the LUN number and the (UUID or Serial Number). Because the LUNs now have new UUIDs, the resulting mismatch with the volume leads to LVM identifying the volumes as snapshots.

You must resignature the VMFS3 volumes to make them visible again.

**Important:**

If you do not have actual snapshot LUNs presented and have no plans to present any to these hosts, the directions in [VMFS Volume Can Be Erroneously Recognized as a Snapshot \(6482648\)](#), then skip the steps below.

**VMFS Volume Can Be Erroneously Recognized as a Snapshot**

**Details**

In some configurations, a VMFS-3 volume can be recognized as a snapshot even when it is not.

The problem was tracked to the following scenario:

Server A is presented LUNs 1, 2, and 3

The same LUNs are then presented to server B as LUNs 5, 6, and 7.

When a VMFS-3 volume is created on LUNs 1, 2, and 3 via server A, rescanning the SAN from server B in the latter complaining that volumes on LUNs 5, 6, and 7 are snapshots of those on LUNs 1, 2, and 3. The vmkernel logs on server B show:

```
Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.787 cpu13:1046)LVM: 5670: Device vmhba1:0:5:1 i  
snapshot:  
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devType 0, scsi 5, h(id) 10179760818951437974>  
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snapshot:  
Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.790 cpu13:1046)LVM: 5676: disk ID: <type 2, len 2  
devType 0, scsi 5, h(id) 11552037668126695191>  
Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.790 cpu13:1046)LVM: 5678: m/d disk ID: <type 2,  
lun 2, devType 0, scsi 5, h(id) 11552037668126695191>  
Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.794 cpu13:1046)LVM: 5670: Device vmhba1:0:7:1 i  
snapshot:  
Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.794 cpu13:1046)LVM: 5676: disk ID: <type 2, len 2  
devType 0, scsi 5, h(id) 13372428508588014685>  
Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.794 cpu13:1046)LVM: 5678: m/d disk ID: <type 2,  
lun 3, devType 0, scsi 5, h(id) 13372428508588014685>
```

If the Storage Processors are not configured as required for use with ESX Server (see corresponding configuration documents), it can result in this behavior.

Sample array misconfiguration that could result in this issue include:

**Symmetrix:**

LUNs presented to two FA ports as 1, 2, and 3

Same LUNs presented to two other FA ports as 5, 6, and 7

Server A is zoned to the first two FAs

Server B is zoned to the second two FAs

**Clarion:**

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ESX Server A is in Storage Group X  
ESX Server B is in Storage Group Z  
LUNs are assigned to Storage Group X as LUNs 1, 2, and 3  
The same LUNs are assigned to Storage Group Z as LUNs 5, 6, and 7

If you have to resignature a datastore spanned across more than one LUN, you must make sure that LUNs that comprise the datastore are in a snapshot state. Failing to do so may result in getting the data locked into an inconsistent status, which may require VMware support assistance.

To resignature the VMFS3 volumes in VMware Infrastructure (VI) Client:

**Note:** You can complete this resignaturing procedure from the command line. For more information, see [ESX host\(s\) added to cluster are seeing snapshot LUNs despite correct Host LUN ID being presented by SAN array \(1005751\)](#).

Resignaturing VMFS3 volumes from the command line

Symptoms

You recently changed the Host Mode setting on an HDS storage array

VMFS3 volumes are seen as snapshot volumes

Volumes are disabled or missing unexpectedly

Datastores are missing unexpectedly

You recently set the SPC-2 flag on the EMC Symmetrix storage array

You recently downgraded the Perc 4e/Di firmware and local datastores are now missing

/var/log/vmkernel contains the entry:

vmhba0:0:0:1 may be snapshot

You recently performed the steps contained in [On ESX Server Systems with Multiple PERC 4 Controllers Become Temporarily Inaccessible After Upgrading the PERC 4 Firmware \(5966817\)](#)

Resolution

Making this type of change on the storage array results in assigning a new LUN ID (UUID or Serial Number) to all LUNs presented via the modified ports/FAs.

VMFS3 metadata identifies the volumes by several properties which include the LUN number and the (UUID or Serial Number). Because the LUNs now have new UUIDs, the resulting mismatch with the volume leads to LVM identifying the volumes as snapshots.

You must resignature the VMFS3 volumes to make them visible again.

**Caution:**

Before performing the steps in this article:

Wait for a maintenance window

Make sure all virtual machines are backed up properly

Do not deviate from these steps.

To resignature the VMFS3 volumes from the command line:

Power off all virtual machines on all ESX hosts that are stored on the volume.

Run the following command to re-read the volume on each ESX host:

```
# vmkfstools -V
```

If this works, the problem is resolved. If this does not work, proceed to step 3.

Remove all of the same virtual machines from the inventory in the VirtualCenter server.

**Warning:** Do not delete the virtual machines from disk. Remove them from the inventory.

Log in to each host.

Run the following command to verify which HBAs are providing access to the LUN:

```
# esxcfg-mpath -l | less
```

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To set the ESX host to resignature all datastores detected as snapshots on the next rescan, run the following command:

For ESX Classic:

```
# echo "1" /proc/vmware/config/LVM/EnableResignature
```

For ESXi:

```
# esxcfg-advcfg -s 1 LVM/EnableResignature
```

To rescan the storage and perform the resignature on volumes detected as a snapshot, run the following command:

```
# vmkfstools -V
```

To disable the resignature flag, run the following command:

**Warning:** Do not skip this step.

For ESX Classic:

```
# echo "0" /proc/vmware/config/LVM/EnableResignature
```

For ESXi:

```
# esxcfg-advcfg -s 0 LVM/EnableResignature
```

To ensure that the volumes stay mounted after resignaturing is turned off, run the command:

```
# vmkfstools -V
```

Reinventory the virtual machines.

Open VI Client to the VirtualCenter Server. The virtual machines show as inaccessible.

Right-click on the virtual machine and click **Remove From Inventory**.

Double-click the datastore to bring up the datastore browser.

Select the folder in which the virtual machines resides.

Right-click the virtual machine file (extension .vmx) or template file (extension .vmtx)

Click **Add to Inventory**.

Follow the wizard.

**Caution:** This procedure can be time-consuming, depending on the size of the environment. Ensure you budget time for the outage.

Shut down all virtual machines running on the datastores recognized as snapshots.

**Note:** This step is necessary because those datastores are affected by the resignaturing process and must be applied to a datastore that is being used (that is, with active I/O).

Unregister all of the virtual machines on the affected datastore(s). This can be done from VI Client by clicking on the virtual machine and selecting **Remove from Inventory**.

Rescan.

**Note:** The /var/log/vmkernel file contains snapshot messages.

Enable LVM Resignaturig on the first ESX host:

Log in to the ESX host with VI Client.

Click the **Configuration** tab.

Select the **Advanced** setting option.

Choose the **LVM** section.

Set the value of LVM.EnableResignaturing to 1.

Save the change.

Click the storage adapter tab.

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Click **Rescan Adapter** located at the top right corner of the interface.

**Note:** There is no need to select an HBA. All are rescanned.

Leave the default option and proceed.

You are now able to see the VMFS volumes with labels prefixed with snap.

Disable LVM Resignaturizing:

Log on to the ESX host with VI client.

Click the **Configuration** tab.

Select the **Advanced** setting option.

Choose the **LVM** section.

Set the value of LVM.EnableResignaturizing to 0.

Save the change.

No snapshot messages are visible in /var/log/vmkernel.

Re-label the volume.

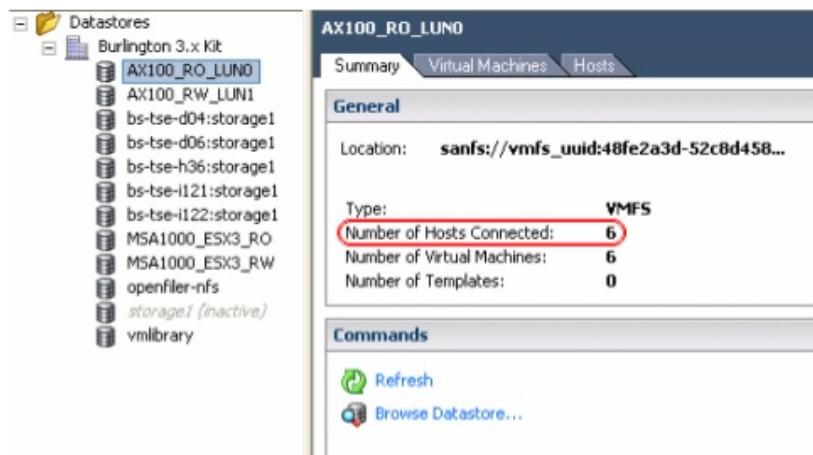
Log in to the VirtualCenter Server with VI Client.

**Note:** Connecting directly to the ESX host does not offer the view identified in step b.

Click the arrow next to the **Inventory** menu option and click **Datastores**.

Select the datastore. Right-click and select **Remove** to remove the old label, which is associated with UUID of the volume.

**Caution:** Ensure that you are removing the correct Datastore entry. In the Datastore view the number of connected hosts should be 0 (identified in the red outline) indicating that the Datastore is not being used by any host or virtual machine. For example:



In this example, the highlighted datastore has 6 ESX hosts connected to it. This datastore is active and cannot be removed.

Perform a remove process in any other view to remove that active datastore.

Click the arrow next to the **Inventory** menu option and click **Hosts & Clusters**.

In the **Summary** tab, you see the list of datastores.

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Click in the name field for the volume and change snap0000 to the original name.

You now have the correct original label associated with the resignatured volume.

Rescan storage from all ESX hosts. You do not need to rescan from the host that performed the resig  
Because the virtual machines are registered against the old UUID, you must re-register them in Virtu

To re-register the virtual machine in VirtualCenter:

Log on to the ESX host with VI client.

Click the **Configuration** tab.

Select **Storage (SCSI, SAN & NFS)**.

Double-click any of the datastores to open the **Datastore** browser.

Navigate to the .vmx file of any of the virtual machines by clicking the folders.

Right-click and select **Add to inventory**.

Remap any RDMS.

If you have a virtual machine that uses an RDM, you must recreate the mapping.

**Caution:** If you used multiple RDMS, it may be difficult to identify one from another. If the RDMS are sizes, you can map them in the correct order by their sizes. If the RDMS are all the same size, this is difficult process because you must map the RDMS to one virtual machine at a time, boot the virtual n and then verify if it is the correct LUN. To prevent having to map the RDMS to one virtual machine at

Make a note of the sizes of the RDMS and which virtual machines they are associated with before start process.

Make a note of the LUN ID before starting this process. You might be able to use this information to i the mapping.

Power on the virtual machines. Reply **yes** if prompted about a new UUID.

If any of the virtual machines refer to missing disks when they power up, check the .vmx file and en: the SCSI disk references are not made against the old UUID instead of against the label (or new labe changed it). For more information, see [Unable to power on a virtual machine after a volume resignat \(1007022\)](#).

Unable to power on a virtual machine after a volume resignature

Symptoms

Some virtual machines fail to boot after

Virtual machines stored on a datastore that was not resignatured fail to boot

Resolution

The disks for the virtual machines are stored on different datastores than the datastore for the virtua machine itself.

While the VMFS where the virtual machine is stored has not been resignatured, the VMFS where the stored has been resignatured. This mean the virtual machine still references the old VMFS UUID to ac disk.

To ensure the virtual machine references the new VMFS UUID:

Unregister the virtual machine from VirtualCenter.

Open a console session to the ESX host.

Make a backup copy of the VMX file.

Update the path to the VMDK with the new UUID in the VMX file.

Register the virtual machine in VirtualCenter.

Power on the virtual machine.

**Warning:** While it is possible to reconfigure the disk from the graphical interface, it presents only the disk and not the delta file if the virtual machine has a snapshot. Thus it boots from the base disk and the snapshot chain.

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Repeat steps 3 through 9 for all subsequent ESX hosts that still see snapshot volumes. If all ESX hosts see the same volumes, this step is not necessary.

**4.D** Verify that the LUN is not larger than 2Tb/2047Gb. This could occur if a LUN was extended. For information, see [Troubleshooting a LUN that was extended in size past the 2Tb/2047Gb limit \(10042\)](#).

Troubleshooting a LUN that is extended in size past the 2TB/2047GB limit

Symptoms

Cannot create VMFS-3 datastore.

Existing VMFS-3 datastore unmounted and no longer mounts.

Guest operating system cannot access an RDM.

Resolution

An ESX Server host is limited to a maximum LUN size of 2047GB. This applies to all LUNs being presented by an ESX Server host (VMFS and RDM). Any capacity larger than the limit is not handled. The LUN is not presented as a choice for a data store in the Virtual Infrastructure Client. Attempting to format the LUN from the command line generates an error.

A VMFS-3 data store on a LUN that has been extended past the limit is unmounted. All content on the store is inaccessible.

Recovery:

Shrink the LUN back to its original size (if possible).

Perform a block copy of the old LUN to a new LUN that is within the size limit.

Destroy the LUN entirely and recreate the LUN within the limit and restore from backup.

**4.E**

Verify that the LUN is not being masked by the ESX Server. For more information, see [LUN masking in ESX Server 3 \(1004044\)](#).

Identifying LUNs masked by ESX 3.x

Symptoms

Cannot see a presented LUN.

The LUN is not visible.

Resolution

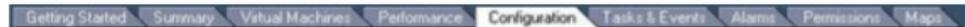
To identify LUNs that are masked by an ESX host:

Log in to the Virtual Infrastructure Client.

Select the ESX Server.



Click the **Configuration** tab.

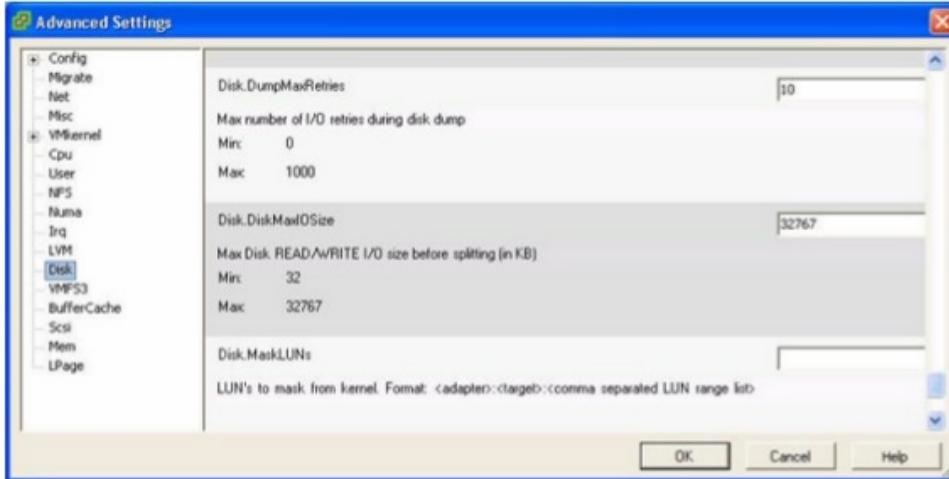


Click **Advanced Settings**.

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Click **Disk** and scroll to Disk.MaskLUNs.



If Disk.MaskLUNs is not blank, this can account for missing LUNs. Removing all text from that field and clicking **OK** removes all LUN masking from the ESX Server host side. This does not affect LUN masking implemented on the array.

#### 4.f

Verify that write caching is not disabled on the array. This is verified using the storage array management interface. Consult your storage array vendor if you require assistance. Also, see: [Write-cache disabled on storage array causing performance issues or failures \(1002282\)](#).

Write-cache disabled on storage array causing performance issues or failures

Details

Poor disk I/O performance to the storage array, causing very slow or even failure of:

Template deployments

Cold migrations

VMotion

VMware Consolidated Backup

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In the case where the ESX environment is large, write caching suddenly becoming disabled can result in performance degradation making communication to the LUNs impossible. If this occurs, you may experience these symptoms:

Virtual machines fail or stop responding.

VMFS datastores go off-line with the following error message in the logs:

Lost heartbeat

Solution

Write caching must always be enabled.

It is always recommended to have a battery backup connected to ensure that write caching does not become disabled. On many arrays, write caching is automatically turned off when the battery backup is disconnected, or if one of the redundant power supplies disconnects or fails.

#### 4.g □

□ Verify that the partition type for the VMFS-3 partition is set to FB. For more information, see [Partition showing up as type 42 or SFS after being connected to the VCB proxy server \(1002168\)](#).

ESX cannot access VMFS datastore after the VMware Consolidated Backup proxy server is connected to the VMFS volume

Details

Unable to access the VMFS datastore. The partition is not set to type fb.

Affected volumes are showing up with a partition type of 42 (SFS). Verify this by running fdisk -l from the service console.

Error message in the log /var/log/vmkernel:

```
Aug 22 15:55:44 esx01 vmkernel: 145:20:59:19.562 cpu1:1037)WARNING: SCSI: 6693: Partition  
vmhba3:0:12:1 is active: partition table was not updated
```

Solution

The Consolidated Backup proxy server is the only Windows server that can see the VMFS volumes.

When the automatic drive letter assignment function (automount) is enabled within diskpart on the VMware Consolidated Backup (VCB) proxy (default setting), the Windows diskpart initializes the volume on disk and autoassigns a driveletter to the volume which results in the change of the partition type to 42 (SFS) thus losing access to the datastore volume.

To setup VCB properly, see [Virtual Machine Backup Guide](#).

After the VCB proxy configuration is corrected, log in to the ESX console and double-check which volumes are affected.

This example shows how the partition looks after being connected to VCB proxy where diskpart automatically assigned the drive letter and changed the partition type to 42 (SFS):

```
[root@localhost root]# fdisk -lu  
Disk /dev/sdb: 73.5 GB, 73557090304 bytes  
255 heads, 63 sectors/track, 8942 cylinders, total 143666192 sectors  
Units = sectors of 1 * 512 = 512 bytes  
  
Device Boot Start End Blocks Id System  
/dev/sdb1 63 143653229 71826583+ 42 SFS
```

To correct this issue, change the partition type back to fb on all the LUNs that are supposed to be VMFS datastores.

**Warning:** The following step must be performed only after creating backups as the result might lead to complete data loss.

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```
[root@localhost root]# fdisk /dev/sdb

The number of cylinders for this disk is set to 8942.
There is nothing wrong with that, but this is larger than 1024,
and could in certain setups cause problems with:
1) software that runs at boot time (e.g., old versions of LILO)
2) booting and partitioning software from other OSs
   (e.g., DOS FDISK, OS/2 FDISK)

Command (m for help): t
Selected partition 1
Hex code (type L to list codes): fb
Changed system type of partition 1 to fb (Unknown)

Command (m for help): w
The partition table has been altered!

Calling ioctl() to re-read partition table.
Syncing disks.
```

After this change, perform a rescan.

```
[root@localhost root]# esxcfg-rescan vmhba1
```

If the volume does not appear as VMFS datastore on the ESX, you may need to align the partition start block 128 as this is the default when ESX does create partitions and this is another aspect that Windows change when initializing the discovered volume.

To set the starting sector to 128 instead of 63 (the default) on the ESX host.  
First to confirm that the current Start is 63

```
[root@localhost root]# fdisk -lu /dev/sdb

Disk /dev/sdb: 73.5 GB, 73557090304 bytes
255 heads, 63 sectors/track, 8942 cylinders, total 143666192 sectors
Units = sectors of 1 * 512 = 512 bytes

Device Boot      Start      End      Blocks   Id  System
/dev/sdb1            63  143653229  71826583+   fb  Unknown
```

This is how the actual change from 63 to 128 is performed.

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```
[root@localhost root]# fdisk /dev/sdb

The number of cylinders for this disk is set to 8942.
There is nothing wrong with that, but this is larger than 1024,
and could in certain setups cause problems with:
1) software that runs at boot time (e.g., old versions of LILO)
2) booting and partitioning software from other OSs
(e.g., DOS FDISK, OS/2 FDISK)

Command (m for help): x

Expert command (m for help): b
Partition number (1-4): 1
New beginning of data (63-143653229, default 63): 128

Expert command (m for help): w
The partition table has been altered!

Calling ioctl() to re-read partition table.
Syncing disks.
```

This is the result after successfully changed.

```
[root@localhost root]# fdisk -lu /dev/sdb

Disk /dev/sdb: 73.5 GB, 73557090304 bytes
255 heads, 63 sectors/track, 8942 cylinders, total 143666192 sectors
Units = sectors of 1 * 512 = 512 bytes

Device Boot Start End Blocks Id System
/dev/sdb1 128 143653229 71826551 fb Unknown
```

Rescan at this point and the volume appears on the ESX as VMFS datastore.

```
[root@localhost root]# esxcfg-rescan vmhba1
```

#### Additional Information

Troubleshooting flow chart:

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3

/86

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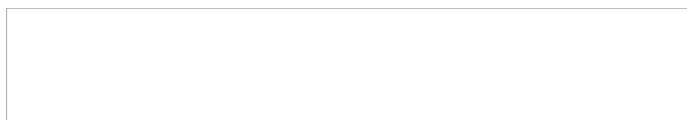


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## VMware Interview questions and answers

Document Transcript

1. Prepared By Sarathi Umakanthan Technical Questions and Answers for VMware Interviews  
Installation and Upgrade of ESX 3.0.1 and Virtual Center 2.0.1 1.List the major components of Vmware Infrastructure ? \* The major components of VMware Infrastructure are: ESX Server host . Virtual Center Server. Virtual Infrastructure (VI) Client . Web browser. License server. Database. 2. What are the minimum H/W requirements to install VirtualCenter Server ? \* VirtualCenter Server hardware must meet the following requirements: Processor : 2.0GHz or higher Intel or AMD x86 processor. Processor requirements can be larger if your database server is also run on the same hardware. Memory : 2GB RAM minimum. RAM requirements can be larger if your database is run on the same hardware . Disk storage :Nearly 1GB free disk space Networking : 10/100 Ethernet adapter minimum (Gigabit recommended). Scalability : A VirtualCenter Server configured with the hardware minimums can support 20 concurrent clients, 50 ESX Server hosts, and over 1000 virtual machines. A dual processor VirtualCenter Server with 3GB RAM can scale to 50 concurrent client connections, 100 ESX Server hosts, and over 2000 virtual machines. 3. Which softwares are supported to install Virtual Center Server Software ? \* The VirtualCenter Server is supported as a service on the 32 bit versions of these operating systems : The Virtual Center installer requires Internet Explorer 5.5 or higher in order to run. o Windows 2000 Server SP4 with Update Rollup 1 (Update Rollup 1 can be downloaded from Windows XP Pro (at any SP level) o Windows 2003 (all releases except 64 bit) Virtual Center 2.0 installation is not supported on 64 bit operating systems. 4. Which Databases are supported to VirtualCenter ? \* Virtual Center supports the following database formats: o Microsoft SQL Server 2000 (SP 4 only) o Oracle 9iR2, 10gR1 (versions 10.1.0.3 and higher only), and 10gR2 o Microsoft MSDE (not supported for production environments) 5. What are the Hardware requirements for Virtual Infrastructure Client ? \* The Virtual Infrastructure Client hardware must meet the following requirements : o Processor : 266MHz or higher Intel or AMD x86 processor (500MHz recommended). o Memory . 256MB RAM minimum, 512MB recommended. o Disk Storage . 150MB free disk space required for basic installation. You must have 55MB free on the destination drive for installation of the program . o Networking . 10/100 Ethernet adapter (Gigabit recommended). 6. Which softwares are supported for Virtual Infrastructure Client ? \* The Virtual Infrastructure Client is designed for the 32 bit versions of these operating systems: o Windows 2000 Pro SP4 o Windows 2000 Server SP4 o Windows XP Pro (at any SP level) All The Best ☺ 1

2. Prepared By Sarathi Umakanthan o Windows 2003 (all releases except 64bit) The Virtual Infrastructure Client requires the .NET framework 1.1 (included in installation if required). 7. What are the Requirements for VirtualCenter VI Web Access ? \* The VI Web Access client is designed for these

browsers : o Windows . Internet Explorer 6.0 or higher, Netscape Navigator 7.0, Mozilla 1.X, Firefox 1.0.7 and higher. o Linux . Netscape Navigator 7.0 or later, Mozilla 1.x, Firefox 1.0.7 and higher. 8. What are the Minimum Hardware Requirements for ESX Server 3.x ? \* You need the following hardware and system resources to install and use ESX Server. At least two processors: o 1500 MHz Intel Xeon and later, or AMD Opteron (32bit mode) . o 1500 MHz Intel Xeon and later, or AMD Opteron (32bit mode) for Virtual SMP. o 1500 MHz Intel Viiv or AMD A64 x2 dualcore processors 1GB RAM minimum. One or more Ethernet controllers. Supported controllers include: \* Broadcom NetXtreme 570x Gigabit controllers \* Intel PRO/100 adapters For best performance and security, use separate Ethernet controllers for the service console and the virtual machines. A SCSI adapter, Fibre Channel adapter, or internal RAID controller: \* Basic SCSI controllers are Adaptec Ultra160 and Ultra320, LSI Logic Fusion MPT, and most NCR/Symbios. SCSI controllers. \* RAID adapters supported are HP Smart Array, Dell Perc RAID (Adaptec RAID and LSI MegaRAID), and IBM (Adaptec) ServeRAID controllers. \* Fibre Channel adapters supported are Emulex and QLogic host bus adapters (HBAs). A SCSI disk, Fibre Channel LUN, or RAID LUN with un partitioned space. In a minimum configuration, this disk or RAID is shared between the service console and the virtual machines. 9. Which Storage systems supports for installing and booting ESX Server ? \* ESX Server supports installing and booting from the following storage systems: IDE/ATA disk drives Installing ESX Server on an IDE/ATA drive or IDE/ATA RAID is supported. However, you should ensure that your specific drive controller is included in the supported hardware. Storage of virtual machines is currently not supported on IDE/ATA drives or RAIDs. Virtual machines must be stored on VMFS partitions configured on a SCSI drive, a SCSI RAID, or a SAN. SCSI disk drives . SCSI disk drives are supported for installing ESX Server. They can also store virtual machines on VMFS partitions. Storage area networks (SANs) . SANs are supported for installing ESX Server. They can also store virtual machines on VMFS partitions. 10. Enhanced Performance Recommendations for ESX Server \* Some recommendations for enhanced performance: RAM : Having sufficient RAM for all your virtual machines is important to achieving good performance. ESX Server hosts require more RAM than typical Servers : An ESX Server host must be equipped with sufficient RAM to run concurrent virtual machines, plus run the service console. Dedicated fast Ethernet adapters for virtual machines : Dedicated Gigabit Ethernet cards for virtual machines, such as Intel PRO/1000 adapters, improve throughput to virtual machines with high network traffic. Disk location . For best performance, all data used by your virtual machines should be on physical disks allocated to virtual machines. These physical disks should be large enough to hold disk images to be used by all the virtual machines. All The Best ☺ 2

3. Prepared By Sarathi Umakanthan VMFS3 partitioning . For best performance, use VI Client or VI Web Access to set up your VMFS3 partitions rather than the ESX Server installer. Using VI Client or VI Web Access ensures that the starting sectors of partitions are 64K aligned, which improves storage performance. Processors . Faster processors improve ESX Server performance. For certain workloads, larger caches improve ESX Server performance. Hardware compatibility . To ensure the best possible I/O performance and workload management, VMware ESX Server provides its own drivers for supported devices. Be sure that the devices you plan to use in your server are supported. 11.What is virtualization ? Virtualization is the creation of a virtual (rather than actual) version of something, such as an operating system, a server, a storage device or network resources. What are the types of virtualization? 12.What are the inherent benefits of virtualization ? primarily cost savings allows multiple operating systems to be installed on a single server reducing the amount of hardware Consolidating servers also potentially reduces the amount of physical space that a company needs for its servers or data center. 13.What is a Hypervisor? A hypervisor, also called a virtual machine manager, is a program that allows multiple operating systems to share a single hardware host. Each operating system appears to have the host's processor, memory, and other resources all to itself. However, the hypervisor is actually controlling the host processor and resources, allocating what is needed to each operating system in turn and making sure that the guest operating systems (called virtual machines) cannot disrupt each other. 14.What is ESX Server? ESX Server is VMware's flagship enterprise server virtualization platform. It comes in two versions – ESX Server and ESXi Server where the latter has no service console and is the thinnest version available. ESX Server has many optional features like VMotion and VMHA (both discussed below) and some built-in features like the VMFS file system. Most end users purchase VMware ESX Server with some set of optional features in a package called VMware Infrastructure. ESX Server is managed by the VMware Infrastructure Client. Its centralized management platform is called Virtual Center. 15.What is Hyper-V? Hyper-V is Microsoft's flagship enterprise server virtualization

platform. Hyper-V is a feature of Windows Server 2008 and it is required to be run on system with a 64-bit CPU. Its Hypervisor is about 100k, the Hyper-V role is about 100Mb, and Windows Server 2008, fully installed is multiple GB. The centralized management platform for Hyper-V is System Center Virtual Machine Manager. 16.Difference between ESX and GSX? With VMware Workstation and GSX Server, the software sits on top of a host operating system such as Windows or Linux. With ESX Server, the software runs directly on the system's hardware, eliminating the need to install a base OS. In fact, ESX has its own OS. The software basically runs on its own Linux kernel, and Linux is quite beneficial to know when working with the product, although it's not an absolute necessity. 17.What is the hardware version currently in ESX4? Version 7 18.What is VMware Workstation? All The Best ☺ 3

4. Prepared By Sarathi Umakanthan VMware Workstation uses virtual machine technology that is designed mostly for the power user. It allows you to run multiple operating systems on a single PC. The operating systems that can run under a VMware virtual machine can include Windows 2000, Windows XP, Windows 2003 Server, Novell Netware, and Linux. 19. What are the file Extensions? Extension .log <vmname>.log or vmware.log This is the file that keeps a log of key VMware Workstation activity. This file can be useful in troubleshooting if you encounter problems. This file is stored in the directory that holds the configuration (.vmx) file of the virtual machine. .nvram <vmname>.nvram or nvram This is the file that stores the state of the virtual machine's BIOS. .vmdk <vmname>.vmdk This is a virtual disk file, which stores the contents of the virtual machine's hard disk drive. A virtual disk is made up of one or more .vmdk files. If you have specified that the virtual disk should be split into 2GB chunks, the number of .vmdk files depends on the size of the virtual disk. As data is added to a virtual disk, the .vmdk files grow in size, to a maximum of 2GB each. (If you specify that all space should be allocated when you create the disk, these files start at the maximum size and do not grow.) Almost all of a .vmdk file's content is the virtual machine's data, with a small portion allotted to virtual machine overhead. If the virtual machine is connected directly to a physical disk, rather than to a virtual disk, the .vmdk file stores information about the partitions the virtual machine is allowed to access. Earlier VMware products used the extension .dsk for virtual disk files. <diskname>-<##>.vmdk This is a redo-log file, created automatically when a virtual machine has one or more snapshots. This file stores changes made to a virtual disk while the virtual machine is running. There may be more than one such file. The ## indicates a unique suffix added automatically by VMware Workstation to avoid duplicate file names. .vmsd <vmname> vmsd This is a centralized file for storing information and metadata about snapshots. .vmsn <vmname>-Snapshot.vmsn This is the snapshot state file, which stores the running state of a virtual machine at the time you take that snapshot <vmname>-Snapshot<##>.vmsn This is the file which stores the state of a snapshot .vmss <vmname>.vmss This is the suspended state file, which stores the state of a suspended virtual machine .Some earlier VMware products used the extension .std for suspended state files .vmtm <vmname>.vmtm This is the configuration file containing team data. .vmx <vmname>.vmx This is the primary configuration file, which stores settings chosen in the New Virtual Machine Wizard or virtual machine settings editor. If you created the virtual machine under an earlier version of VMware Workstation on a Linux host, this file may have a .cfg extension .vmxf <vmname>.vmxf This is a supplemental configuration file for virtual machines that are in a team. Note that the .vmxf file remains if a virtual machine is removed from the team. .VMDK -- These files are the actual hard disk of the virtual machine itself, and tend to be the largest file within the folder. You can consider the size of this file to be roughly equivalent to the size of either the disk itself (if you've chosen to use preallocated disks) or the size of the data currently stored on that disk (if you use growable disks). .NVRAM -- Consider this file the BIOS of the virtual machine. .VMX -- With typically one VMX file per folder, this file holds the configuration information for the virtual machine in a text format. Unlike almost all the other files you'll see, these files can be edited using any text editing program, a process that is actually required for some functionality that is not exposed in the GUI. All The Best ☺ 4

5. Prepared By Sarathi Umakanthan .VMXF -- This file, in XML format, includes additional information about the virtual machine if it has been added to a team. If a machine has been added to a team and then later removed, this file remains resident. This file can also be opened and read in a text editor. .VMTM -- For virtual machines actively participating in a team, this file stores information about that team membership. .VMEM -- These files, which contain a backup of the VMs paging file, are typically very small or non-existent when the virtual machine is powered off, but grow immediately to the size of configured RAM when the machine is powered on. .VMSN and .VMSD -- When snapshots are created for a virtual machine, these files are created to host the state of the virtual machine. The VMSN file

stores the running state of the machine, what you could consider the "delta" between the VMDK at the point of the snapshot and what has been processed up until the present time. The VMSD stores information and metadata about the snapshot itself. .VMSS -- If you've suspected the state of your machine, this file contains the suspended state of that machine. These files typically only appear when virtual machines have been suspended. 20. What are a host, guest, and virtual machine? A host system (host operating system) would be the primary & first installed operating system. If you are using a bare metal Virtualization platform like Hyper-V or ESX, there really isn't a host operating system besides the Hypervisor. If you are using a Type-2 Hypervisor like VMware Server or Virtual Server, the host operating system is whatever operating system those applications are installed into. A guest system (guest operating system) is a virtual guest or virtual machine (VM) that is installed under the host operating system. The guests are the VMs that you run in your virtualization platform. Some admins also call the host & guest the parent and child. 21. What products are available for Server Virtualization? Bare Metal Hypervisor / Native / Type 1: VMware ESX Server Microsoft Hyper-V Citrix/Xen Server Hosted in an OS / Type 2: VMware Server Microsoft Virtual Server Parallels Server 22. What products are available for desktop virtualization? Host in an OS / Type 2 / intended for workstations: VMware Workstation Microsoft Virtual PC Parallels Workstation VMware Fusion for Mac OS Parallels Desktop for Mac OS 23. What is the difference between ESX Server and VMware Server? While both ESX Server and VMware Server are server virtualization products, the difference is that VMware ESX installs and runs on the bare metal of a physical server whereas VMware Server needs a base operating system. In other words, VMware ESX has a type 1 hypervisor whereas VMware Server has a type 2 hypervisor. You will obtain much better performance from ESX Server as it has much less overhead. ESX Server also has many features available such as VMFS, VMotion, VMHA, and DRS. On the other hand, ESX Server is also a commercial product that must be purchased whereas VMware Server is a free product. VMware Server is an excellent option to choose to slowly migrate to server consolidation at a low cost. VMware Server is also an excellent way to learn about virtualization as well as a way to run multiple operating systems on your desktop PC, at no cost. 24. What is the difference between Hyper-V and Virtual Server? Like the difference between ESX Server and VMware Server, Hyper-V and Virtual Server have similar differences. Hyper-V is a type-1 hypervisor whereas Virtual Server is a type 2 hypervisor. Virtual Server requires that you first host a Windows operating system to load it. Hyper-V is meant to be a higher performance commercial virtualization platform with a centralized management platform and 3rd party add-ons. Virtual Server, on the other hand, is a free virtualization platform meant for the desktop or for small-scale server virtualization solutions. All The Best ☺ 5

6. Prepared By Sarathi Umakanthan 25. What is the difference between emulation, native virtualization, and paravirtualization? Emulation is where software is used to simulate hardware for a guest operating system to run in. This has been used in the past but is difficult to do and offers low performance. Native virtualization (or full virtualization) is where a type-2 hypervisor is used to partially allow access to the hardware and partially to simulate hardware in order to allow you to load a full operating system. This is used by emulation packages like VMware Server, Workstation, Virtual PC, and Virtual Server. Paravirtualization is where the guest operating systems run on the hypervisor, allowing for higher performance and efficiency. For more technical information and videos on this topic, visit VMware's Technology Preview for Transparent Virtualization. Examples of paravirtualization are Microsoft Hyper-V and VMware ESX Server. 26. What are the different types of virtualization? Server Virtualization – consolidating multiple physical servers into virtual servers that run on a single physical server. Application Virtualization – an application runs on another host from where it is installed in a variety of ways. It could be done by application streaming, desktop virtualization or VDI, or a VM package (like VMware ACE creates with a player). Microsoft Softgrid is an example of Application virtualization. Presentation Virtualization – This is what Citrix Met frame (and the ICA protocol) as well as Microsoft Terminal Services (and RDP) are able to create. With presentation virtualization, an application actually runs on another host and all that you see on the client is the screen from where it is run. Network Virtualization – with network virtualization, the network is "carved up" and can be used for multiple purposes such as running a protocol analyzer inside an Ethernet switch. Components of a virtual network could include NICs, switches, VLANs, network storage devices, virtual network containers, and network media. Storage Virtualization – with storage virtualization, the disk/data storage for your data is consolidated to and managed by a virtual storage system. The servers connected to the storage system aren't aware of where the data really is. Storage virtualization is sometimes described as "abstracting the logical storage from the physical storage. 27. Why do I care that VMware ESX uses the VMFS? VMware's VMFS was

created just for VMware virtualization. VMFS is a high performance cluster file system allowing multiple systems to access the file system at the same time. VMFS is what gives you the necessary foundation to perform VMotion and VMHA. With VMFS you can dynamically increase a volume, support distributed journaling, and the addition of a virtual disk on the fly. 28. How do I backup my virtual guest operating systems? There are multiple ways to backup your virtual guest operating systems. As long as your critical data is sent offsite and follows your backup rotation, you are doing well. One option would be to run a backup client inside each guest operating system, just like you do your physical servers. If you are using a bare metal virtualization platform (like ESX Server), the greatest challenge is sometimes gaining access to your data. For example, with ESX Server, your data is stored inside ESX Server's VMFS file system. That file system cannot be accessed by a typical Windows or Linux backup client. For that reason, there are specialized virtualization backup products like Vizioncore's vRanger and EsXpress. 29. What are VMware VMotion & Storage VMotion (SVMotion)? With VMotion, VM guests are able to move from one ESX Server to another with no downtime for the users. What is required is a shared SAN storage system between the ESX Servers and a VMotion license. Storage VMotion (or SVMotion) is similar to VMotion in the sense that it moves VM guests without any downtime. However, what SVMotion also offers is the capability to move the storage for that guest at the same time that it moves the guest. Thus, you could move a VM guest from one ESX server's local storage to another ESX server's local storage with no downtime for the end users of that VM guest. 30. What is VMware HA? One of the most amazing capabilities of VMware ESX is VMHA. With 2 ESX Servers, a SAN for shared storage, Virtual Center, and a VMHA license, if a single ESX Server fails, the virtual guests on that server will move over to the other server and restart, within seconds. This feature works regardless of the operating system used or if the applications support it. 31. What is VMware VCB? VMware Consolidated Backup (or VCB) is a group of Windows command line utilities, installed on a Windows system, that has SAN connectivity to the ESX Server VMFS file system. With VCB, you can perform file level backups. All The Best ☺ 6

7. Prepared By Sarathi Umakanthan or image level backups and restores of the VM guests, back to the VCB server. From there, you will have to find a way to get those VCB backup files off of the VCB server and integrated into your normal backup process. Many backup vendors integrate with VCB to make that task easier. Contrary to what it sounds like VCB IS NOT a traditional backup application because it doesn't do anything to get the data off the system and onto external media nor does it have a GUI interface. 32. What is Virtual Center? Both VMware Virtual Center and Microsoft System Center are centralized management applications for their respective virtualization platform. Virtual Center is a required piece of many of the advanced VMware ESX Server features but it must be purchased separately. Virtual Center runs on a Windows server and it could use SQL as a backend. 33. What is System Center Virtual Machine Manager? Microsoft System Center is Microsoft's centralized management platform for just about every Microsoft enterprise function ("from data center to desktop", as Microsoft says). More specifically, Microsoft System Center Virtual Machine Manager is the centralized management platform for virtualization. Microsoft calls it their "comprehensive virtualization management tool". It can perform virtual machine monitoring, configuration, provisioning, and administration. The latest version, VMM 2008, can manage Microsoft Hyper-V, Virtual Server 2005, and VMware ESX Server platforms. 34. What is a partition? In virtualization terminology, a partition is what is managed by a hypervisor. That partition could have a virtual guest operating system inside of it, or the partition could be empty. 35. What are: virtual processor, virtual RAM, virtual NIC, & virtual disk? From working with servers and PCs, you are familiar with common components like CPU, RAM, Disk, network, and so on. When using server virtualization, each guest operating system will have its own virtual components such as the virtual CPU, virtual memory (RAM), virtual disk, virtual network, and so on. Inside the guest operating system, the OS will see these devices as physical devices and you may or may not have the vendor's virtualization driver loaded for that device. These virtual devices are configured in the virtual guest configuration for that VM, in the management interface for your virtualization software. 36. Why do I need to care about the hardware requirements of VMware ESX and Microsoft Hyper-V? Type 1 virtualization platforms that run on the bare metal of your server hardware will have specific hardware requirements because they are not typical applications that run inside an underlying (host) operating system. Because of this, type-1 virtualization platforms will have strict hardware requirements. For example, Hyper-V must run on 64 bit hardware and VMware ESX Server only supports certain disk storage systems and network interface cards. For more information on the hardware requirements of these two virtualization platforms, please see: Microsoft Hyper-V Hardware

Requirements VMware ESX Server Hardware Compatibility List (HCL) 37.What is a snapshot? A snapshot is a “point in time image” of a virtual guest operating system (VM). That snapshot contains an image of the VMs disk, RAM, and devices at the time the snapshot was taken. With the snapshot, you can return the VM to that point in time, whenever you choose. All changes made after the snapshot was taken may be based on that snapshot information (incremental changes). You can take snapshots of your VMs, no matter what guest OS you have and the snapshot functionality can be used for features like performing image level backups of the VMs without ever shutting them down. Do not confuse Virtual Machine Snapshots with Microsoft’s VSS (Microsoft’s Volume Shadow Copy Service). Snapshots can be taken in just about every virtualization platform available. 38.What is Quick Migration? Quick Migration is a feature of Microsoft’s Hyper-V virtualization platform. With Quick Migration, you can move running virtual machines from one host to another host server with minimal downtime. This feature is comparable to VMware’s VMotion except Quick Migration, in its current incarnation, is not as quick as VMotion (VMotion is about 1 second vs Quick Migration of about 5-20 second) 39. Why won’t my virtualization product boot from my OS CD to load my new guest OS? Many times, admins have complained that they could not access or could not boot a virtual CDROM that was inserted or an ISO file that was mapped. All The Best ☺ 7

8. Prepared By Sarathi Umakanthan And so many times, the cause of this issue is just a simply click. To access a virtual CDROM, that CDROM must be connected. If you look at the graphic below, you can see how the device is both connected and connected at power on. Connected devices are connected after the VM boots where as connected at power on devices, are connected before the VM boots. To boot a new OS CD, that CDROM needs to be connected at power on. 40. What do I need to know about licensing and Virtualization? Concerning licensing and virtualization – the most important thing to know is that any guest operating system must have a license, just as any physical server or workstation does. Thus, if you run Microsoft Virtual Server on Windows Server 2003 and 3 guest operating systems are running (Windows XP, Windows Server 2008, and Windows Vista), you must have 4 Microsoft operating system licenses – Windows XP, Windows Vista, Windows Server 2003, and Windows Server 2008. As Linux is typically open source, you can generally have as many Linux guest operating systems as you want without paying any licensing fees. 41. What is a P2V conversion? Virtualization is most frequently used for server consolidation. This is where physical servers are converted into virtual servers. This “physical to virtual” conversion process is commonly called P2V conversion. This process can be done manually but it is easier if you use a P2V conversion application. While this P2V (or Virtual machine Import) functionality may be built into the management interface for your virtualization product, there are also standalone P2V products such as VMware Converter (diagram shown below) and Vizioncore’s vConverter. These P2V products connect to the physical server, copy all data from that physical server into a virtual disk on the virtual server, replace the drivers in the guest operating system with virtual drivers, and start the new virtual machine. In some cases, there is no downtime for end users of that server. Similar to a P2V conversion, a V2V (virtual to virtual) conversion is where a virtual guest machine from one virtualization platform is converted to another virtualization platform. 42. What is VDI? VMware describes Virtual Desktop Infrastructure (VDI) as “delivering desktops from the data center”. In other words, VDI is where enterprise desktop computers are virtualized, moved to the data center, then presented over the LAN or WAN to the end users. Once VDI is used, typically the end user devices are replaced with thin-client devices. While VMware has a VDI product called VDM (Virtual Desktop Manager), VDI is not a product exclusive to VMware. Other VDI vendors include Citrix XenDesktop & Kidaro (now owned by Microsoft). With VDI, virtual desktops are served by enterprise virtualization servers running products like VMware ESX, Microsoft Hyper-V, and Xen Server. With the addition of the VDI products, these desktops can be dynamically created, pooled & shared, or even accessed from a GUI menu, over a web page. The graphic below, shows some examples of how VDI could be used and how it works. 43. What is SoftGrid? All The Best ☺ 8

9. Prepared By Sarathi Umakanthan Microsoft purchased Softgrid and has renamed it Microsoft Application Virtualization. With this software, you are able to virtualize your applications and deliver them over the network. With application virtualization, your software applications are never installed on the end user devices so there are never any software conflicts. Because of this, software testing is reduced, time to set up end user computers is reduced, and software troubleshooting is reduced. Overall, application virtualization is going to save time and money. Microsoft Application Virtualization competes with XenApp and VMware’s ThinApp 44.What are the best free virtualization options? In my opinion, the best

free virtualization options are: For testing, development, and production server virtualization solutions for SMBs, I recommend VMware Server or Microsoft Virtual Server For desktop virtualization on your own PC, I recommend Microsoft Virtual PC And for Linux hosts – Xen and KVM 45. What is VM Sprawl? Because creating new virtualized servers is so quick and easy, many organizations have a problem with “VM Sprawl”. With VM Sprawl, the number of virtual machines (VM) running in a virtualized infrastructure increases over time, simply because of the ease of creating new VMs, not because those VMs are absolutely necessary for the business. Concerns with VM sprawl are the overuse of the infrastructure if it is not needed and the cost of licenses for virtual machines that may not have been required. To prevent VM sprawl, you should more carefully analyze the need for all new VMs and ensure that you are able to justify the cost of the infrastructure and the licenses for all new VMs created. 46. How many virtual machines can you run on one host? As with many server performance questions, the answer to this question is “it depends”. You can run as many VMs on a single host as your hypervisor supports (usually that is a lot) and as you have server resources for (RAM, CPU, Disk, and Network). Typically, on a desktop PC, you can run 1-3 VMs and on a Server you can run 10-50 VMs – depending on the application demands. 47. What is ThinApp? VMware bought a company (Thinstall) who offered an application virtualization product. VMware renamed that product ThinApp. Similar in concept to Microsoft’s SoftGrid (now Microsoft Application Virtualization), ThinApp allows you to virtualize your applications and deliver them from servers in the data center. This prevents application conflicts, allows for easy end user device replacements, allows for easy software deployment and, overall, saves time and money. 48. Why is centralized storage so important for enterprise virtualization products? Centralized storage (such as an iSCSI or FC SAN) is very critical to many optional virtualization features. For example, with VMware High Availability (VMHA), VMs are stored in a centralized shared data store. If an ESX Server goes down, those VMs are automatically restarted on another ESX host because that host can access them over the centralized shared storage (SAN). Thus, while centralized storage isn’t required to use enterprise virtualization features, many of the advanced or optional virtualization features don’t work without it. 49. What are the best online resources for Virtualization knowledge? However, there are also a number of other valuable Internet resources for virtualization information. They are:

Virtualization.info VM Blog VMware.com VMware VMTN Blog Run Virtual Microsoft.com -

Virtualization SearchVMware.com VMwareVideos.com Petri IT Knowledgebase – Virtualization 50. What are the best training options for learning about Virtualization? As virtualization is relatively new and there is a large following building for its use, there is a huge demand for virtualization training. Here are a few of my recommendations: VMware Education – offers a strong classroom and online training program as well as a certification program All The Best ☺ 9

10. Prepared By Sarathi Umakanthan Train Signal – offers a 3+ virtualization related videos covering Microsoft and VMware video training. One of their best sellers is the VMware ESX Server video product. Dell Virtualization Training – covering VMware products Citrix/Xen Education – covering XenServer & related products 51. What is a VMware VCP & a VCDX? Until recently VMware’s virtualization certification was the VMware Certified Professional (VCP). Recently, VMware announced a more advanced certification – the VCDX. To become a VCP you must complete an official VMware training course (online or in the classroom), then pass a certification test at a local training center. The VCDX builds on the VCP. To become a VCDX, you must first be a VCP and then you are required to pass 2 more advanced tests and present a VMware Infrastructure Design plan to a certification board. You can learn more about the VCP and VCDX certifications at the VMware Certification Portal. 52. What is a virtual datastore? A datastore, as it is used by VMware, is a storage container for files. The datastore could be on a local server hard drive or across the network on a FC or iSCSI SAN. Inside the datastore, you will find the virtual machines, VM disks, VM configurations, and any other files you place in the datastore (such as ISO files to install a VM). Datastores are using in VMware ESX Server (viewed with the VI Client) and in the new VMware Server 2.0. 53. Why should I try virtualization on my desktop PC? While virtualization is still a new concept to some admins, it has been adopted by so many more. In my opinion, understanding virtualization isn’t hard, it allows you so much flexibility and power, and you need less hardware. When it comes to desktop virtualization you could, for example, run a Windows Server with Exchange 2007 and Linux Server running Apache, all inside your laptop or desktop computer – amazing! Plus, there are free desktop virtualization products like Microsoft Virtual PC which are easily installed. So, if you haven’t tried virtualization, I encourage you to try it out today by downloading Microsoft Virtual PC or VMware Server. 54. What is the Open Virtual Machine Format? With various competing virtualization products a problem arose where different every virtualization software vendor

had their own standard for packaging and distributing virtual machines. With the ability to share virtual machines over the Internet and between virtualization platforms becoming more and more important, VMware helped to create the Open Virtualization Format (OVF). The OVF is “a platform independent, efficient, extensible, and open packaging and distribution format for virtual machines”. With OVF, you are able to download VMs directly from the Internet and immediately import & start that VM. Plus, there only needs to be a single file format stored on sites where VMs are downloaded. 55. Can I virtualize all my servers or should some servers or applications not be virtualized? In my opinion, just about every server or application can be virtualized. What you need to consider is that 1) is there any specialized hardware that is required for that application which may not be supported when virtualized 2) will your virtualized servers have the resources to perform as well as the original physical server did? Virtualized servers can support just about any amount of CPU, RAM, Disk, and Network bandwidth that is required by an application. Additionally, virtualized servers can support special peripherals such as USB, Serial (COM), and Parallel (LPT) ports for special application needs. Of greatest concern is the virtualization of high performance applications such as SQL and Exchange. However, I have even virtualized these applications without end users noticing. Typically, the only servers that I do not virtualize are DNS servers (which are usually Windows AD Servers) as a DNS server will be needed by the virtualized servers to function. You can read VMware customer case studies and Microsoft customer case studies to learn more about what types of server virtualization successes they have experienced. 56. What are the drawbacks to virtualization? In the end, I don't believe that there are any drawbacks to virtualization as virtualization will save money and make server administration easier. However, just like any critical new piece of your infrastructure, server virtualization must be done right, from the beginning. You will need to spend time learning and training to learn about virtualization. Likely, if you choose an enterprise virtualization product, you will need to spend money on virtualization software. It may also be necessary to purchase servers with more RAM (or upgrade existing unneeded All The Best ☺ 10

11. Prepared By Sarathi Umakanthan servers) to be virtualization host servers (however you will be able to get rid of many servers with less RAM once they are virtualized). If you do not already have one, you will likely need an iSCSI or Fibre Channel (FC) storage area network (SAN) to support some of the enterprise virtualization features. Also, keep in mind that as servers are more consolidated, if a single server goes down, you could lose as many as 50 virtual guest servers. With the servers being so consolidated, “all your eggs are in one basket” (or a few baskets), as they say. Because of this, you will need to choose servers that are as redundant and reliable as possible as your virtualization hosts. Still, all of this investment in time, hardware, and software will be worth it, in the end, as you will realize so many benefits 57. How do I manage my virtualized servers? Management of your virtual servers is easier than with traditional physical servers because you will have a more centralized interface for those consolidated servers. The application that you use to manage your servers will vary based on what virtualization application you use. For example, with VMware ESX Server, you will manage your servers (ie: power status, configuration, remote control) from either the VMware Virtual Infrastructure Client (VI Client) or the VMware Infrastructure Web Access interface (via a web browser). You could also manage your ESX Server via the command line using SSH. With Microsoft Hyper-V, you would manage your server using the Hyper-V Manager MMC. 58. How much do virtualization products cost? Virtualization products range in price from free to thousands of dollars. You would have to check each manufacturer's website to verify the current prices as prices could change. However, based on today's pricing, here are current prices for virtualization products: VMware ESX Server – range in price from \$500 to \$6000 depending on the number of features and the level of service/support you choose Microsoft Hyper-V - \$999 for Windows Server 2008 Standard with Hyper-V Citrix/Xen Server - \$780 for XensServer Standard VMware Server - FREE Microsoft Virtual Server - FREE VMware Workstation - \$189 Microsoft Virtual PC - FREE 59. Will Microsoft overtake VMware as the market virtualization leader? Well this is the “billion dollar question”, now isn't it? As Microsoft has a reputation for taking over companies and integrating or renaming those companies' products into their own, it is easy to speculate that Microsoft's Hyper-V will overtake VMware's ESX Server in the virtualization top spot. However, VMware has, in my opinion, at least a 2-3 year technological lead in the number of features that it offers and its general development. More importantly, VMware has developed a huge enterprise, and more recently, a strong SMB customer base. VMware has 10 years of virtualization experience, every Fortune 500 company uses its products, 92% of the Fortune 1000 use ESX, VMware as 11 virtualization patents, and over 100,000 customers worldwide. On the other hand, as of this month, Microsoft just released their first enterprise virtualization product (Hyper-V) and that product is missing many of the features

that it was originally advertised to have. While those features may come in the next version, even with those features, they will still be far behind VMware in the functionality of their Enterprise virtualization product and their customer base. 60. How much money can my company save with Server consolidation using virtualization? There is no doubt that your company can save significant money by consolidating servers using virtualization. If you haven't reviewed Virtualization FAQ #2, you should first read all the inherent benefits of virtualization. When it comes to calculating the dollar savings from consolidating servers with virtualization, I recommend that you check out the following ROI calculators: VMware ROI/TCO Calculator Microsoft Integrated Virtualization ROI Tool Intel Virtualization Calculator With these calculators, you can help justify your server consolidation project. In the end, I know that you will be very satisfied with your savings, both in recurring costs and in administrative time savings. 61. What is the difference between a fixed and a dynamic virtual hard disk? Some virtualization products (like MS Virtual Server and VMware Server) support two types of virtual hard drives – fixed & dynamic. What is the difference between these two types of virtual hard drives? All The Best © 11

12. Prepared By Sarathi Umakanthan With both fixed and dynamic virtual hard drives, you set a maximum size that the virtual hard drive will appear to the guest virtual machine. What is different is that, with the fixed disk, the size of the disk is allocated when it is created. Thus, if you create a 100GB fixed virtual disk, 100GB in space is taken up on the host system when you create that disk. On the other hand, when you create a dynamic virtual disk, only a tiny amount of space is taken up when you create the disk. Over time, as the amount of space used in the dynamic virtual disk is increased, the amount of real disk used on the host is increased. While a dynamic disk is better as it uses less real space on the host disk, it is also not as preferential for performance as a dynamic virtual disk easily gets fragmented. 62. Where can I download pre-built virtual machines? The quickest way to get started with virtualization is to download free pre-built virtual machines. These VMs already have an operating system installed and usually already have a application installed. For example, you can download Microsoft evaluation virtual machines (actually VHD files) with some of their latest enterprise applications (like Exchange Server 2007 or Windows Server 2008). Another excellent source with hundreds of VMs available for download is the VMware Virtual Appliance Marketplace. At this site, companies and individuals have contributed VMs that anyone can download – both for commercial evaluation of software or just for fun. You will, of course, need a virtualization product. I recommend the free VMware Server or Microsoft Virtual Server & PC. 63. What are virtual machine additions and integration components? Just about every virtualization application offers some kind of “additions” or “integration components” that you install inside your virtual machine guests. These additions are usually device drivers that increase VM performance, enable features, or make the VMs easier to manage. With VMware products, these drivers are called the “Virtual Machine Additions”. With Microsoft Hyper-V, these drivers are called “integration components”. 64. What are some of the VMware ESX Server add-ons that I should consider? Depending on which level of the VMware Infrastructure Suite that you purchase, you may or may not get a variety of add-ons for ESX Server (such as SVMotion, VCB, VMHA, and DRS). But what other add-ons are available for VMware ESX Server and the VMware Infrastructure Suite? As ESX Server is a very mature product, there are many 3rd party products available for ESX Server. 65. Vmware Vsphere ESX 4 Best practice Configuration. The / (or “root”) partition stores the ESX system and all files not stored in another custom partition. If / ext3 5.0GB this partition is filled to capacity, the ESX host could crash. It is imperative to prevent this. The swap partition is used to supplement RAM if the service console runs out swap 1600MB of physical memory. The /home partition is created as a failsafe to help prevent / from filling up. Service console accounts (not vCenter) each have an associated /home folder. As a best practice, administrators should not use these folders for storage. If service /home ext3 512MB console accounts are to be used and there are multiple users requiring access, the size of this partition may need to be increased. By default, /home is part of the / partition. By creating a custom partition for it the / partition will be protected if /home fills to capacity. The /tmp partition is also created as a failsafe to help prevent filling the / partition. /tmp is often used to untar support files, temporarily store copied logs and stage /tmp ext3 2.0GB patches. By default, /tmp is part of the / partition. By creating a custom partition for it the / partition will be protected if /tmp fills to capacity. Traditionally, /vmimages was used to /vmimages ext3 512MB store CD-ROM images (.ISOs) and Floppy Disk images (.flp, .img). However, most organizations following best-practices have moved this All The Best © 12

13. Prepared By Sarathi Umakanthan from each individual host to a single shared-storage location. However, by default ESX creates a /vmimages folder within /. This makes it dangerously easy for an

Administrator to mistake it for the shared-storage repository and copy images into it that will fill /. As a failsafe to help prevent this, a small custom /vmimages partition can be created. If the local /vmimages folder is actually used, this size may need to be increased. The /var partition stores most system logs. Creating a custom /var partition provides substantial, dedicated /var ext3 2.0GB log storage space (/var/log) while protecting the / partition from being filled by log files. Normally /var is part of the / partition. /boot ext3 260MB /boot stores the files necessary to boot the service console. The vmcore partition temporarily stores log and error information should the vmcore 100MB VMkernel crash.

66.What is SWAP Partition? To replace pages or segments of data in memory. Swapping is a useful technique that enables a computer to execute programs and manipulate data files larger than main memory. The operating system copies as much data as possible into main memory, and leaves the rest on the disk. When the operating system needs data from the disk, it exchanges a portion of data (called a page or segment ) in main memory with a portion of data on the disk. DOS does not perform swapping, but most other operating systems, including OS/2, Windows, and UNIX, do. Swapping is often called paging or Virtual memory. (1) Windows example Virtual memory has been a feature of Microsoft Windows since Windows 3.1 in 1991. 386SPART.PAR (or WIN386.SWP on Windows 3.11 and Windows for Workgroups) is a hidden file created by Windows 3.x for use as a virtual memory swap file. It is generally found in the root directory, but it may appear elsewhere (typically in the WINDOWS directory). Its size depends on how much virtual memory the system has set up under Control Panel - Enhanced under "Virtual Memory." If a user moves or deletes this file, Windows will BSOD (Blue Screen of Death) the next time it is started with "The permanent swap file is corrupt" and will ask the user if they want to delete the file (It asks whether or not the file exists). Windows 95 uses a similar file, except it is named WIN386.SWP, and the controls for it are located under Control Panel - System - Performance tab - Virtual Memory. Windows automatically sets the page file to be 1.5 x physical memory. This page file is located at C:\pagefile.sys on all NT - based versions of Windows (including Windows 2000 and Windows XP). If you run memory intensive applications on a low physical memory system it is preferable to manually set the size to a value higher than default. Additionally, fixing the size of the swap file will prevent it from being dynamically resized by Windows. This resizing causes the swap file to become fragmented, resulting in reduced performance. This page file cannot be defragmented with Windows' built-in defragmenting tools, such as ntfsdefrag. (2) Virtual Memory in Linux In Linux operating system, it is possible to use a whole partition of the HDD for virtual memory. Though it is still possible to use a file for swapping, it is recommended to use a separate partition, because this excludes chances of fragmentation, which reduces the performance of swapping. A swap area is created using the command mkswap filename/device , and may be turned on and off using the commands swapon and swapoff, respectively, accompanied by the name of the swap file or the swap partition. In order to additionally increase performance of swapping, it is advisable to put the swap partition at the beginning of the HDD, because the transfer speed there is somewhat higher than at the end of the disk. There were also some successful attempts to use the memory located on the videocard for swapping, as modern videocards often have 128 or even 256 megabytes of RAM. 67.Minimum Requirements for vCenter Server ■CPU – 2 CPUs Processor – 2.0GHz or faster Intel or AMD processor. Processor requirements might be higher if the database runs on the same machine. ■Memory – 3GB RAM. Memory requirements might be higher if the database runs on the same machine. All The Best ☺

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14. Prepared By Sarathi Umakanthan vCenter Server includes a service called VMware VirtualCenter Management Webservices. This service requires 128MB to 1.5GB of additional memory. The VirtualCenter Management Webservices process allocates the required memory at startup. ■Disk storage – 2GB. Disk requirements might be higher if the database runs on the same machine. Microsoft SQL Server 2005 Express disk requirements – Up to 2GB free disk space to decompress the ■installation archive. Approximately 1.5GB of these files are deleted after the installation is complete. ■Networking – Gigabit connection recommended. See your database documentation for the hardware requirements of your database. The database requirements are in addition to the vCenter Server requirements if the database and vCenter Server run on the same machine. 68.Minimum Requirements for the vSphere Client ■CPU – 1 CPU ■Processor – 266MHz or faster Intel or AMD processor (500MHz recommended). ■Memory – 200MB RAM ■Disk Storage – 1GB free disk space for a complete installation, which includes the following components: ■Microsoft .NET 2.0 ■Microsoft .NET 3.0 SP1 ■Microsoft Visual J# ■vSphere Client 4.0 ■vSphere Host Update Utility 4.0 You must also have 400MB free on the drive that has your %temp% directory. If all of the prerequisites are already installed, 300MB of free space is

required on the drive that has your %temp% directory, and 450MB is required for the vSphere Client 4.0.  
■Networking – Gigabit connection recommended. 32-Bit or 64-Bit Operating System for vCenter Server  
When you have up to 200 hosts, you can use a 32-bit Windows operating system, but a 64-bit Windows operating system is preferred. When you have 200–300 hosts, a 64-bit Windows operating system is required.

69.What is Vcenter Server? VMware vCenter Server, formerly known as VirtualCenter, is the centralized management tool for the vSphere suite. VMware vCenter Server allows for the management of multiple ESX servers and virtual machines (VMs) from different ESX servers through a single console application.

70.Difference between HA and Vmotion? VMotion and HA are not related and are not dependants of each other. DRS has a dependency on vMotion, but not HA. HA is used in the event that a host fails you can have your virtual machines restart on another host in the cluster. vMotion allows you to move a virtual machine from one host to another while it is running without service interruption.

Ideally you will utilize vMotion, HA and DRS within your cluster to achieve a well balanced VI environment. so HA fail over is not really seamless ? since you mentioned it has virtual machines restart on another host in the cluster? no, your VM's will go down if there is a host failure and then HA will restart them on another ESX Host in the cluster. This is where DRS will take over and start to balance out the load across the remaining ESX Hosts in the cluster using vmotion.

71. What is VMotion?

VMware VMotion enables the live migration of running virtual machines from one physical server to another with zero downtime, continuous service availability, and complete transaction integrity. It is transparent to users. VMotion lets you: Automatically optimize and allocate entire pools of resources for maximum hardware utilization and availability. Perform hardware maintenance without any scheduled downtime. Proactively migrate virtual machines away from failing or underperforming servers.

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15. Prepared By Sarathi Umakanthan 72.So how does VMotion work? First, the entire state of a virtual machine is encapsulated by a set of files stored on shared storage. VMware's clustered Virtual Machine FileSystem (VMFS) allows multiple installations of ESX Server to access the same virtual machine files concurrently. Second, the active memory and precise execution state of the virtual machine is rapidly transferred over a high speed network. This allows the virtual machine to instantaneously switch from running on the source ESX Server to the destination ESX Server. VMotion keeps the transfer period imperceptible to users by keeping track of on-going memory transactions in a bitmap. Once the entire memory and system state has been copied over to the target ESX Server, VMotion suspends the source virtual machine, copies the bitmap to the target ESX Server, and resumes the virtual machine on the target ESX Server. This entire process takes less than two seconds on a Gigabit Ethernet network. Third, the networks used by the virtual machine are also virtualized by the underlying ESX Server. This ensures that even after the migration, the virtual machine network identity and network connections are preserved. VMotion manages the virtual MAC address as part of the process. Once the destination machine is activated, VMotion pings the network router to ensure that it is aware of the new physical location of the virtual MAC address. Since the migration of a virtual machine with VMotion preserves the precise execution state, the network identity, and the active network connections, the result is zero downtime and no disruption to users.

73.What is storage Vmotion? Storage VMotion is similar to VMotion in the sense that "something" related to the VM is moved and there is no downtime to the VM guest and end users. However, with SVMotion the VM Guest stays on the server that it resides on but the virtual disk for that VM is what moves. Thus, you could move a VM guest's virtual disks from one ESX server's local datastore to a shared SAN datastore (or vice versa) with no downtime for the end users of that VM guest.

74.What is the requirement for Vmotion? Shared Storage Shared VMFS volume Processor Compatiblity the virtual machine configuration file for ESX Server hosts must reside on a VMFS. VMotion does not currently support raw or undoable virtual disks or migration of applications clustered using Microsoft Cluster Service (MSCS). VMotion requires a Gigabit Ethernet network between hosts. Motion requires a private Gigabit Ethernet migration network between all of the VMotion-enabled managed hosts. When VMotion is enabled on a managed host, configure a unique network identity object for the managed host and connect it to the private migration network.

75. Port used in VCenter Server? HTTPS – 443 HTTP – 80 Vcenter Diagnostic Port(TCP/IP) – 8083 Vcenter Port(TCP/IP) – 902 Vcenter Heartbeat Port(UDP) – 902

76. Which version of tomcat used in Vcenter 4?  
Its uses Tomcat 6

77. What port numbers must be open for SRM and VirtualCenter / vCenter Server?  
VMware VirtualCenter / vCenter Server: 80 (HTTP) 443 (HTTPS) 22 (SSH) 902 (VMware) 8096 (Tomcat) VMware Site Recovery Manager: 80 (HTTP) 8095 (SOAP Listen) 8096 (HTTP Listen) 9007 (API Listen) 9008 (HTTP Listen)

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16. Prepared By Sarathi Umakanthan 78. NEW Topic: Snapshot timeouts and failures. Virtual machine snapshot deletion can fail for several reasons. However, the removal/deletion is called 'after' the 3rd party backup has completed. If a snapshot removal fails to respond to VC in the expected time, the VC will throw a 'timeout'. This will leave a "ConsolidatedHelper" snapshot on the VM and must be removed before another backup starts. Possible reasons for snapshot failure. 1) Busy VM I/O. Exchange Server, Databases, Domain Controller etc. Microsoft Knowledge Base article 888794

(<http://support.microsoft.com/kb/888794>) These VMs do not react well to have their I/O quiesced during snapshotting. Disable LGTO\_SYNC driver <http://kb.vmware.com/kb/5962168> Install the Microsoft VSS driver [http://www.vmware.com/support/vi3/doc/vi3\\_vcb15\\_rel\\_notes.html#vss\\_quiescing\\_VSS](http://www.vmware.com/support/vi3/doc/vi3_vcb15_rel_notes.html#vss_quiescing_VSS) Quiescing Consolidated Backup now uses VSS for quiescing on ESX Server 3.5 Update 2 hosts when backing up Windows Server 2003, Vista, and Windows Server 2008 virtual machines. To use this feature, VSS components must be installed on the virtual machine as part of updated VMware Tools. The VSS components in the tools perform application-level quiescing on Windows Server 2003 and file system-level quiescing on Windows Vista and Windows Server 2008 virtual machines. Consolidated Backup continues to use SYNC driver for quiescing on pre-ESX Server 3.5 Update 2 hosts. 2) Space on volume. If a snapshot has grown too large during the backup, it can fail to remove because extra space is needed on removing 'layered' snapshots. This can happen if there are existing snapshots prior to another backup call. 3) Busy vmfs volumes. If several VMs on the same volume are trying to remove their snapshots at the same time, then 'reservation' conflicts can occur and halt the removal. VMware backup recommendations suggest staggering VM backup schedules to avoid too many snapshots on the same luns. 4) Service Console Busy If the mgmt services memory on the ESX server is low, this can inhibit the snapshot removal process and either fail the removal or cause a long delay resulting in the timeout response from VC. i) You can increase the Service Console memory to 800MB. Requires reboot. <http://kb.vmware.com/kb/1003501> ii) You can increase the VC timeout to 600. Edit>Client Settings. Use Custom Value seconds 600 <http://kb.vmware.com/kb/1004790> 5) SAN latency issues If luns are not responding or scsi commands are slow to reply, the ESX may fail to snapshot removal. 6) Scripted Customized scripts that do not allow for scheduling, multiple vmfs All The Best ☺ 16

17. Prepared By Sarathi Umakanthan snapshotting, or deletion. Edit the Remote Command Timeout in Client>Setting on the VC GUI to 600. I would not quickly dismiss using VCB, as it is only a backup enabler. If any solution, be it manual or 3rd party leverages the ESX Snapshot mechanism, it has to concede/conform to the known snapshotting limitations. New Topic :- Troubleshooting Disk and Datastore Related Issues 1.Troubleshooting a VMFS resource volume that is corrupted The event indicates the reported VMFS volume is corrupted. Example If 4976b16c-bd394790-6fd8-00215aaf0626 represents the UUID and san-lun-100 represents the associated volume label, you see: For Event: vmfs.lock.corruptondisk Volume 4976b16c-bd394790-6fd8-00215aaf0626 (san-lun-100) may be damaged on disk. Corrupt lock detected at offset 0 For Event: vmfs.resource.corruptondisk Volume 4976b16c-bd394790-6fd8-00215aaf0626 (san-lun-100) may be damaged on disk. Resource cluster metadata corruption detected Impact The scope of the corruption may vary. It might affect just one file or corrupt the whole volume. Do not use the affected VMFS any longer. Solution To recover from this issue: Back up all data on the volume. Run the following command to save the VMFS3 metadata region and provide it to VMware customer support: dd if=/vmfs/devices/disks/<disk> of=/root/dump bs=1M count=1200 conv=notrunc where <disk> is the partition that contains the volume. If you have a spanned volume, <disk> is the head partition. This provides information on the extent of the volume corruption and can assist in recovering the volumes. 2. VMFS Lock Volume is Corrupted Details You may observe the following events within the /var/log/vmkernel logs within your VMware ESX host: Volume 4976b16c-bd394790-6fd8-00215aaf0626 (san-lun-100) may be damaged on disk. Corrupt lock detected at offset 0 Note: In this example 4976b16c-bd394790-6fd8-00215aaf0626 represents the UUID of the VMFS datastore and san-lun-100 represents the name of the VMFS datastore. You may observe the following events within the /var/log/vmkernel logs within your VMware ESX host: Resource cluster metadata corruption detected Volume 4976b16c-bd394790-6fd8-00215aaf0626 (san-lun-100) may be damaged on disk. Note: In this example 4976b16c-bd394790-6fd8-00215aaf0626 represents the UUID of the VMFS datastore and san-lun-100 represents the name of the VMFS datastore. Solution The events indicate that the reported VMFS volume is corrupt. The scope and the cause of the corruption may vary. The corruption may affect just one file or the entire volume. Create a new datastore and restore any information that may have been compromised to the new datastore from existing backups. Do not use the corrupt VMFS datastore any longer. Note: If some information is still accessible on the datastore that

is reportedly corrupt, you may attempt to migrate the information off of the datastore with the use of the vCenter migrate feature, vmkfstools, or the datastore browser. If you are able to migrate any information off of the corrupt datastore, validate the information to ensure that it has not been affected by the corruption. All The Best ☺ 17

18. Prepared By Sarathi Umakanthan Determining the cause of the corruption If you would like assistance in determining the cause of the corruption, VMware technical support can provide assistance in a best effort capacity. To collect the appropriate information to diagnose the issue: Note: More information about support service terms and conditions can be found here. Log into the service console as root. Find the partition that contains the volume. In the case of a spanned volume, this is the head partition. Run the following command to find the value of the partition: vmkfstools -P /vmfs/volumes/<volumeUUID> For example, run the following command to find the partition for 4976b16c-bd394790-6fd8-00215aa0626: # vmkfstools -P /vmfs/volumes/4976b16c-bd394790-6fd8-00215aa0626 File system label (if any): san-lun-1000 Mode: public Capacity 80262201344 (76544 file blocks \* 1048576), 36768317440 (35065 blocks) avail UUID: 4976b15-1f252bd1-1e57-00215aa0626 Partitions spanned (on "lvm"): naa.60060160b4111600826120bae2e3dd11:1 Make note of the first device listed in the output for the Partitions spanned list. This is the value for the partition. In the above example, the first device is: naa.60060160b4111600826120bae2e3dd11:1 Using the value from step 3, run the following command to save the vmfs3 metadata region and provide it to VMware customer support: dd if=/vmfs/devices/disks/<disk:partition> of=/root/dump bs=1M count=1200 conv=notrunc Note: The variable <disk:partition> is the value recorded in step 3. Caution: The resulting file is approximately 1200 MB in size. Ensure that you have adequate space on the destination. The destination in the above example is the /root/ folder. To compress the file, you can use an open source utility called gzip. The following is an example of the command: # gzip /root/dump Note: For more information on the gzip utility, type man gzip at the console. Create a new support request. For more information, see How to Submit a Support Request. Upload the resulting file along with a full support bundle to VMware technical support.

3. Troubleshooting virtual machine performance issues Symptoms The guest operating system boots slowly Applications running in virtual machines perform poorly Applications running in virtual machines take a long time to launch Applications running in virtual machines frequently become unresponsive Multi-user services have long transaction times or can handle less simultaneous users than expected Purpose This article discusses identifying and resolving various issues that affect virtual machine performance running on VMware-hosted products. Resolution Validate that each troubleshooting step below is true for your environment. The steps will provide instructions or a link to a document, for validating the step and taking corrective action as necessary. The steps are ordered in the most appropriate sequence to isolate the issue and identify the proper resolution. Please do not skip a step. Verify that the reduced performance is unexpected behavior. When a workload is virtualized, it is common to see some performance reduction due to virtualization overhead. Troubleshoot a performance problem if you experience the following conditions: All The Best ☺ 18

19. Prepared By Sarathi Umakanthan The virtual machine was previously working at acceptable performance levels but has since degraded. The virtual machine performs significantly slower than a similar setup on a physical computer. You want to optimize your virtual machines for the best performance possible. Verify that you are running the most recent version of the VMware product being used. For download information, see the VMware Download Center. Check that VMware Tools is installed in the virtual machine and running the correct version. The version listed in the toolbox application must match the version of the product hosting the virtual machine. To access the toolbox, double-click the VMware icon in the notification area on the task bar, or run vmware-toolbox in Linux. Some VMware products indicate when the version does not match by displaying a message below the console view. For more information on installing VMware Tools, see 4. Review the virtual machine's virtual hardware settings and verify that you have provided enough resources to the virtual machine, including memory and CPU resources. Use the average hardware requirements typically used in a physical machine for that operating system as a guide. Adjustments to the settings are required to factor-in the application load: higher for larger loads such as databases or multi-user services, and lower for less intense usage such as casual single-user applications like e-mail or web clients. 5. Ensure that any antivirus software installed on the host is configured to exclude the virtual machine files from active scanning. Install antivirus software inside the virtual machine for proper virus protection. For more information, see Investigating busy hosted virtual machine files (1003849). Investigating busy hosted virtual machine files

Symptoms Unable to open file. Insufficient permissions. Virtual machine runs slowly. Virtual machine becomes unresponsive. Virtual machine crashes. Virtual machine file corruption. Guest operating system data corruption. Cannot power on virtual machine. Unable to successfully perform snapshot operations. Unexpected behaviour in guest operating system. Purpose This article guides you through determining if problems being experienced by a virtual machine are related to other software on your host trying to access virtual machine files. The article also offers means of correcting this situation. Resolution To ensure optimum performance and data integrity, VMware requires exclusive disk access to all of the files that comprise the resources of a virtual machine while it is powered on. If another program accesses one of these files at the wrong moment, unexpected results may occur. For information on determining the location of virtual machine files, see Locating a hosted virtual machine's files (1003880) . The following are the types of software and activities that may interfere with normal virtual machine operation, and the steps to take in order to ensure that they do not cause a conflict: Antivirus software. Exclude all of the virtual machine files from manual, automatic, and real time scanning. Limit antivirus scanning of virtual machines to the guest operating system inside the virtual machine. If an antivirus scan of the virtual machine files is required ensure that the virtual machine is powered off prior to the scan. Backup software. Exclude all virtual machine files from host file backups. If a virtual machine needs to be backed up it can be done from the guest operating system inside the virtual machine. If the virtual machine files themselves need to be backed up ensure that the virtual machine is powered off prior to the backup. Disk utility software. Do not run host disk integrity checks, defragmentation routines, or anything else that involves writing to the disk or otherwise accessing files, on any of the virtual machine's files while the virtual machine is powered on. All The Best ☺ 19

20. Prepared By Sarathi Umakanthan Other software. This includes spyware, P2P applications, and anything else that may be accessing one of the virtual machine's files. Operations that make use of the files include reading, scanning, copying, and writing. Exclude the virtual machine's files from any of these operations. Editing of virtual machine files. Do not edit any of the virtual machine's files while it is powered on. 6. Check the storage sub-system on the host and verify that it is configured for optimal performance. For information, see Troubleshooting hosted disk I/O performance problems (1008885). Troubleshooting hosted disk I/O performance problems Symptoms The virtual machine performs very slowly: applications start slowly or take a long time to appear, or the operating system takes a long time to boot. Virtual machines stop responding for long periods of time. Windows guests fail with STOP 0x77 KERNEL\_STACK\_INPAGE\_ERROR, or the event log contains Event ID 51 from the source: Disk. Linux guests become nonresponse or lock-up. The vmware.log file contains lines similar to: Command WRITE(10) took 10.858 seconds (ok) Command READ(10) took 1.173 seconds (ok) SCSI0: RESET BUS Resolution These symptoms may indicate that there is a disk performance issue on the underlying hardware. When using VMware hosted products, consider that both the virtual machines and host operating system often share the same disk resources and hardware. Below are some suggestions you can implement to improve disk I/O performance issues: Suggestion Details Using non-growable or preallocated VMDK disks When creating a production virtual machine, VMware recommends that the virtual hard disk be configured to preallocated mode. If existing disks are not in preallocated mode, use the vmware-vdiskmanager tool to convert the disks. Consult the product's User Guide for more information. Removing or reducing snapshots When a snapshot is created, the VMware product produces an additional delta file. Each successive snapshot produces an additional file. When a disk operation is performed within the guest, the disk I/O is recreated by parsing each snapshot delta file in the chain. This produces additional disk overhead on the host because more than one file must be opened and processed to recreate the I/O data for the guest operating system. For best performance, remove all snapshots in the guest operating system or store performance-sensitive data on an independent virtual disk. Consult the product's User Guide for information on configuring independent virtual disks. Using separate physical and virtual hard disks Install the host operating system onto a separate hard disk than the virtual machines. Also store the paging file or swap partition on a different drive than the host operating system. Optimizing the drive Run disk defragmentation software on the host and in the guest operating system. Fragmentation of both the VMDK files and within the guest can create a double the impact from fragmentation. Using partitions Implementing partitions inside the guest operating system or host can improve performance by creating fragmentation boundaries and can reduce further fragmentation. For example, consider storing the small, often modified files of the operating system away from large files such as database or Microsoft Exchange stores by using a separate partition. Also consider storing the virtual machine files (.VMDK files) on their own partition or disk on the host Using

RAID or adjusting the RAID configuration or adding disks to the array Certain RAID configurations can impact read or write performance positively and negatively. When using a RAID 5 configuration, consider adding more disks to the array. This generally improves the performance of All The Best ☺ 20

21. Prepared By Sarathi Umakanthan the array. Using mirroring can improve read performance but may degrade write performance. If write performance is primarily impaired, consider a different RAID type to host the virtual machine. Check for disk encryption Disk encryption can reduce disk performance. Try moving the virtual machine to a non-encrypted volume and test if performance has improved. Ensure the existing physical hardware is healthy and performing as expected Often disk problems such as bad sectors or failing controllers can impact performance because I/O and bad cluster auto-recovery can cause sudden interruptions in I/O operations to the device. Perform a hardware and file system diagnostic to verify if this is impacting performance. For more information, see Performing a disk check (1004003). Upgrade or choose different physical disk hardware It is important to consider the performance characteristics of the physical disk hardware. In general, hardware RAID and independent disk controllers perform better than software RAID and integrated disk controllers. When an independent controller is used, often it is possible to configure or increase the cache memory to yield better performance. Consult the hardware vendor for more information. Typically older hardware performs slower than newer hardware. Hard disks used in laptop or notebook computers are often far slower than drives used in desktop computers. SCSI hard disks typically perform much faster than those used in regular desktops and notebooks. Hard disks connected over USB typically perform slower than directly attached local disks (such as IDE, SATA, and SCSI). Flash-based USB thumb drives typically perform slower than hard drives. Review the performance specifications provided by the disk manufacturer on critical metrics such as spindle speed, and average seek time (latency), burst data transfer rates. Higher spindle speeds, lower seek times and higher transfer rates perform better. When comparing flash-based drives, observe both the read and write transfer performance ratings. Edit the virtual machine settings to reduce I/O usage by using more host memory Adding the following settings to a virtual machine can reduce the I/O load on the hard disk, however these adjustments require additional memory on the host. Only add these settings if there is sufficient free memory on the host to accommodate all the memory allocated to the virtual machine, otherwise you may cause a memory starvation condition that can reduce performance of all the running virtual machines or possibly affect the host operating system. Use these settings with caution. Open the .VMX file for the affected virtual machine while it is powered off. Add the following lines to the file using a text editor. Note: If you are using VMware Server, you may need to restart the VMware Authorizatioin Service (vmware-authd) for changes to take effect.

```
MemTrimRate = "0"
mainMem.useNamedFile=false
sched.mem.pshare.enable = "FALSE"
prefvmx.useRecommendedLockedMemSize = "TRUE"
```

7. Verify that there are enough free resources on the host to satisfy the requirements of the virtual machine. In VMware hosted products resources must be shared by both the host operating system and all running guests. For more information, see Investigating hosted virtual machine resources (1003848). All The Best ☺ 21

22. Prepared By Sarathi Umakanthan Investigating hosted virtual machine resources Symptoms A virtual machine: Cannot be powered on. Cannot be resumed. Cannot be suspended. Cannot perform a snapshot operation. A guest operating system or a host operating system with powered on virtual machines: Has stopped responding. Has performance problems. Is slow. Is experiencing excessive disk use. Purpose This article guides you through the process of determining if a lack of host resources is causing problems with a virtual machine operation. A lack of host resources can also cause problems on a virtual machine's guest operating system and on a host computer where a VMware product is installed and virtual machines are powered on. The steps outlined here eliminate the possibility that the problem is related to insufficient host resources. Resolution To determine if your host has enough resources to support your virtual machines, consider memory, disk space, and CPU. For each of these resources: Note: The following procedures must all be done when the affected virtual machine is powered off. Note: If you perform a corrective action in any of the following steps, confirm if you are still experiencing the problem. Total the amount of the resource assigned to all virtual machines that can be powered on at the same time. If different virtual machines can be powered on at different times use the highest total. Note: The amount of disk space assigned to a virtual machine is the combined maximum size of all of its virtual drives. If you use snapshots with a virtual machine, take into account that each snapshot may require as much disk space as the combined size of all of the virtual machine's virtual drives. Each snapshot starts off requiring very little disk space but its disk space requirements increase over time. Note: There is no

direct way of modifying the amount of CPU assigned to a virtual machine. When considering virtual machine performance, evaluate the CPU needs of the guest operating system and its applications. Add to this the amount of the resource required by your host for its own operations. If this results in a number that is not less than the amount of the resource available on your host, do one of the following: Reduce the number of virtual machines powered on at the same time on this host. Reduce the amount of this resource assigned to the virtual machines. Increase the amount of this resource installed on the host.

Note: To adjust virtual CPU assignment if your host has multiple CPUs or CPU cores, it is possible to set processor affinity among virtual machines so that one or more CPUs are not used by any other virtual machine. For more information, see [Associating a Virtual Machine With a Particular Host Processor](#) (110) . Alternatively, the host hardware must be upgraded to one with faster or more CPUs. [Associating a Virtual Machine With a Particular Host Processor Details](#) I have a multiprocessor or hyperthreaded processor system, but my virtual machine shows only one processor. Why is that? Solution VMware products run on symmetric multiprocessor (SMP) systems, also referred to as multiprocessor specification (MPS) systems. However, the environment provided within each virtual machine is a uniprocessor system. If you have multiple virtual machines running at the same time, some use one processor and some use another, thus taking advantage of the multiple processors in the system. All The Best ☺ 22

23. Prepared By Sarathi Umakanthan [Associating a Virtual Machine with a Particular Processor on a Multiprocessor/Hyperthreaded Processor Host](#) If your host is a multiprocessor system (multiple physical processors) or if the processor or processors are hyperthreaded (where each physical processor is split into two or more logical processors), you can associate each virtual machine with a specific processor on the host. By default, each virtual machine is associated with all physical and logical processors on the host. The virtual machine uses whichever processor is available at the time it needs to execute instructions. To associate a virtual machine with a specific physical or logical processor on the host, do the following. Note: These steps apply to virtual machines on Windows hosts and on Linux hosts with 2.6.x kernels. In a text editor, open the virtual machine's configuration file (.vmx). Add the following line for each processor with which you do not want to associate the virtual machine: processor# .use = FALSE where # is the number of the processor on the host, the count beginning at 0 . On a Windows host, processors are listed in the registry. To view the processors, complete the following steps. Choose Start>Run, then type regedit32. The Windows registry opens. In the registry, choose HKEY\_LOCAL\_MACHINE>HARDWARE>DESCRIPTION> System>CentralProcessor. Each CPU on the host is listed here, numbered starting with 0. On a Linux host, processors are listed in /proc/cpuinfo. Typically, on a Windows or Linux 2.6.x kernel system with multiple hyperthreaded processors, the physical processors are numbered first, followed by the logical processors. Keep this numbering system in mind if you move the virtual machine to another host with a different number of physical or logical processors. Caution: GSX Server 3.1 and earlier and Workstation for Linux do not honor the processor# .use option. Thus, a virtual machine cannot be associated with a specific CEC while on a Linux host, and the workaround discussed here does not work. Keep this in mind if you move a virtual machine from a GSX Server or Workstation Windows host to a Workstation or older GSX Server Linux host. For more information on checking free host memory, see [Investigating operating system memory usage](#) (1004014) . Investigating operating system memory usage Purpose This article describes how to determine memory usage. Memory usage information is useful in addressing problems encountered with an operating system as a result of a process taking up excessive memory or with an operating system that has insufficient free memory for correct operation. Memory usage problems result in slow operating system performance, slow application performance, and the inability of an application to load or continue to run. In some instances, these problems can include an operating system crashing or failing to respond. Resolution The methods of determining memory usage differ between operating systems. Refer to the section that matches your operating system. Note: If you determine that you have insufficient memory, you must limit the amount of concurrently running processes or increase the amount of memory. If your operating system has been installed on a virtual machine, you can increase the amount of memory assigned to the virtual machine. For more information, see [Increasing the amount of memory assigned to a virtual machine](#) (1004059). Windows To determine memory usage: Run the Task Manager: All The Best ☺ 23

24. Prepared By Sarathi Umakanthan Click Start>Run. Type taskmgr. Click OK. Note: If you are running a version of Windows where this command does not work, you must find an alternate method of

launching the Task Manager or determining the amount of free memory. Click the Performance tab. The memory usage is displayed. Linux Note: The exact procedure may differ between distributions of Linux. If the following commands do not work, consult the manual for your distribution of Linux. To determine memory usage: Open a shell prompt. For more information, see [Opening a command or shell prompt \(1003892\)](#). Type free -mt and press Enter. The memory usage is displayed. Mac OS To determine memory usage: Press Shift + Command + U. Double-click Activity Monitor. Click the System Memory tab. The memory usage is displayed. For more information on checking free disk space, see [Investigating operating system disk space \(1004007\)](#). Investigating operating system disk space Purpose This article guides you through determining disk usage. Disk usage information is useful in addressing problems encountered with an operating system as a result of a lack of disk space. Problems related to disk usage can include slow operating system performance, slow application performance, and the inability of an application to load or continue to run. In some cases, these problems can include an operating system unexpectedly stopping or failing to respond. Resolution The methods of determining disk usage differ between operating systems. Refer to the section below that matches your operating system. Note: If you determine that you have insufficient disk space you must free up some space or increase the size of your hard disk. If your operating system has been installed on a virtual machine, you can increase the size of its virtual disk. For more information, see [Increasing the size of a virtual disk \(1004047\)](#). Windows Note: The exact procedure differs between versions of Windows. If one procedure does not work try the other. If neither method works, consult the manual for your version of Windows. To determine disk usage from the user interface: Double-click the My Computer icon. Right-click the entry for your local disk. Click Properties. Disk usage is displayed graphically. To determine disk usage from a command line: Open a command prompt. For more information, see [Opening a command or shell prompt \(1003892\)](#). Type dir c: and press Enter. Free disk space is displayed on the last line of output. Note: If the local disk being investigated is not c:, replace c: with its drive letter. Linux Note: The exact procedure may differ between distributions of Linux. If the following commands do not work for you, consult the manual for your distribution of Linux. To determine disk usage from a shell prompt: Open a shell prompt. For more information, see [Opening a command or shell prompt \(1003892\)](#). Type df -vh and press Enter. Disk usage is displayed for each file system. Mac OS To determine disk usage from the user interface: Press Shift + Command + U. All The Best © 24

25. Prepared By Sarathi Umakanthan Double-click Activity Monitor. Click the Disk Usage tab. Disk usage is displayed graphically. To determine disk usage from a shell prompt: Open a shell prompt. For more information, see [Opening a command or shell prompt \(1003892\)](#). Type df -H and press Enter. Disk usage is displayed for each file system. For more information on checking free host CPU, see [Investigating operating system CPU usage \(1004016\)](#). Investigating operating system CPU usage Purpose This article guides you through determining CPU usage. CPU usage information is useful in addressing problems encountered with an operating system as a result of a process taking up excessive CPU cycles. CPU usage problems result in slow operating system performance. Resolution The methods of determining CPU usage differ between operating systems. Refer to the section that matches your operating system. Note: If you determine that you have insufficient CPU you must limit the amount of concurrently running processes or increase the amount of CPU. If your operating system has been installed on a virtual machine running under an ESX Server host, see [Increasing the amount of CPU assigned to a virtual machine \(1004060\)](#). If this is a virtual machine running under a different product there is no direct way of increasing the amount of CPU assigned. If your host has multiple CPUs or CPU cores, it is possible to set processor affinity among virtual machines so that one or more CPUs are not used by any other virtual machine. For more information, see [Associating a Virtual Machine With a Particular Host Processor \(110\)](#). Alternatively, the host hardware must be upgraded or the virtual machine moved to a different host. If this is a virtual machine, you can increase the amount of memory assigned to the virtual machine. For more information, see [Increasing the amount of memory assigned to a virtual machine \(1004059\)](#). Windows To determine CPU usage: Run the Task Manager: Click Start > Run. Type taskmgr. Click OK. Note: If you are running a version of Windows where this command does not work, you must find an alternate method of launching the Task Manager or determining the CPU usage. Click the Performance tab. The CPU usage is displayed. Note: Click the Processes tab to get detailed information about the CPU usage of each process. Click the CPU column to sort the results by the amount of CPU each process is using. Linux Note: The exact procedure may differ between distributions of Linux. If the following commands do not work, consult the manual for your distribution of Linux. To determine CPU usage: Open a shell prompt. For further information, see [Opening a command or shell prompt \(1003892\)](#). Type

top and press Enter. The C PU usage is displayed. Mac OS To determine memory usage: Press Shift + Command + U. Double-click Activity Monitor. Click the CPU tab. The CPU usage is displayed. Note: Click the % CPU column to sort these results by the amount of CPU each process is using. 8. Disable the CPU power management features on the host. In some cases, these features can cause CPU performance issue with virtual machines. For more information, see Virtual Machine Clock Reports Time Unpredictably on Multiprocessor Systems (2041). Virtual Machine Clock Reports Time Unpredictably on Multiprocessor Systems All The Best © 25

26. Prepared By Sarathi Umakanthan Details The clocks in my virtual machines run in an unpredictable manner. Sometimes they run too quickly, other times they run too slowly, and sometimes they just stop. What is happening? Solution If you are running VMware desktop virtualization products on a multiprocessor system in which the timestamp counters (TSCs) do not remain synchronized between all processors, the operating system clock in each virtual machine can perform unpredictably. In this context, "multiprocessor" includes systems with multiple cores but only one processor socket. This problem can occur on some 64-bit AMD systems and on some Intel systems. See the relevant information described in the following sections: 64-bit AMD Systems Intel Systems 64-bit AMD Systems This problem can occur on some 64-bit AMD multiprocessor (including multicore) systems. If you run VMware products on one of these systems and the clocks in your virtual machines are performing unpredictably, VMware recommends you apply the workaround described below. Timestamp counters (TSCs) on 64-bit AMD systems should ideally remain synchronized because these systems run all CPUs from a common clock oscillator. However, some 64-bit AMD systems have power management features that can cause the TSCs on some processor cores to lose time in relation to other cores. You might be able to disable these features: In your system's BIOS setup windows, look for settings labeled PowerNow or Cool'N'Quiet, and disable them. If you are running a Linux host operating system, look for a system daemon or applet called cpufreqd, cpuspeed, powernowd, cpudyn, speedy, or cpufreq, and disable it. For example, on some systems the command service cpuspeed stop might work. The instructions to disable the daemon or applet found on your system vary. Refer to your system's documentation for more information. If you require these features or you cannot find a way to disable them, you need to assign each of your virtual machines to a subset of processor cores on which the TSCs do remain synchronized. In some cases you may need to do this even after turning off power management in your system's BIOS; this occurs if your system only partially disables the power management features involved. See <http://kb.vmware.com/kb/2039> for more information. How to Run VMware Hosted Products on Systems on Which TSCs Are Not in Sync Details How can I work around problems on multiprocessor systems on which the timestamp counters do not stay in sync, such as IBM x-Series systems and some 64-bit AMD systems? Solution You must perform two actions. Disable a feature in some versions of VMware products that attempts to resynchronize the TSCs whenever a virtual machine is started. See the section Avoiding Forced TSC Resynchronization, below. Assign each virtual machine to a subset of processors whose TSCs are synchronized with each other. See the section Assigning a Virtual Machine to Processors with Synchronized TSCs, below. Avoiding Forced TSC Resynchronization On a Windows host operating system, you may encounter a problem with unwanted resynchronization of timestamp counters (TSCs) when a virtual machine starts. The workaround is to add the following line to your global configuration file: host.TSC.noForceSync = TRUE The global configuration file is normally found at: C:Documents and SettingsAll UsersApplication DataVMwareVMware Workstationconfig.ini for VMware Workstation C:Documents and SettingsAll UsersApplication DataVMwareVMware GSX Serverconfig.ini for GSX Server If this file does not exist, see <http://kb.vmware.com/kb/1754>. Creating and editing config.ini on Windows Hosts All The Best © 26

27. Prepared By Sarathi Umakanthan Details Some knowledge base articles tell me to edit the config.ini file, but I can't find it. Where is it? How do I create it if it doesn't exist? <br style=""> <br style=""> Solution The config.ini file may not exist if you have not changed the default configuration setting from the Edit > Preferences menu. To see if the file already exists, look for it at C:Documents and SettingsAll UsersApplication DataVMwareVMware ProductName, where VMware ProductName is the name of the product you are using. Notes: Make sure you are looking on the Windows host on which you have installed the VMware software. You should not look for this file in your virtual machine. On Vista and newer versions of Windows, look for the file at C:Program DataVMWare<VMWare Product>Config.ini Note: On Vista and Windows 7 type systems, the C:Program DataVMware<VMware Product> folder is normally hidden by default. You will need to go to Control Panel >> Appearance and Personalization >>

Folder Options >> Show hidden files and folders, and then check the "Show hidden files, folders and drives" radio button in order to make this folder viewable/accessible. To create the file if it does not exist, do one of the following: Create a new, empty text file named config.ini in the location above. Caution: Use a text editor like Notepad. Do not use Word or Wordpad, because these editors create extra characters in the text file that render the configuration settings that you add unreadable. Make a configuration change from the menu. From the Edit menu of your virtual machine, choose Preferences > Memory. Note the current value that appears for Reserved Memory. Enter a new value for Reserved Memory and click OK. Confirm that a config.ini file now exists in the location above. Repeat steps 1-3 and change Reserved Memory back to its original value. Note (8/15/07): "Avoiding Forced TSC Resynchronization" is no longer necessary for current versions of VMware products, because the default value for that option is now TRUE. But it doesn't hurt if you have added the option explicitly. Assigning a Virtual Machine to Processors with Synchronized TSCs When a system has processors that have timestamp counters which are not all synchronized, the host operating system may move a virtual machine between two processors on which the timestamp counters are out of sync. This can cause the virtual machine clock to perform unpredictably. The clock may run too quickly or too slowly, or may even stop at times. On an affected IBM x-Series system or its derivatives, each NUMA node (or CEC, in IBM terminology) has processors whose TSCs are synchronized with each other, but the TSCs of different NUMA nodes are not synchronized. So this issue can be solved by assigning each virtual machine to run only on the processors of a single NUMA node. On affected 64-bit AMD systems, depending on which power management features are in use, every processor core's TSC may be out of sync with the others. (In other cases, the two cores in each dual-core processor may remain in sync.) If disabling power management does not solve this issue for you, it is safest to assign each virtual machine to only one processor core. The details of how to assign a virtual machine to a subset of processors depend upon whether you are running GSX Server 3.2 or Workstation 5.5, or an earlier version of GSX Server or Workstation. For Virtual Machines Running on a GSX Server 3.2, VMware Server 1.0, or Workstation 5.5 Host (or later versions) These VMware products assign each virtual machine to a single NUMA node on an x440-class server running one of the following host operating systems: Windows Server 2003 Any Linux 2.6.x kernel Linux 2.4.21 or later kernel All The Best ☺ 27

28. Prepared By Sarathi Umakanthan When you power on a virtual machine, the VMware software by default assigns it to a NUMA node at random. You can configure a virtual machine to run on a specific NUMA node if you prefer. To assign a virtual machine to a specific NUMA node, complete the following steps. Make sure the virtual machine is powered off. In a text editor, open the virtual machine's configuration file (.vmx file). Look for a line that starts with processors.NUMANode =. If the line does not exist, add it. Change or set the value after the equal sign (=) to the number of the desired NUMA node. Put the value in quotation marks. For example, to assign the virtual machine to NUMA node 2, add the following line to its configuration file: processors.NUMANode = "2" To return this virtual machine to the default behavior, in which the VMware software assigns the virtual machine to a NUMA node at random, complete the following steps. Make sure the virtual machine is powered off. In a text editor, open the virtual machine's configuration file (.vmx file). Delete the line that starts with processors.NUMANode =. Also delete any lines that start with processor<n>.use (where <n> is any number). These lines may be present if you previously applied the older workaround from GSX Server 3.1 and earlier or Workstation 5.0 and earlier, as described below. In general, do not use the processor<n>.use option described below together with the processors.NUMANode option. If both options are present in the configuration file, any processor<n>.use options are ignored. If you are using GSX Server, VMware Server, or Workstation on a 64-bit AMD multiprocessor system, the VMware product does not assign each virtual machine to a subset of processor cores by default. If you need this assignment to be done on your 64-bit AMD system, choose a specific processor core to which to assign each virtual machine, using the processor<n>.use options as described in the next section. For Virtual Machines Running on a Workstation 5.0 or Earlier Host, or on a GSX Server 3.1 or Earlier Host To work around this problem for systems running on Workstation 5.0 or earlier, or GSX Server 3.1 or earlier, choose one NUMA node for each virtual machine and associate the virtual machine with the processors in that NUMA node. You can associate different virtual machines with different NUMA nodes; just make sure you do not allow any single virtual machine to run on multiple NUMA nodes. To associate a virtual machine with the processors in one NUMA node, complete the following steps. Make sure the virtual machine is powered off. In a text editor, open the virtual machine's configuration file (.vmx file). Add the following line for each processor with which you do not want to associate the virtual machine (where

<n> is the number of the processor on the host): processor<n>.use = FALSE For example, you have an eight-processor host with processors 0 through 3 on NUMA node 0 and processors 4 through 7 on NUMA node 1, and there are two virtual machines on the host. To associate the first virtual machine with NUMA node 0, add the following lines to that virtual machine's configuration file: processor4.use = FALSE processor5.use = FALSE processor6.use = FALSE processor7.use = FALSE To associate the second virtual machine with NUMA node 1, add the following lines to that virtual machine's configuration file: processor0.use = FALSE processor1.use = FALSE processor2.use = FALSE processor3.use = FALSE If your host has four processors, they may either be located all in one NUMA node or be split between two NUMA nodes. If all the processors are located on the same NUMA node, this problem does not occur. If the processors are split between two NUMA nodes, add the following lines to the virtual machine's configuration file to associate it with NUMA node 0: All The Best ☺ 28

29. Prepared By Sarathi Umakanthan processor2.use = FALSE processor3.use = FALSE Then add the following lines to the virtual machine's configuration file to associate it with NUMA node 1: processor0.use = FALSE processor1.use = FALSE Caution: On a Linux host, GSX Server 3.1 (and earlier) and Workstation 5.0 (and earlier) do not honor the processor<n>.use option. You should not run GSX Server 3.1 and earlier, or Workstation 5.0 and earlier, at all on a machine that uses Linux as the host operating system and that has multiple NUMA nodes on which the TSCs are not synchronized. You need to upgrade to GSX Server 3.2 or Workstation 5.5. Caution: The above examples assume that the GSX Server or Workstation host does not have hyperthreading enabled for its processors. For information about how hyperthreading affects which processors a virtual machine uses, read the next section. How Hyperthreading Affects the Way in Which a Virtual Machine Is Associated with a Processor in a NUMA Node When you enable hyperthreading on a host, the processor<n>.use option associates the virtual machine with CPU <n>, which is now a logical processor. Continuing with the example above, if you enable hyperthreading on an eight-processor host with two NUMA nodes, and you want to associate a virtual machine with NUMA node 0, add the following lines to that virtual machine's configuration file: processor4.use = FALSE processor5.use = FALSE processor6.use = FALSE processor7.use = FALSE processor12.use = FALSE processor13.use = FALSE processor14.use = FALSE processor15.use = FALSE When hyperthreading is enabled, an eight-processor Windows host has sixteen logical processors, numbered as follows: Physical CPU 0: logical CPU 0, 8 Physical CPU 1: logical CPU 1, 9 Physical CPU 2: logical CPU 2, 10 Physical CPU 3: logical CPU 3, 11 Physical CPU 4: logical CPU 4, 12 Physical CPU 5: logical CPU 5, 13 Physical CPU 6: logical CPU 6, 14 Physical CPU 7: logical CPU 7, 15 Each NUMA node includes the following logical processors: NUMA node 0 includes logical CPUs 0, 1, 2, 3, 8, 9, 10, 11 NUMA node 1 includes logical CPUs 4, 5, 6, 7, 12, 13, 14, 15 In enabling or disabling hyperthreading, use caution when associating virtual machines with processors. When you enable hyperthreading on the host, you should modify each virtual machine's configuration file to account for all the logical processors on the host. However, disabling hyperthreading does not require you to modify the virtual machines' configuration files, as long as you do not make hardware changes to the host (such as adding or removing NUMA nodes or physical processors, or moving processors between NUMA nodes). GSX Server and Workstation ignore any processor<n>.use option where <n> is greater than the highest numbered processor available to the host operating system. Thus, with hyperthreading disabled, the options that you added for the first hyperthread on each physical processor (CPUs 0 through 7 above) now apply to the physical processor itself, while those you added for the second hyperthread (CPUs 8 through 15) are now ignored. Caution: You must consider the change to the CPU numbering scheme when you add or remove NUMA nodes or physical processors to or from the host. With hyperthreading enabled, the number for each second logical processor changes when you add or remove a NUMA node or physical processor. Adding or removing a NUMA node or physical processor to or from a host requires you to re-associate virtual machines with the correct processors on each NUMA node. All The Best ☺ 29

30. Prepared By Sarathi Umakanthan Note: Knowledge base articles 2039, 2040, and 2041 replace knowledge base article 1236. Note: If you are running Windows XP Service Pack 2 as the host operating system on a multiprocessor 64-bit AMD host that supports processor power management features, you also need to apply the hotfix described in Microsoft knowledge base article 896256 at <http://support.microsoft.com/?id=896256>. According to this Microsoft knowledge base article, the hotfix is needed for the following operating systems: Microsoft Windows Server 2003, Standard and Enterprise x64 Editions Microsoft Windows XP Service Pack 2, when used with Microsoft Windows XP Home and

Professional Editions Microsoft Windows XP Tablet PC Edition 2005 No hotfix is needed for Microsoft XP Media Center. Note: VMware knowledge base articles 2039, 2040, and 2041 replace knowledge base article 1236. Intel Systems This problem can occur on some Intel multiprocessor (including multicore) systems. After a Windows host performs a "stand by" or "hibernation", the TSCs may be unsynchronized between cores. The hotfix described in Microsoft knowledge base article 896256 addresses this issue. See <http://support.microsoft.com/kb/896256>. 9. Confirm that the networking drivers installed in the virtual machine are the performance optimized drivers, or match the networking mode set on the host for that virtual machine. Typically, installing VMware Tools installs the correct network drivers. 10. Verify that host networking issues are not impacting the performance of the virtual machine. For more information, see Verifying host networking speed (1009527). Verifying host networking speed Symptoms Applications running in virtual machines perform poorly It takes a long time to log into a network It takes a long time to copy a file from a network share Multi-user services have long transaction times or can handle less simultaneous users than expected Purpose This article assists you in determining if a computer running a VMware hosted product is affected by slow networking. Slow host networking results in slow guest operating system networking. Resolution Evaluate these points for validity. A positive result may indicate a networking problem on the physical host that needs to be corrected to ensure optimum virtual machine performance. If corrective action is taken on the host, test virtual machine networking performance again. It takes longer to copy a file from a network location to this host than it does to copy the same file to a different host Logging into a network from the host takes the same amount of time as it does when logging into the same network from the guest operating system There are multiple virtual machines running on the host and they are all equally slow Running an application that is slow when run from the guest operating system is just as slow when run on the host The networking settings of host network adapters have been manually set to a speed or duplex lower than their capability The firmware and driver versions for host network adapters are not current There is a firewall, network shaping software, or network monitoring software on the host affecting network speed There is software running on the host that makes extensive use of networking traffic, like a heavily used Web server or file share 11. Verify that the host operating system is working properly and is in a healthy state. When the host is not working correctly it may draw excessive resources from the guests. For more information, see Verifying the health of an operating system (1003956). Verifying the health of an operating system Symptoms A guest or host operating system: Has stopped responding and displayed a blue screen with a stop code All The Best ☺ 30

31. Prepared By Sarathi Umakanthan Has experienced a core dump Has experienced a kernel panic Has stopped responding Keeps rebooting for no apparent reason Has performance problems Is slow Has an application that is not working properly Is experiencing network problems Purpose This article guides you through the process of determining if problems encountered on a virtual machine's guest operating system or on a host computer where a VMware product is installed, are related to VMware. The steps outlined here eliminate the possibility that the problem is related to the operating system itself, to another application installed to the operating system, or to the physical hardware of the host computer. Note: While this article addresses problems related to the guest operating system of a virtual machine running on an ESX Server host, it does not address problems related to the ESX Server host itself. For more information about ESX Server issues, see Verifying the health of an ESX Server operating system (1004019). Resolution A VMware product may behave unexpectedly if the operating system on which it is installed is experiencing problems. Follow the section that matches your operating system. Note: If you perform a corrective action in any of the following steps, determine if the problems initially encountered are still being experienced. Common Windows Problems Verify there are no problems with the filesystem by performing a disk check on your hard drives. For more information, see Performing a disk check (1004003). Performing a disk check Symptoms VMware Workstation unrecoverable error: (vcpu-0) Exception 0xc0000006 (disk error while paging) has occurred. Purpose This article describes how to perform a disk check. This is required to address problems encountered with an operating system as a result of file system errors. Problems can include data loss, virtual machine crashes, slow performance, virtual machine resume and suspend failures, and other unexpected behaviour. Resolution Determine if there are problems with your file system by performing a disk check. A disk check can be done by using a 3rd party application or by using tools native to your operating system. The method of performing a disk check differs between operating systems. Refer to the section below that matches your operating system. Windows Note: The exact procedure differs between versions of Windows. If one procedure below does not work try the other. If neither method works, consult the manual for your version of

Windows. To perform a disk check from the user interface: Double-click the My Computer icon. Right-click the entry for your local disk. Click Properties. Click the Tools tab. Click Check Now. Select Scan for and attempt recovery of bad sectors. Click Start. To perform a disk check from a command line: Open a command prompt. For more information, see Opening a command or shell prompt (1003892). Type chkdsk c:/r and press Enter. Note: If the local disk being scanned is not c:, replace c: with its drive letter. All The Best ☺ 31

32. Prepared By Sarathi Umakanthan Note: A scan of the system drive requires that the operating system be rebooted. Linux Note: The exact procedure may differ between distributions of Linux. If the following commands do not work for you, consult the manual for your distribution of Linux. The following commands may also fail if you are not logged in as a user with root access. Open a shell prompt. For more information, see Opening a command or shell prompt (1003892). Type touch /forcefsck and press Enter. Type shutdown -r now and press Enter. Note: Issuing the shutdown command restarts your operating system. Mac OS To perform a disk check: Press Shift + Command + U. Double-click Disk Utility. Click the entry for the disk or volume to check. Click Verify Disk. Note: You cannot use this utility to verify the integrity of the startup volume. Instead, use Safe Boot. For more information, see Using Safe Boot (1004017). Note: You can also click on Verify Disk Permissions to confirm that there are no problems being experienced due to incorrect permissions. If you find that there are permission problems, they can be corrected by clicking on Repair Disk Partitions. 2. Verify that there is no disk fragmentation on your hard drive. For more information, see Defragmenting a disk (1004004).

Defragmenting a disk Purpose This article describes how to defragment a disk. Defragmenting a disk is required to address problems encountered with an operating system as a result of file system fragmentation. Fragmentation problems result in slow operating system performance. Resolution

Determine if fragmentation of your file system is causing problems by defragmenting. Note: Linux file systems do not require disk defragmentation and Mac OS performs disk defragmentation as required. To manually defragment a disk in either of these operating systems, a 3rd party application is required.

Defragmenting a disk under Windows This can be done by using a 3rd party application or by using tools native to Windows. If you have more than one hard drive, perform the defragmentation on each hard drive. Note: The exact procedure differs between versions of Windows. If one procedure does not work, try the other. If both do not work, consult the manual for your version of Windows. To defragment a disk from the user interface: Double-click the My Computer icon. Right-click the entry for your local disk. Click Properties. Click the Tools tab. Click Defragment Now. Click Defragment. To defragment a disk from a command line: Open a command prompt. For more information, see Opening a command or shell prompt (1003892). Type defrag c: and press Enter. Note: If the local disk being defragmented is not c:, replace c: with its drive letter. 3. Check if there are sufficient resources in the following areas:

Memory For more information, see Investigating operating system memory usage (1004014). Disk For more information, see Investigating operating system disk space (1004007). All The Best ☺ 32

33. Prepared By Sarathi Umakanthan CPU For more information, see Investigating operating system CPU usage (1004016). Note: If your operating system is installed to a virtual machine, and you have determined that there are insufficient resources, you need to increase the resource that is lacking:

Memory For more information, see Increasing the amount of memory assigned to a virtual machine (1004059). Disk For more information, see Increasing the size of a virtual disk (1004047). CPU If this is a virtual machine running under an ESX Server host, see Increasing the amount of CPU assigned to a virtual machine (1004060). Note: If this is a virtual machine running under any other product, there is no direct way of increasing the amount of assigned CPU. If your host has multiple CPUs or CPU cores, it is possible to set processor affinity among virtual machines so that one or more CPUs are not used by any other virtual machine. For more information, see Associating a Virtual Machine With a Particular Host Processor (110). Alternatively, the host hardware must be upgraded or the virtual machine moved to a different host. 4. If a virtual machine with multiple CPUs is performing poorly, see Determining if multiple virtual CPUs are causing performance issues (1005362). Determining if multiple virtual CPUs are causing performance issues Symptoms You may experience these performance issues with a multiple CPU virtual machine running on an ESX host: Poor transfer speeds when copying data to or from a virtual machine

Backup jobs time out or are very slow A virtual machine performs poorly Purpose This article helps you determine if multiple virtual CPUs (vCPUs) are causing performance issues. Resolution To determine if multiple vCPUs assigned to your virtual machine is causing poor performance: Open a console prompt on the ESX host or initiate an SSH connection to it. For more information, see Opening a command or shell

prompt (1003892). Type esxtop and press Enter. On the CPU screen, check the %CSTP value. If this number is higher than 100, the performance issues may be caused by the vCPU count. Try lowering the vCPU count of the virtual machine by 1. Note: The %CSTP value represents the amount of time a virtual machine with multiple virtual CPUs is waiting to be scheduled on multiple cores on the physical host. The higher the value, the longer it waits and the worse its performance. Lowering the number of vCPUs reduces the scheduling wait time. To lower the vCPU count: Note: The virtual machine must be powered off to perform these steps. Right-click on the virtual machine and click Edit Settings. Click CPUs. Use the Number of virtual processor drop-down to lower the vCPU count by 1. Click OK. If your virtual machine still experiences performance issues, and if its kernel or HAL can handle switching to a single vCPU, lower the vCPU count to 1. Warning: If your virtual machine's kernel or HAL cannot handle switching to a single vCPU, unexpected behaviour may occur. 5. Confirm that there is no virus compromising the operating system. For more information, see Detecting viruses (1004008). Detecting viruses Symptoms A guest or host operating system: Stops responding. Keeps rebooting for no apparent reason. Has performance problems. All The Best ☺ 33

34. Prepared By Sarathi Umakanthan Is slow. Has an application that isn't working properly. Has applications that keep closing. Has network problems. Experiences excessive disk access for no apparent reason. Purpose This article guides you through the process of determining if problems encountered on a virtual machine's guest operating system, or on a host computer where a VMware product is installed, are related to a virus infection. Resolution If an operating system is suddenly behaving unexpectedly it may be because of a virus. VMware recommends that a virus scan be performed to confirm a virus infection as the cause of this behaviour. VMware does not provide a virus scanner. You must obtain from a virus scanner from the operating system vendor or through a third party application. Examples of third party utilities include Confirm that there is no spyware interfering with the operating system. For more information, see Detecting spyware (1004009). A guest or host operating system: Stops responding. Has performance problems. Is slow. Has an application that isn't working properly. Has browser pop-ups or application windows appear randomly. Has network problems. Experiences excessive disk access for no apparent reason. Purpose This article guides you through the process of determining if problems encountered on a virtual machine's guest operating system or on a host computer where a VMware product is installed, are related to spyware. Resolution Note: Having some Spyware removal software installed can cause unpredictable connectivity issues in some environments. If an operating system is suddenly behaving unexpectedly it may be because of spyware. VMware recommends that a spyware scan be performed to confirm spyware as the cause of this behaviour. VMware does not provide a spyware scanner. Spyware scanners must be obtained from the operating system vendor or through a third party utility. Use the Windows System Configuration (msconfig) utility to eliminate software and processes as possible causes. For more information, see Using the Windows System Configuration utility (1004010). Note: Depending on your problem, following this procedure may remove a software environment that is required to test the health of your operating system. A guest or host operating system: Fails Stops responding Stops responding and displays a blue screen with a stop code Keeps rebooting for no apparent reason Has performance problems Performs slowly Has applications that are not working properly Is experiencing network problems Purpose This article describes how to use the Window's System Configuration utility. The Windows System Configuration utility helps determine if a service or application being loaded into Windows is causing unexpected operating system behaviour. This utility allows services and applications to be selectively disabled. If the unexpected behaviour stops after disabling a service or application then the source of the problem is identified. <br style=""> <br style=""> Resolution To launch the Windows System Configuration utility: Note: Not all versions of Windows include this utility. If you have a version of Windows where the following All The Best ☺ 34

35. Prepared By Sarathi Umakanthan procedure does not work, you must use a third party utility to selectively disable services and applications. Windows 2000 does not include this utility, but you can use the version that comes with Windows XP. Locate a Windows XP computer and copy the file msconfig.exe from the C:\WINDOWS\pchealth\helpctrbinaries directory to the Windows 2000 computer. Click Start > Run. Type msconfig and click OK. To use the Window's System Configuration utility to disable services and applications: Click the Services tab. Click Hide all Microsoft services. Click Disable all. Click OK. Reboot the computer. If the issue no longer occurs, it is likely that one of the service or startup applications was the source of the problem. To selectively disable individual services from the

Window's System Configuration utility select or deselect each service from the Services tab. To selectively disable individual startup applications, select or deselect each application from the Applications tab. Note: Depending on your problem, following this procedure may remove a software environment that is required to test the health of your operating system. 8. Boot into Safe Mode to eliminate software and processes as possible causes. For more information, see Booting into Safe Mode (1004011). Booting into Safe Mode Symptoms A guest or host Windows operating system: Has failed. Has stopped responding and displayed a blue screen with a stop code. Has stopped responding. Keeps rebooting for no apparent reason. Has performance problems. Is slow. Has an application that is not working properly. Is experiencing network problems. Purpose This article describes how to boot any version of a Windows operating system in Safe Mode. Safe Mode disables all third party applications and non-essential Windows services. If the symptoms are resolved when using Safe Mode then the source of the symptoms are related to a third party application or nonessential Windows service, not Windows itself. Resolution To boot any version of a Windows operating system in Safe Mode: Caution: Depending on your problem, following this procedure may remove a software environment that is required to test the health of your operating system. Restart the operating system or power off and power on the computer. When the computer starts, press and hold F8. Note: You may see a series of messages that display information about hardware and memory. This is called POST information. If you see POST information, you do not need to press F8 until the screen goes black. Make sure the mouse focus is inside the virtual machine, by clicking inside the console window. You are presented with a text menu of boot options. Note: If you do not see this text menu and Windows boots normally, repeat steps 1-2. Select a safe mode and press enter. If the operating system issues involve networking, select Safe Mode with Networking. If the operating system issues do not involve networking, select Safe Mode. If the symptoms are resolved when using Safe Mode then the source of the symptoms are related to a third party application or nonessential Windows service, not Windows itself. You can try selectively disabling individual services and startup applications to narrow the cause of the problem. For more information, see Using the Windows System Configuration utility (1004010). If the problem reoccurs, you may have to investigate uninstalling third party software and Microsoft applications. All The Best ☺ 35

36. Prepared By Sarathi Umakanthan Note: Safe Mode eliminates more software and processes than the System Configuration utility, but it also further reduces operating system functionality. Depending on your problem, following this procedure may remove a software environment that is required to test the health of your operating system. 9 .Confirm that the problem is not linked to your username by logging in as a different user. Additionally, verify that the problem is not linked to your username having or lacking administrator rights by logging in as a user whose rights are the opposite. 10. Verify that the memory on the host computer is healthy. For more information, see Validating host memory (1004012). Validating host memory Symptoms A guest or host operating system: Has failed. Has stopped responding and displays a blue screen with a stop code. Has experienced a core dump. Has experienced a kernel panic. Has stopped responding. Keeps rebooting for no apparent reason. Purpose This article guides you through the process of determining if problems encountered on a virtual machine's guest operating system or on a host computer where a VMware product is installed are related to a memory problem on the physical host. Note: This article does not address memory problems unique to an ESX host. Resolution VMwrae products may behave unexpectedly if there is a problem with the memory being used on the physical host computer. To ensure that host memory is healthy: Note: If you perform a corrective action in any of the following steps, determine if the problems initially encountered are still being experienced. Ensure that the RAM in the host computer is seated correctly. Note: The computer must be powered down and its case removed. Proper maintenance procedures based on the manual provided by the hardware vendor must be followed. Verify that the memory has not been overclocked. Overclocking is the process of forcing a computer component to run at a higher clock rate than it was designed for by its manufacturer. Overclocking improves performance but may result in instability. VMware does not recommend overclocking. Conform to memory compatibility guidelines provided by the server or system vendor. Where the server or system vendor does not provide specific guidance, or in the case of a user-assembled system, VMware recommends that all memory be from the same manufacturer to ensure compatibility and maximum stability. Run a memory diagnostic utility that was provided by the hardware vendor. Run a third party memory diagnostic utility: Note: This is required if the computer is a clone system or a computer where a memory diagnostic utility was not provided by the hardware vendor. Note: VMware cannot endorse or recommend any particular third party utility, nor can it take responsibility for anything that may occur as a result of its use. Note: This list is not meant to be

exhaustive. Any inclusion or exclusion of a particular third party utility from this list is not an implicit or explicit indication of VMware's recommendation or lack of recommendation for that utility.

10. Verify that the hardware devices on the host computer are healthy and supported. For more information, see [Performing hardware diagnostics \(1004013\)](#).

Performing hardware diagnostics

Symptoms A guest or host operating system: Has failed Has stopped responding and displayed a blue screen with a stop code Has experienced a core dump

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37. Prepared By Sarathi Umakanthan Has experienced a kernel panic Has stopped responding Keeps rebooting for no apparent reason Purpose This article guides you through the process of determining if problems encountered on a virtual machine's guest operating system or on a host computer where a VMware product is installed, are related to a hardware problem on the physical host.

Note: This article does not address hardware problems unique to an ESX Server host.

Resolution VMware may behave unexpectedly if there is a problem with the hardware being used on the physical host computer. To ensure that host hardware is healthy:

Note: For more information about problems related specifically to memory, see [Validating host memory \(1004012\)](#).

Validating host memory

Symptoms A guest or host operating system: Has failed Has stopped responding and displays a blue screen with a stop code Has experienced a core dump Has experienced a kernel panic Has stopped responding Keeps rebooting for no apparent reason Purpose This article guides you through the process of determining if problems encountered on a virtual machine's guest operating system or on a host computer where a VMware product is installed are related to a memory problem on the physical host.

Note: This article does not address memory problems unique to an ESX host.

Resolution VMwrae products may behave unexpectedly if there is a problem with the memory being used on the physical host computer. To ensure that host memory is healthy:

Note: If you perform a corrective action in any of the following steps, determine if the problems initially encountered are still being experienced.

Ensure that the RAM in the host computer is seated correctly.

Note: The computer must be powered down and its case removed.

Proper maintenance procedures based on the manual provided by the hardware vendor must be followed.

Verify that the memory has not been overclocked.

Overclocking is the process of forcing a computer component to run at a higher clock rate than it was designed for by its manufacturer.

Overclocking improves performance but may result in instability.

VMware does not recommend overclocking.

Conform to memory compatibility guidelines provided by the server or system vendor. Where the server or system vendor does not provide specific guidance, or in the case of a user-assembled system, VMware recommends that all memory be from the same manufacturer to ensure compatibility and maximum stability.

Run a memory diagnostic utility that was provided by the hardware vendor.

Run a third party memory diagnostic utility:

Note: This is required if the computer is a clone system or a computer where a memory diagnostic utility was not provided by the hardware vendor.

Note: VMware cannot endorse or recommend any particular third party utility, nor can it take responsibility for anything that may occur as a result of its use.

Note: This list is not meant to be exhaustive. Any inclusion or exclusion of a particular third party utility from this list is not an implicit or explicit indication of VMware's recommendation or lack of recommendation for that utility.

Note: If you perform a corrective action in any of the following steps, determine if the problems initially encountered are still being experienced.

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38. Prepared By Sarathi Umakanthan Ensure that all of the components are seated and attached correctly.

Note: The computer must be powered down and its case removed.

Proper maintenance procedures based on the manual provided by the hardware vendor must be followed.

Verify that none of the components have been overclocked.

Overclocking is the process of forcing a computer component to run at a higher clock rate than it was designed for by its manufacturer.

Overclocking improves performance but may result in instability.

VMware does not recommend overclocking.

Run a diagnostic utility that was provided by the hardware vendor.

Run a third party diagnostic utility:

Note: This is required if the computer is a clone system or a computer where a diagnostic utility was not provided by the hardware vendor.

Note: VMware cannot endorse or recommend any particular third party utility, nor can it take responsibility for anything that may not occur as a result of its use.

Note: This list is not meant to be exhaustive.

Any inclusion or exclusion of a particular third party utility from this list is not an implicit or explicit indication of VMware's recommendation or lack of recommendation for that utility.

CheckIt Diagnostics [http://www.smithmicro.com/default.tpl?group=product\\_full&sku=CKDWINEE](http://www.smithmicro.com/default.tpl?group=product_full&sku=CKDWINEE)

DIAG <http://www.diagnoseprogramm.de/indexe.htm>

EVEREST <http://www.lavalys.com/>

Fresh Diagnose <http://www.pc-certified.com/>

Sandra <http://www.sissoftware.net/>

Test My Hardware

<http://www.testmyhardware.com/> TuffTEST <http://tufftest.com/> Ultra-X QuickTechPRO

<http://www.udx.com/qtpro.shtml> 11. If the operating system having the problem has been installed to a virtual machine, power on the virtual machine from a different host. If the problem continues, the issue is with the virtual machine itself. Continue to step 11. If the problem disappears, the issue is with the original host. Repeat steps 1-11 for the host operating system. 12. If none of the above steps resolved the problem, reinstall the operating system to confirm if there is something about the particular installation that is causing the problem. 13. If none of the above steps resolved the problem, it is recommended that the operating system be reinstalled to confirm if there is something about the particular installation that is causing the problem. All The Best ☺ 38

39. Prepared By Sarathi Umakanthan Common Linux Problems Verify there are no problems with the filesystem by performing a disk check on your hard drives. For further information, see Performing a disk check (1004003). Check if there are sufficient resources in the following areas: Memory For more information, see Investigating operating system memory usage (1004014). Disk For more information, see Investigating operating system disk space (1004007). CPU For more information, see Investigating operating system CPU usage (1004016). Note: If your operating system is installed to a virtual machine, and you have determined that there are insufficient resources, you need to increase the resource that is lacking: Memory For more information, see Increasing the amount of memory assigned to a virtual machine (1004059). Disk For more information, see Increasing the size of a virtual disk (1004047). CPU If this is a virtual machine running under an ESX Server host, see Increasing the amount of CPU assigned to a virtual machine (1004060). Note: If this is a virtual machine running under any other product, there is no direct way of increasing the amount of assigned CPU. If your host has multiple CPUs or CPU cores, it is possible to set processor affinity among virtual machines so that one or more CPUs are not used by any other virtual machine. For more information, see Associating a Virtual Machine With a Particular Host Processor (110). Alternatively, the host hardware must be upgraded or the virtual machine moved to a different host. 3. If a virtual machine with multiple CPUs is performing poorly, see Determining if multiple virtual CPUs are causing performance issues (1005362). 4. Confirm that there is no virus compromising the operating system. For more information, see Detecting viruses (1004008). 5. Confirm that there is no spyware interfering with the operating system. For more information, see Detecting spyware (1004009). 6. Switch to run level 3 to eliminate software and processes as possible causes. For more information, see Changing Linux run levels (1004015). Changing Linux run levels Purpose This article describes how to change Linux run levels. Changing Linux run levels is useful in troubleshooting problems where it is suspected that there is a daemon or application being loaded into Linux that may be causing unexpected operating system behavior. Examples of such unexpected behavior include crashes, the operating system failing to respond or being slow, and network problems. If the unexpected behavior stops after disabling a service or application then the source of the problem is identified. Other reasons for changing the run level include not having a requirement for an X-Windows environment and needing to perform system maintenance. Resolution To change the run level of a Linux operating system: Note: If the run level is being changed to troubleshoot a problem with the operating system or an All The Best ☺ 39

40. Prepared By Sarathi Umakanthan application, following this procedure may remove a software environment that is required to test the health of your operating system. Ensure that you are logged in as a user with root privileges. Edit the file /etc/inittab in the text editor of your choice. Note: To perform this from a shell prompt using the VI text editor, refer to the Additional Information section at the end of this document. Look for the line of text id:X:initdefault: where X is replaced by a number. This number represents the default Linux run level. Edit the line of text and replace X with the run level you want to change to: 1 Single User Mode 3 Full multiuser 5 X-Windows (X11) Note: The above is a list of run levels that are generally used. If the full list is not displayed at the top of the inittab file and you need to change to a level not listed, refer to the manual for your distribution of Linux. Warning: Do not set X to 0 or 6. Save the edited file. Reboot the operating system. Note: Linux boots into the new run level each time it is started. To return it to its former behavior, repeat steps 1-6 and edit the file to use the original value of X . Note: It is possible to change the run level without rebooting the operating system and without affecting the run level the operating system defaults to when it is started: Open a shell prompt. For more information, see Opening a command or shell prompt (1003892). Type init X and press Enter, where X is replaced by the run level you want to change to. Note: If this command does not work, refer to the manual for your distribution of Linux. Caution: This command exits all running applications. Save

all work before entering this command. Note: Depending on your problem, following this procedure may remove a software environment that is required to test the health of your operating system. 7. Switch to Single User Mode to eliminate software and processes as possible causes. For more information, see Changing Linux run levels (1004015). Note: Single User Mode eliminates more software and processes than run level 3 does, but it also further reduces operating system functionality. Depending on your problem, following this procedure may remove a software environment that is required to test the health of your operating system. 8. Confirm that the problem is not linked to your username by logging in as a different user. Additionally, verify that the problem is not linked to your username having or lacking root privileges by logging in as a user whose rights are the opposite. 9. Verify that the memory on the host computer is healthy. For more information, see Validating host memory (1004012). All The Best ☺ 40

41. Prepared By Sarathi Umakanthan 10 Verify that the hardware devices on the host computer are healthy and supported. For more information, see Performing hardware diagnostics (1004013). 11. If the operating system having the problem has been installed to a virtual machine, power on the virtual machine from a different host. If the problem continues, the issue is with the virtual machine itself. Continue to step 11. If the problem disappears, the issue is with the original host. Repeat steps 1-11 for the host operating system. 13. If none of the above steps resolved the problem, reinstall the operating system to confirm if there is something about the particular installation that is causing the problem. New Topic:- Troubleshooting FC SAN storage in ESX All the information is given in the below link

<http://www.megaupload.com/?d=QR3EH0Y0> NEW TOPIC:- Using vmkfstools The vmkfstools command supports the creation of a VMware ESX Server file system (VMFS) on a SCSI disk. Use vmkfstools to create, manipulate and manage files stored in VMFS volumes. You can store multiple virtual disk images on a single VMFS volume. Note: You can also do most of the vmkfstools operations through the VMware Management Interface. vmkfstools Command Syntax Note: You must be logged in as the root user to run the vmkfstools command. vmkfstools Syntax When Specifying a SCSI Device The format for the vmkfstools command, when specifying a SCSI device, is: vmkfstools <options> <device\_or\_VMFS\_volume>[:<file>] where <device\_or\_VMFS\_volume> specifies a SCSI device (a SCSI disk or a partition on a SCSI disk) being manipulated or a VMFS volume, and <options> specifies the operation to be performed. If <device\_or\_VMFS\_volume> is a SCSI device, then it is specified in a form such as: vmhba1:2:0:3 Here, vmhba1 specifies the second SCSI adapter activated by the command vmkload\_mod .../XXX.o vmhba. (See VMkernel Module Loader for details on vmkload\_mod.) The second number specifies the target on the adapter, the third number specifies the LUN (logical unit number) and the fourth number specifies the partition. Partition 0 (zero) implies the whole disk; otherwise, the number specifies the indicated partition. <device\_or\_VMFS\_volume> may also be a VMFS volume label, as set in the management interface or with the vmkfstools --setfsname command. <file> is the name of a file stored in the file system on the specified device. vmkfstools Syntax When Specifying a VMFS Volume or File The format for the vmkfstools command, when specifying a VMFS volume or file, is: vmkfstools <options> <path> where <path> is an absolute path that names a directory or a file under the /vmfs directory. For example, you can specify a VMFS volume by a path such as: All The Best ☺ 41

42. Prepared By Sarathi Umakanthan /vmfs/vmhba1:2:0:3 You can also specify a single VMFS file: /vmfs/lun1/rh9.dsk vmkfstools Options This section includes a list of all the options used with the vmkfstools command. Some of the tasks in this section include options that are suggested for advanced users only. These advanced options are not available through the VMware Management Interface. Note: The long and short (single letter) forms of options are equivalent. For example, the following commands are identical: vmkfstools --createfs vmfs2 --blocksize 2m --numfiles 32 vmhba1:3:0:1 vmkfstools -C vmfs2 -b 2m -n 32 vmhba1:3:0:1 If the vmkfstools command fails, and you don't know why, then check the log files in /var/log/vmkernel or use the management interface to view the latest warning. Log in to the VMware Management Interface as root. The Status Monitor page appears. Click the Options tab. The Options page appears. Click System Logs. Basic vmkfstools Options Basic options are common tasks that you may perform frequently. You may also perform through the management interface. Creates a VMFS on the specified SCSI device -C --createfs [vmfs1|vmfs2] -b --blocksize #[gGmMkK] -n --numfiles # This command creates a VMFS version1 (vmfs1) or version 2 (vmfs2) file system on the specified SCSI device. For advanced users: Specify the block size by using the -b option. The block size must be 2x (a power of 2) and at least 1MB. (The default file block size is 1MB.) You can specify the size in kilobytes, megabytes, or gigabytes by adding a suffix of k (kilobytes), m (megabytes), g

(gigabytes) respectively. Specify the maximum number of files in the file system with the -n option. The default maximum number of files is 256 files. Lists the attributes of a VMFS volume or a raw disk mapping -P --querypartitions <VMFS\_volume\_name> -P --querypartitions <VMFS\_volume:fileName> For a VMFS\_volume\_name, the listed attributes include the VMFS version number (VMFS-1 or VMFS-2), the number of physical extents (partitions) comprising the specified VMFS volume, the volume label (if any), the UUID (if any), and a listing of the SCSI device names of all the physical extents comprising the VMFS volume. For a VMFS\_volume:fileName, the listed attributes include the vmhba name of the raw disk or partition, corresponding to the mapping referenced by fileName, and any identification information for the raw disk. Creates a file with the specified size on the file system of the specified SCSI device -c --createfile #[gGmMkK] The size is specified in bytes by default, but you can specify the size in kilobytes, megabytes, or gigabytes by adding a suffix of k (kilobytes), m (megabytes), g (gigabytes) respectively. All The Best ☺ 42

43. Prepared By Sarathi Umakanthan Exports the contents of the specified file on the specified SCSI device to a virtual disk on the file system of the service console -e --exportfile <dstFile> After the export, you may transfer the virtual disk to another server machine and import it to a SCSI device on the remote machine. If your virtual disk has redo logs, you have the following options: If you use the exportfile option on the base virtual disk, only the base virtual disk is exported. Any uncommitted redo logs are not exported, but can be copied out separately. If you use the exportfile option on a ESX Server redo log, the exported virtual disk contains the redo log, any previously created redo logs, and the base virtual disk. That is, the newly created exported virtual disk appears as if the redo log(s) was committed to its base virtual disk. Note: However, your original source redo log(s) and base virtual disk remain unchanged. If you want to export your redo logs and base virtual disk separately, then use the exportfile option to export the base virtual disk, and the cp command to export each redo log separately. Use the combination of exportfile and importfile together to copy VMFS files to remote machines. The virtual disk should take less space than the full size of the VMFS file, since the virtual disk does not include zeroed sectors of the VMFS file. Imports the contents of a VMware virtual, plain, or raw disk on the service console to the specified file on the specified SCSI device -i --importfile <srcFile> This command is often used to import the contents of a VMware Workstation or VMware GSX Server virtual disk onto a SCSI device. You may also run this command to import a virtual disk, that was created by exporting the contents of a disk from another SCSI device. Note: The destination device must have space for the entire size of the virtual disk, even if it is mostly free space, as the complete contents of the source disk are copied. Caution: The vmkfstools command may fail when attempting to import plain disks created with version 2.5 or earlier of GSX Server. If vmkfstools returns an error when importing a plain disk, see Path Name Failures When Importing GSX Server Virtual Machines. Lists the files on the file system on the specified device -l --list -h --human-readable -M --verbosemappings The output includes permissions, sizes and the last modification time for redo logs, virtual disk files, and swap files. You can use the -h option to print the sizes in an easier-to-read format; for example, 5KB 12.1MB, and so on. (Advanced users only) The -M option lists the vmhba name that corresponds to each raw disk mapping. Sets the name of the VMFS on the specified SCSI device -S --setfsname <fsName> You can see the VMFS name by running the vmkfstools command with the -l option, vmkfstools -l. Advanced vmkfstools Options Advanced options are tasks that you may perform infrequently. These tasks are not available through the management interface, or are available in a limited form, and are suggested for advanced users only. Commits the redo log of the specified file, making the associated changes permanent -m --commit If a virtual machine is in undoable or append mode, then the redo log is created automatically. The name of the redo log is derived by appending .REDO to the name of the file that contains the base disk image. You can commit the changes to the disk that are stored in the redo log by using the commit option or eliminate the All The Best ☺ 43

44. Prepared By Sarathi Umakanthan changes by using the rm command to delete the redo-log file. Sets the VMFS on the specified SCSI device to the specified mode -F --config [public|shared|writable] Note: In ESX Server 2.1, private VMFS volumes are deprecated. If you have existing VMFS version 1 (VMFS-1) or VMFS version 2 (VMFS-2) private volumes, then change the access to public. Public — With public VMFS-2 volumes, multiple ESX Server computers can access the same VMware ESX Server VMFS volume concurrently. VMware ESX Server file systems with a public access mode use an automatic per-file locking to ensure file system consistency. With a public VMFS-1 volume, multiple ESX Server computers have the ability to access the VMware ESX Server VMFS volume, as long as the

VMFS volume is on a shared storage system (for example, a VMFS on a storage area network). However, only one ESX Server can access the VMFS-1 volume at a time. Note: ESX Server creates VMFS volumes as public by default. Shared — The shared access mode allows virtual machines on multiple servers to access the same virtual disk on a VMFS-2 volume simultaneously. (In public mode, virtual machines can only access the same VMFS volume, never the same virtual disk, at the same time.) Note: A VMFS volume that is used for failover-based clustering should have its mode set to shared.

Writable — When virtual machines access a file on a shared VMFS, the file system metadata becomes read-only. That is, no virtual machine or user command can create, delete or change the attributes of a file. If you need to create, remove, or change the length of a file (vmkfstools -X), then you need to change the volume to "writable". First, be sure that no virtual machines are accessing the VMFS volume (all virtual machines are powered off or suspended), then change the file system metadata to writable with the command, vmkfstools --config writable. Once you power on or resume a virtual machine, the file system metadata reverts to being read-only. Extends an existing logical VMFS-2 volume by spanning multiple partitions -Z --extendfs <extension- SCSIDevice> -n --numfiles # This option adds another physical extent (designated by <extension-SCSIDevice>), starting at the specified SCSI device. By running this option, you lose all data on <extension-SCSIDevice>. Note: A logical VMFS-2 volume can have at most 32 physical extents. This operation is not supported on the VMFS-1 file system and in fact, returns an error if the specified SCSI device is formatted as VMFS-1. Each time you use this option and extend a VMFS-2 volume with a physical extent, the VMFS volume supports, by default, an additional 64 files. You can change this default number of files by using the -n option. Maps a Raw Disk or Partition to a File on a VMFS-2 Volume -r --maprawdisk <raw-SCSI-device> Once this mapping is established, you can access the raw disk like a normal VMFS file. The file length of the mapping is the same as the size of the raw disk or partition. The mapping can be queried for the raw SCSI device name by using the -P option. By mapping a raw disk or partition to a file, you can manipulate this raw disk or partition as any other file. In addition, this mapping enables you to have undoable, append, and nonpersistent "raw disks". All VMFS-2 file-locking mechanisms apply to raw disks. All The Best ☺ 44

45. Prepared By Sarathi Umakanthan Displays Disk Geometry for a VMware Workstation or GSX Server Virtual Disk -g -- geometry <virtual-disk> The output is in the form: Geometry information C/H/S is 1023/128/32, where C represents the number of cylinders, H represents the number of heads, and S represents the number of sectors. When importing VMware Workstation or VMware GSX virtual disks to VMware ESX Server, you may see a disk geometry mismatch error message. A disk geometry mismatch may also be the cause if you have problems loading a guest operating system, or running a newly created virtual machine. View the events log through the VMware Management Interface (Users and Events page for the virtual machine) or through the service console (the vmware.log file, found, by default, in the <user>/vmware/<guest\_operating\_system> directory). Look for C/H/S and compare this with the output of the vmkfstools -g command. If the disk geometry information is different, then specify the correct information, from the output of the vmkfstools -g command, in the configuration file of the newly created virtual machine. See Migrating VMware Workstation and VMware GSX Server Virtual Machines for complete details on specifying the disk geometry in a virtual machine's configuration file. Extends the specified VMFS to the specified length -X --extendfile #[gGmMkK] Use this command to extend the size of a disk allocated to a virtual machine, after the virtual machine has been created. The virtual machine that uses this disk file must be powered off when you enter this command. Also, the guest operating system must be able to recognize and use the new size of the disk, for example by updating the file system on the disk to take advantage of the extra space. You specify the size in kilobytes, megabytes, or gigabytes by adding a suffix of k (kilobytes), m (megabytes), g (gigabytes) respectively. Manages SCSI reservations of physical targets or LUNs -L --lock [reserve|release|reset] Caution: Be careful when using these commands. The reserve, release, and reset commands can interrupt the operations of other servers on a storage area network (SAN), so use these commands with great caution. The -L reserve command reserves the specified raw disk, or the disk containing the specified VMFS volume. After the reservation, other servers will get a SCSI reservation error if they attempt to access that disk, but the server that did the reservation will be able to access the disk normally. The -L release command releases the reservation on the specified disk, or disk containing the specified VMFS volume. Any other server can access the disk again. The -L reset command does a SCSI reset to the specified disk. Any reservation held by another server is released. Recovers a VMFS -R --recover This command enables you to recover a VMFS (accessible by multiple ESX servers) when other vmkfstools commands indicate that the file system is locked by another ESX Server machine, but, in fact, no other

server is currently accessing this file system. This situation may occur if the VMFS was being accessed by a server (for example, running a virtual machine) and that server crashed. Note: You should only use this command if you are certain that no other ESX Server is still accessing the file system. All The Best  
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46. Prepared By Sarathi Umakanthan Scans the specified vmhba adapter for devices and LUNs -s --scan <FC\_SCSI\_adapter> This option is particularly useful for adapters connected to storage area networks, particularly if you are reconfiguring your SAN. If a new device or LUN becomes accessible through the adapter, then ESX Server registers this new virtual device for use by virtual machines. If an existing device or LUN is no longer used and appears to be gone, then it is removed from use by virtual machines. Note: Only use this -s option for Fibre Channel adapters. You can see the results of the scan by using ls /vmfs or looking at the contents of /proc/vmware/scsi. Create or Resize a Swap File in a VMFS Volume of the specified SCSI device -k --createswapfile #[gGmMkK] The size is specified in bytes by default, but you can specify the size in kilobytes, megabytes, or gigabytes by adding a suffix of k (kilobytes), m (megabytes), or g (gigabytes), respectively. Note: You must be logged in to the Service Console with root user permissions to create a swap file. You can resize an existing swap file by specifying the new file size as an argument to the -k option: Deactivate the swap file, if it is active, with vmktools -y. Resize the swap file with the -k option. Activate the swap file with vmktools -w filename. If you try to resize an active swap file, ESX Server returns an error message. ESX Server does not automatically activate a swap file after it is created. Use vmkfstools with the -w option to activate a swap file. You can set a swap file to be activated automatically after a system reboot with the Activation Policy option of the Swap Management section in the Options tab of the Management Interface. Activate a Swap File -w --activateswapfile This command activates the specified swap file. Note: You must be logged in to the Service Console with root user permissions to activate a swap file. Deactivate a Swap File -y --deactivateswapfile <fileID> ESX Server assigns a fileID tag to a swap file when it is activated. You must identify a swap file by its fileID tag when specifying which swap file to deactivate with the -y option. Note: You must be logged in to the Service Console with root user permissions to activate a swap file. You can find the fileID tag assigned to a swap file in the swap status file, /proc/vmware/swap/stats. Note: You must shutdown all virtual machines before deactivating a swap file. Entering a vmkfstools -y command returns an error message if any virtual machines are powered on. Migrate a VMFS from VMFS-1 to VMFS-2 -T --tovmfs2 This command converts the VMFS volume on the specified partitions from VMFS-1 to VMFS-2, while preserving all files in the volume. ESX Server's locking mechanism attempts to ensure that no remote ESX Server or local process is accessing the VMFS volume that is being converted. Note: If you have an active swap partition, you must deactivate it before running this command. Deactivate All The Best © 46

47. Prepared By Sarathi Umakanthan swap through the VMware Management Interface and reboot your server. Once this vmkfstools -T command completes, you can reactivate your swap file. This conversion may take several minutes. When your prompt returns, the conversion is complete. Note: In ESX Server 2.1, private VMFS volumes are deprecated. If you have an existing VMFS version 1 (VMFS-1) private volume, then the newly created VMFS-2 volume's access mode is automatically changed to public. Before starting this conversion, check the following: Back up the VMFS-1 volume that is being converted Be sure there are no virtual machines powered on using this VMFS-1 volume (SAN only) Be sure no other ESX Server is accessing this VMFS-1 volume (SAN only) Be sure this VMFS-1 volume is not mounted on any other ESX Server Caution: The VMFS- 1 to VMFS-2 conversion is a one-way process. Once the VMFS volume is converted to VMFS-2, you cannot revert it back to a VMFS-1 volume. Note: The first time you access a newly converted VMFS-2 volume, the initial access will be slow, because of internal volume consistency checking. Examples Using vmkfstools This section includes examples using the vmkfstools command with the different options described previously. Create a new file system vmkfstools -C vmfs2 -b 2m -n 32 vmhba1:3:0:1 This example illustrates creating a new VMFS version 2 (vmfs2) on the first partition of target 3, LUN 0 of SCSI adapter 1. The file block size is 2MB and the maximum number of files is 32. Extends the new logical volume by spanning two partitions vmkfstools -Z vmhba0:1:2:4 vmhba1:3:0:1 This example illustrates extending the new logical file system by adding the 4th partition of target 1 (and LUN 2) of vmhba adapter 0. The extended file system supports a maximum of 64 (2 X 32) files, and spans two partitions — vmhba1:3:0:1 and vmhba0:1:2:4. You can address the file system by using the name of its head partition; for example, vmhba1:3:0:1. Names a VMFS volume vmkfstools -S mydisk vmhba1:3:0:1 This example illustrates assigning the name of mydisk to the new file

system. Creates a new VMFS virtual disk file vmkfstools -c 2000m mydisk:rh6.2.dsk This example illustrates creating a 2GB VMFS file with the name of rh6.2.dsk on the VMFS volume named mydisk. The rh6.2.dsk file represents an empty disk that may be accessed by a virtual machine. Imports the contents of a virtual disk to the specified file on a SCSI device vmkfstools -i ~/vms/nt4.dsk vmhba0:2:0:0:nt4.dsk The example illustrates importing the contents of a virtual disk (that contains Windows NT 4.0) from the service console's file system to a file named nt4.dsk on target 2 of SCSI adapter 0. You can configure a virtual machine to use this virtual disk by adding the following lines to its configuration file: scsi0.virtualDev = vmxbuslogic All The Best ☺ 47

48. Prepared By Sarathi Umakanthan scsi0:0.present = TRUE scsi0:0.name = vmhba0:2:0:0:nt4.dsk Migrate virtual machines to VMware GSX Server or VMware Workstation, then back to VMware ESX Server Note: The following example, illustrating the -e and -i options, result in the export or import of a virtual disk. This example illustrates migrating a virtual machine's virtual disk file from ESX Server to VMware GSX Server or VMware Workstation, then migrating the virtual disk back to ESX Server. vmkfstools -e winXP.vmdk vmhba0:6:0:1:winXP.dsk The preceding command exports the winXP.dsk virtual disk file to one or more .vmdk files, maximum size 2GB, that you can use as a virtual disk in a virtual machine on GSX Server or Workstation. The resultant winXP.vmdk file(s) can reside on a VMFS volume, or an /ext2, /ext3, or NFS file system. The following example imports a GSX Server or Workstation virtual disk file into the VMFS volume on the specified SCSI device. vmkfstools -i winXP.vmdk vmhba0:6:0:1:winXP.dsk By contrast, if you are importing directly into a raw partition, the example becomes: vmkfstools -i winXP.vmdk vmhba0:6:0:1 Lists the files on the VMFS of the specified device vmkfstools -l vmhba0:2:0:0 This command illustrates listing the contents of the file system, including redo logs, virtual disk files, and swap files on target 2 of SCSI adapter 0. Scans a vmhba adapter This example illustrates scanning the vmhba1 adapter for any new or removed targets or LUNs. vmkfstools -s vmhba1 New Topic :- Admission Control Policy Interview Question :- what is admission control in esx Admission Control Policy VMware ESX Server uses an admission control policy to ensure that sufficient unreserved memory and swap space are available before powering on a virtual machine. Memory must be reserved for the virtual machine's guaranteed minimum size; additional overhead memory is required for virtualization. Thus the total required for each virtual machine is the specified minimum plus overhead. The overhead memory size is determined automatically; it is typically 54MB for a single virtual CPU virtual machine, and 64MB for a dual-virtual CPU SMP virtual machine. Additional overhead memory is reserved for virtual machines larger than 512MB. Swap space must be reserved on disk for the remaining virtual machine memory — that is the difference between the maximum and minimum settings. This swap reservation is required to ensure the system is able to preserve virtual machine memory under any circumstances. In practice, only a small fraction of the swap space may actually be used. Similarly, while memory reservations are used for admission control, actual memory allocations vary dynamically, and unused reservations are not wasted. All The Best ☺ 48

49. Prepared By Sarathi Umakanthan The amount of swap space configured for the system limits the maximum level of overcommitment. A default swap file size equal to the physical memory size of the computer is recommended in order to support a reasonable 2x level of memory overcommitment. You may configure larger or smaller swap files or add additional swap files. If you do not configure a swap file, memory may not be overcommitted. You may configure the swap file using the VMware Management Interface (Swap Configuration in the Options page) or from the service console using the vmkfstools command. You can create additional swap files using the vmkfstools command. You should consider adding additional swap files if you want to run additional virtual machines but you're unable to do so because of the lack of swap space. See Using vmkfstools. Q1) Can we use EMC PowerPath together with VMware NMP (Native Multi-pathing Plug-in) ? It is not recommended to use both at the same time, we usually either use PowerPath or VMware NMP. Refer to "EMC PowerPath VE With VSphere" documentation for more details. Q2) Can we use VMware Update Manager (VUM) to schedule upgrading of VMware tools on the VMs to meet latest ESX hardware version ? Yes, this is possible with VMware Update Manager 4. We do not need to create a new baseline, there's a default baseline that does this task. Q3) Does Storage Vmotion use the Service Console to migrate running VMs live from one storage to another storage ? Storage VMotion migrates VM via the Service Console network, this means that there's no additional burden on the other Virtual Machine connection network. Q4) Can we implement VMware Fault Tolerance on a VM with an existing VMware Snapshot on the VM ? No, VMware FT does not support VM with existing snapshots. We have to merge or discard the snapshot

before enabling VMware FT to protect that VM. Q5) What is the protocol used by vCenter Linked Mode to link to other Virtual Center Servers ? vCenter Management Server 4 uses LDAP via port 386 by default. Q6) Does VMware supports installation of vCenter Server 4 on Windows Server 2008 R2 operating system platform ? No, Windows Server 2008 R2 is not a supported platform for installing vCenter Server 4. Refer to "vSphere Compatibility Matrix" for details. Q7) Is it possible to configure both thin provisioned virtual disk and thick provision virtual disk n a single VM, thus, creation of a VM with multiple virtual disks which have different provisioned modes virtual disk ?Yes, this is possible. Q8) When deploying thin provisioned virtual disk for VM, the virtual disk is expand on demand which creates many fragments which could be scattered across our datastore, what's the way to defrag a VM with thin provisioned virtual disk ? When performing Storage Vmotion migrating the VM to a different LUN and migrating the VM back to original datastore, the VM's file will be fragmented. Q9) During Scripted Installation of ESX Server 4, is it possible create local directory on the host and run scripts to install third party utilities from other vendors such as HP or Dell ? Yes, it is possible to create a local directory to load packages then configure scripts to run pre or post installation of ESX Server. Refer to "Scripted Installation of ESX" for more information. Q10) What's the major different between virtual network adapter E1000 and VMXNET3 ? VMXNET3 is the third generation of paravirtual network adapter by VMware. Includes features such as MSI/MSI-X support, Receive Side Scaling, IPv6 checksum and TCP Segmentation Offloading (TSO) over IPv6, VLAN off-loading and Large TX/RX ring sizes. Refer to "vSphere Networking" guide and "E1000 and VMXNET3" discussion for more details. Q11) Are we able to configure vCenter Server Heartbeat to keep replication and synchronization while disabling automatic failover and enabling only the option for a manual switch over ? No, that is not possible with current version of vCenter Server Heartbeat. Q12) If the local Windows OS running vCenter Server Heartbeat restarts after applying a security patch, will the Primary vCenter Server trigger a failover to the Secondary vCenter Server ? All The Best ☺ 49

50. Prepared By Sarathi Umakanthan As the default ping for the channel network is 3 pings with 20 seconds interval between each ping, the failover will occur and Secondary vCenter Server will take control and start protected services. However, we are able to configure the ping intervals in the vCenter Server Heartbeat manage server console. Q13) Can we import host profiles created on our master vCenter Server located in our main datacenter to the vCenter Servers running in remote sites or branch offices ? Yes, vCenter host profile configuration allows us to import host profiles created in virtual machine profile format .vpf into existing vCenter Servers that we wish to apply the host profiles. Q14) Is it possible to configure a schedule task to stage ESX Server patching with VMware Update Manager ? No, this is not possible with the current version of VMware Update Manager 4. Q15) When migrating VMs with Storage VMotion, could we choose different datastore LUNs if our single VM has multiple virtual disks ? Yes, when performing Storage Vmotion of a running VM live from one storage to another storage, at the screen when we are prompted to select datastore, we could click on "advanced" tab to select different datastores for our virtual disks. Q16) Does vCenter Server Heartbeat works across LAN and WAN ? Yes, it works both across LAN and WAN. Refer to "vCenter Server Heartbeat Reference Guide" for more details. Q17) What's the main benefit of deploying ESXi 4.x Servers as compared to ESX 4 Servers in a datacenter production environment ? There's significantly less patches required for an ESXi Server as compared to ESX Server. As ESXi does not have a service console, it is relatively more secure and less vulnerable to attacks. Q18) Is it advisable to run anti virus software on the Service Console on ESX Servers in production environment ? Running anti virus softwares in Service Console will generally take up resources which might affect performance of the ESX Server as the anti virus software requires resources to run. Q19) In terms of hardening the ESX Server from a security aspect, what's the solution for managing root accounts on ESX Server hosts ? We could restrict root user account logins and password only to datacenter administrators. We could then create linux user accounts inside Service Console and then enable sudo permissions to grant these users shell access. We could also join ESX Server to Active Directory authentication. Q20) Is there a new VMFS version with VMware vSphere ? No, vSphere is still running on VMFS3 version. However, there is a change in virtual machine hardware to version 7. Q21) What's the maximum number of vCenter Servers we can configured in a linked mode ? We can configure a total of 10 vCenter Servers in a vCenter Server linked mode. vCenter linked mode can manage up to 1000 ESX/ESXi Servers and 10000 virtual machines across 10 vCenter Servers in a single console. Q22) What's the main functions and capabilities when deploying vCenter Server linked mode ? vCenter Server linked mode gives administrators a single pane of glass view, it allows administrators to share global roles and licenses across vCenter Servers. Q23) What's the rollback

option tab when configuring vCenter Server Heartbeat ? As vCenter Server Heartbeat uses Microsoft Virtual Shadow Copy Service (VSS) we could configure a rollback. Refer to help guide on the local vCenter Server after installation and configuration of vCenter Server Heartbeat for details. Q24) What are the supported Microsoft SQL version that can be protected by vCenter Server Heartbeat 5.5 update 1 ? vCenter Server Heartbeat is currently able to protect only Microsoft SQL Server 2005 SP1-SP3 and Microsoft SQL Server 2008 versions. Q25) Can we use vCenter Server 4 to manage legacy ESX 3.x and 2.x Servers ? Yes, vCenter Server 4 can only manage legacy ESX Servers if we configure connectivity to an existing flexnet license server as vCenter Server 4 does not manage the licenses for legacy host directly. Q26) After joining ESX Servers to Active Directory domain, can we use distribution groups instead of user accounts ? VMware does not support the add of AD groups but it does support the adding of individual users and PAM module. Refer to "ESX Authentication AD" All The Best ☺ 50

51. Prepared By Sarathi Umakanthan Q27) Will vCenter Server Heartbeat works together with vCenter Linked Mode ? Yes, vCenter Server Heartbeat and vCenter linked mode is compatible with the most current version update 2. Adam components will be replicated active and passive, therefore, full functionality is available when switch to target mode. Refer to "forum discussion" for more details. Q28) Does vSphere 4 supports Microsoft Clustering VMs whose file resides on iSCSI LUN ? No, this version of vSphere 4 is not compatible with iSCSI SAN for MSCS configuration. Refer to "Setup for Failover Clustering and MSCS" for more details. Q29) When running resxtop command in vMA to view performance output, how do I view only VMs and not other worlds ? After entering the resxtop command, we can enter "V" which will output displaying only VMs on that specific ESX Server. Q30) If we set a memory limit of a VM to 400 MB and available memory to 512 MB, what will happen after the VM reaches the limit ? Based on the POC done in the class, the ballooning vmmemctl kicks in after the VM hits the 400MB limit. Thus, the remaining 112 MB of memory is not used. Q31) Can we create a vmdk greater than 256 GB when configuring a block size of 1MB ? No this is not possible, we will have to increase the block size before the vmdk size will be increased. For example, a block size of 2MB will allow us to create a 512GB vmdk and a block size of 4MB will allow us to create a vmdk that's 1024GB. Refer to "Forum discussion" for more details. Q32) Where can I create the session file within the vMA ? Session file creation can be found within the vMA when we access \$ cd /usr/lib/vmware-vcli/apps/session Q33) Does vCLI supports running on Linux and Windows OS ? Yes, vCLI is supported and can be run from both Windows and Linux OS. Q34) When can we use explicit failover on a vSwitch ? We can select "use explicit failover" when we want vSwitch to always use the highest order uplink from the list of Active adapters which passes failover detection criteria such as link state only and beacon probing. Refer to "virtual switch policies" for more details. Q35) What is the difference between consumed memory and active memory ? Consumed memory is when there is no contention and active memory refers to the memory used when there is contention. VMware View Frequently Asked Questions Q1) What is the difference between desktop recomposition and desktop refresh ? Desktop recomposition is used to update changes such as application updates, patches, service packs or even Vista upgrades to the source image. Desktop refresh is returning the image back to its original state when you first deployed it. Q2) During installation of View Connection Server, installation halted due to IIS using port 80, what should I do ? There are 2 options, either you can stop the IIS service on the Windows OS you are installing the View Connection Server or you can change the port from 80 to 8000. This is because the installation requires the use of port 80. Q3) If I have an SQL Server Application running in my 6gb VM and I decide to check it out, will the application be checked out as well ? Yes, View client with offline desktop will checkout the entire VM including everything inside so that your mobile users can use their VM offline even without network connectivity. Q4) What is the recommendation to protect VMware View Connection Server to ensure high availability ? The way to build high availability is to configure replica View connection servers, the sessions information is replicated between View connection servers using ADAM. Q5) If the user were to checkout an offline desktop and the online equivalent were to get patched by administrators, when the users update their offline desktop or run the backup will their offline desktops receive the patches as well ? Update will not be possible as this kind of operations is not available. Q6) Is the link clone technology used in VMware View Composer similar to the one used in VMware Lab Manager ? No. When using VMware View Composer link clone technology to create multiple desktops or pool of desktops All The Best ☺ 51

52. Prepared By Sarathi Umakanthan using the Automated Desktop Delivery option, the virtual machines being created are reflected in the Virtual Center Server via VI Client. Q7) Besides integration with AD,

what other directory services does VMware View integrate with ? As of present, it is only able to integrate with AD and no other services. Q8) Is there a way to enhance the security level on my View Connection Server ? Yes. We can integrate VMware View Connection Server with RSA Secur ID. Q9) Name me a key difference between VMware View and Citrix Xen desktop virtualization ? Citrix is a forward looking technology which supports W2k3 OS and above. Whereas, VMware View gives users the flexibility of looking at a wider range of OS ranging from legacy OS to the latest OS available in the market. Q10) Does VMware View's VMs support printer drivers and usb devices on the client ? Yes. There is support for all printer drivers as it is using virtual drivers and usb devices on the VMs are also supported. Q11) What is the benefit of using VMware ThinApp for packaging an application ? It packs the application into an exe file which means you do not have to install the application into your user's system drive. The exe file can be run from any location including network shares, usb drives and cd roms. This helps save space and increases performance of user's desktop. Q12) What is the default maximum caching time for offline desktop ? The default maximum cache life is 7 days but we can choose to change this number to a higher number of days. This setting can be changed when you login to your view administrator via browser -> desktops and pools -> global policies -> offline desktop policies -> edit -> change the number of days Q13) What is the purpose of the cache lifetime setting for the offline desktop ? The data on each offline system is encrypted and has a cache lifetime controlled through policy, if the client loses contact with the View Connection Server, the cache lifetime is the period in which the user can continue to use the desktop before they are refused access; this countdown is reset once the connection is re-established. Q14) Does Offline Desktop support tunneled or non tunneled communications ? Offline Desktop supports tunneled or non tunneled communications for LAN based data transfers. When tunneling is enabled, all traffic is routed through the View Connection Server. When tunneling is not enabled, data transfers take place directly between the online desktop host system and the offline client. Q15) Is it true that by passing the tunnel increases the data transfer speed ? Yes, but do note that bypassing the tunnel and using an unencrypted connection increases data transfer speed at the expense of secure data communication. The encryption setting has no effect on the offline data, which is always encrypted on the client system. Q16) When users are logon to their Virtual Machines via View Client, when they wish to end the session, should they choose "disconnect" or "disconnect and log off" option ? The first option is Disconnect. With Disconnect, the user remains logged on. Any programs that the user is running continue to run and no other users (except for an Administrator) can connect to this desktop. If an administrator chooses, they may log into the desktop, but will automatically log the user out and force any programs the user was running to end. The second option is Disconnect and Log off. This option allows the user to log off and it allows other users to access this desktop. Q17) What is estimated size of a linked clone system disk ? For a 20GB system disk with OS and application, the estimated linked clone size would be 100mb, this size will typically grow to the size of the system disk and then a refresh would return it back to the original size. Refer to "Introduction To View" for more details. Q18) How does VMware charge for VMware View licenses ? Licenses are based on per concurrent connection user. Refer to "View 4 licensing" for more information. Q19) Can we intergrate VMware View Connection Server with 3rd party Secure Access boxes ? Yes, it is possible for such setup. Refer to "Juniper SA box with Vmware View" for secure access. Q20) Does the View Security Servers in the DMZ zone do their own load balancing ? VMware View does not provide load balancing features, we have to rely on 3rd party load balancing softwares such as NLB. Q21) Does the virtual desktops support serial com ports ? Yes, virtual desktops support serial, parallel, HID and usb ports. Refer to "View Peripherals" for more information. All The Best ☺ 52

53. Prepared By Sarathi Umakanthan Q22) Can VMware View client be installed on Linux OS ? Yes, View Client can be installed on Linux OS. Refer to "View Client Compatibility Guide" for more information. Q23) Does the ADAM database schema change ? No, the schema does not change. VMware vSphere 4.x Install Configure Manage FAQ Q1) Are we able to add odd number virtual CPUs to our virtual machines, for example 3 or 5 VCPU as compared to VI3 version when virtual SMP only supports 2 or 4 VCPU per virtual machine ? Yes, we can now add odd number VCPU to our virtual machines. Q2) What is the limitation for configuring VMware Fault Tolerance for a virtual machine ? Virtual machine selected for VMware FT must be provisioned with thick disk and not thin disk, if it was provisioned with thin disk, there will be a prompt to inflate the existing disk size. Q3) What is the disadvantage of configuring VM direct path I/O for a virtual machine ? If we configured VM direct path I/O, the virtual machine gains significant performance improvement as it is provided direct access through the adapter, however, it loses its virtualization features and the adapter cannot be used by other

virtual machines. Q4) Does vSphere provide support for the currently version of VMware Site Recovery Manage version 1.0 ? vSphere has does not support SRM version 1.0 at this present moment. Q5) What is the benefit of using a Distributed vSwitch as compared to a Standard vSwitch ? With a distributed virtual switch, the network statistics and policies of the virtual machine that has been vmotion to another ESX Server will migrate with the VM. This provides the ability for network vmotion and is useful for implementing inline intrusion detection systems and firewalls. Q6) Does ESX 4 and ESXi 4 support jumbo frames and TSO ? Yes, both ESX 4 and ESXi 4 provides support for jumbo frames as well as TSO, these can now be configured in the GUI as compared to VI3 where administrators could only do it via command lines. Q7) What is the different between VMware Data Protection as compared to the traditional VMware Consolidated Backup ? VMware Data Protection supports all storage architecture for backup and restore via LAN and SAN. It also supports full, incremental and differential file level backup options. Q8) What is the key driving factor for users adopting VMware vCenter Data Recovery ? It's an API that runs in a virtual machine within your vCenter, it provides agentless backup and can backup virtual machines even when they are being vmotion to a different host. Q9) Can we perform Storage Vmotion now via the GUI inside vCenter ? Yes, Storage Vmotion feature is now available in the vSphere Client connected to vCenter Server. It provides full support for FC SAN and NFS. Q10) When using vCenter Linked Mode feature, what are the functions that could be shared among the vCenters in this link ? vCenter Linked Mode allows administrator to centrally manage all the vCenter within a single view, roles and licenses can be shared across the vCenters configured in a link. Q11) Do I still require a Flexnet License Server if all my ESX Servers are ESX 4 and ESXi 4 ? No, you no longer require a license server for the to manage the new ESX Servers. All licenses are managed within the vCenter Server. Q12) If my customer has a hybrid environment where they still have ESX 3 and ESX 3.5, can vCenter communicate with the existing Flexnet License Server ? Yes, vCenter can communicate with existing license servers so as to allow it to manage legacy ESX Servers. vCenter will pull the licenses for legacy hosts from the flexnet license server. Q13) Why am I unable to hot add CPU and memory to virtual machine ? You are required to enable this function under the virtual machine settings in order to use it. Therefore, it is advisable to enable it before you start your virtual machine for the very first time. Q14) Is it true we can now use the new VMware Update Manager to upgrade our legacy ESX Servers (For example: ESX 3.5) to ESX 4.0 version ? Yes, the new VUM has the ability to upgrade your legacy ESX Server hosts for you. However, if you are upgrading a standalone host, you will be required to power off all virtual machines running on that host. Q15) How come we are unable to use our existing VI Client to manage our ESX 4 and vCenter 4 ? No, the legacy VI Client is unable to manage newer ESX Server Hosts and vCenter. You will need to install vSphere Client to manage newer ESX Server Hosts and vCenter as well as legacy ESX Hosts. All The Best ☺ 53

54. Prepared By Sarathi Umakanthan Q16) In vSphere, can we configure bidirectional CHAP authentication for iSCSI ? Yes, we can now configure bidirectional CHAP authentication for iSCSI software. It is fully supported. Previously, we could only configure unidirectional CHAP authentication. Q17) Do we still need to configure a Service Console port for iSCSI initiator ? No, we no longer need a Service Console for software iSCSI initiator. The vmkiscsid no longer runs in the Service Console. There have been improvements made to the new iSCSI stack in the kernel and also with the use of TCP/IP2 which has multi threading capabilities. Q18) What is the maximum number of CPU and maximum amount of memory a virtual machine can scale ? In vSphere, a virtual machine can now be configured with a maximum of 8 virtual CPUs and 255 GB of memory. Q19) What is the maximum amount of logical CPUs and memory per ESX Server 4 host can scale ? ESX Server 4 now supports a maximum of 64 logical CPUs and 1 TB of memory. Q20) What actions allow us to configure thin disk provisioning for a virtual machine ? When we create a new virtual machine, clone an existing virtual machine, clone a template or perform Storage Vmotion on an existing virtual machine. Q21) What is the benefit of configuring thin disk provisioning as compared to thick disk provisioning for a virtual machine ? When we configure thin disk provisioning the virtual machine only uses the space that it requires and not the entire disk size, this allows the remaining unused space for other virtual machines. This enables us to do Storage Over-commitment and use the storage more efficiently. Q22) Will my virtual machines still have connection if the virtual center that stores my Distributed vSwitch configuration goes down ? Yes, this is because the Distributed vSwitch has an control plane which sits at the vCenter Server level and an I/O plane which are the form of hidden vSwitches sitting at the ESX level. Therefore, even if the vCenter goes down, virtual machines continue to have connectivity through the I/O plane at the ESX level. Q23) What is the maximum number of ESX Hosts we can connect to a single distributed switch ? We can

connect up to 64 ESX hosts per distributed switch and vCenter 4 can support up a maximum of 16 distributed switches. Which means we can have up to 1024 hosts on these 16 distributed switches. Refer to "Configure Maximums" for more details. Q24) What is the version of the 64 bit Service Console running in ESX 4 ? The Service Console is a 2.6 linux kernel compatible with Red Hat Enterprise Linux 5.2 or CentOS 5.2 version. Q25) What is the maximum number of uplinks or ports per ESX 4 or ESXi 4 Host ? The maximum number of uplinks per ESX 4 or ESXi 4 Host is 32 uplinks. Refer to "Configure Maximums" for more details. Q26) Can we install vCenter Server on a 64 bit Windows OS ? Yes, vCenter Server can be installed on both 32-bit and 64-bit Windows OS. Refer to "Compatibility matrix" for more details. Q27) Does ESX/ESXi 4 supports round robin multipathing policy ? Yes besides fixed (preferred) and most recently used (MRU), ESX/ESXi 4 now supports round robin multipathing policy and it has to be configured on the storage level. Q28) Can vCenter 4 support a cluster which includes ESX 3.x and ESX 4 hosts ? Yes, we can cluster legacy ESX 3.x hosts and ESX 4 hosts together in the same cluster. vCenter will have to connect to the flexnet license server to manage the licenses for the legacy hosts. However, new features such as hot add and PCI pass through may not be available to the VMs on legacy hosts. Refer to "Upgrade Guide" for more details. Q29) When upgrading from virtual center 2.x to vCenter 4, is there downtime for the host and do we need to re add the ESX hosts back into the inventory ? No, there's no time for the hosts and existing hosts will remain in the inventory. However, there will be downtime for virtual center. Remember to backup the databases as during the upgrade process, the database schemas are changed and in the event of a upgrade failure, you will not be able to roll back and you will have to do a restore. Refer to "Upgrade Guide" for more details. Q30) When we hot add memory to a powered on VM, will the swap file get dynamically increased ? When we hot add memory to a powered on VM, the swap file size will get dynamically increase. Q31) When we hot add memory to a powered on VM and the swap file get dynamically increased, what happens if there is not enough disk space to meet the growing vswap file size ? All The Best ☺ 54

55. Prepared By Sarathi Umakanthan You will not be able to add memory to that VM that has not enough memory for the swap file to grow and you will receive an error. Q32) Can we add USB controllers to our VM in ESX/ESXi 4 ? Yes, we now have the ability to hot plug USB controller into our VMs while they are running. However, the usb device has to be connected to the ESX Server and not the client local machine. Q33) When installing convertor plug-in, I get a 404 error and the installation halts ? During installation of vCenter Convertor you will have to enter the FQDN instead of the IP address or netbios name as this may cause you to receive the 404 error when installing the vCenter convertor plug-in later. Q34) Where is Distributed Power Management configured and what are the protocols it uses ? DPM is configured and managed at the DRS cluster level. It uses IPMI, ILO and Wake On LAN protocols. DRS can use DPM to put under utilized hosts into standby modes to save power consumption. Q35) What is new with vCenter 4 user access and role management as compared to the virtual center 2.5 ? vCenter 4 allows us the ability to assign administrators to inventory objects such as networks and datastores which were not available with the previous virtual center version. Q36) What are the new tasks we can schedule in vCenter 4 task scheduler ? vCenter 4 task scheduler allows us the ability to schedule a task to increase the resources in a resource pool or virtual machine. This would be good to cater to the needs of virtual machines that will require additional ad-hoc resources such as finance department doing month end closing which may result in resources surge on their machines. Q37) How does VMware HA on an ESXi Server sends out heart beat if ESXi does not have a service console ? VMware HA clusters configured for ESXi Servers uses the vmkernel present on all ESXi Servers to send and receive heart beats. Whereas, on ESX Servers the heartbeat is send and receive through the service console. Therefore, we may not want to cluster ESX and ESXi Servers together in the same cluster. Q38) Can we create a cluster with ESX and ESXi Servers ? Yes. However, VMware HA may not work as both servers uses different port groups to send out heart beats. Vmotion and DRS may still work. This is not a supported practise. Q39) What is the limitation for configuring VMware Fault Tolerance for a virtual machine ? Virtual machine selected for VMware FT must be provisioned with thick disk and not thin disk, if it was provisioned with thin disk, there will be a prompt to inflate the existing disk size. Q40) How can I grow an existing VMFS LUN without creating an extent or physical partition ? We can use the grow function to grow an existing VMFS LUN. If the LUN is out of space, first we must get the storage administrator to grow the same LUN on the storage level with storage array management utilities then within the vCenter Server, we can then select the LUN and grow it. Q41) How come the hot add CPU and hot add memory option is greyed out for my VM ? This feature is currently available only on supported guest OS such as Windows Server 2003 enterprise and Windows 2008 datacenter edition. The type of license also

plays a part on the availability of this feature to the VM. Q42) What does the channel number stands for in vmhba#:T:CL? The only real example that I've seen in vSphere so far, is the software iSCSI initiator. If you give the VMkernel multiple VMkernel ports, and each port can reach (over its own subnet) different targets, they are listed with different "channel" numbers, to indicate whether they use the first VMkernel port, the second or the third. Q43) Can we install VMware Consolidated Backup VCB in a virtual machine ? Yes, VCB can now be installed in a VM and it can be used to backup VMs running on iSCSI and NFS. However, if you wish to backup VMs whose files reside on an FC San LUN, VCB must be installed on a physical machine. Q44) Does VMware View 3 work with VMware vSphere 4 ? No, currently VMware View 3 is only supported on VI 3.5 infrastructure and it is not supported to work with vSphere 4 environment. Q45) Is the Service Console root file system still running on ext3 file system ? No, the SC root file system is now running on VMDK and this is automatically created during initial installation of ESX Servers. Q46) Is it possible to configure VMware Update Manager 4 to point to WSUS to grab windows updates ? All The Best ☺ 55

56. Prepared By Sarathi Umakanthan No, this is not possible as the VUM Server is unable to communicate with the WSUS Server. Q47) Can vCenter 4 perform Storage Vmotion on a legacy ESX 3.x Host and convert the VM virtual disk from thick to thin disk ? Yes, vCenter 4 is able to convert a VM's virtual disk from thick to thin using storage vmotion. Refer to this "ESX 3.x and vCenter 4 Svmotion" for more detail discussion. Q48) I understand that Oracle databases licensed by per CPU, how does that translate to the number of license I have to purchase if I port it over to VM ? In order for you to run your Oracle DB within a VM on that ESX Server, you have to purchase license for each physical CPU on that ESX Server box. Refer to this "Oracle Licensing Per Processor" for more detail discussion. Q49) How come there is no standalone boot CD for VMware Converter 4.0 for me to download for use for cold cloning ? VMware vCenter Converter Standalone 4.0.1 does not support cold cloning, you must use an earlier Converter edition boot CD 3.0.x Enterprise Edition. Refer to this "VMware Converter User Guide" for more information. Q50) When we convert a VM from thin disk to thick disk, which state must the VM be in to perform the request ? The VM must be in the powered off state in order to be converted from thin to thick disk. Q51) What is the default multipathing policy for ESX 4 ? The hypervisor determines whether to use MRU or Fixed based on the type of arrays it detects. If array is activepassive, it would be treated as MRU. If array is activeactive, it would be treated as fixed. Refer to "Multipathing Policies in ESX 4" for more details. Q52) What is the difference between Enhanced vmxnet and vmxnet3 ? Vmxnet3 is an improved version of enhanced vmxnet, some benefits and improvements are MSI/MSI-X support, Side Scaling, checksum and TCP Segmentation Offloading (TSO) over IPv6, off-loading and Large TX/RX ring sizes. Refer to "Vmxnet3 tips and tricks" for more details. Q53) When we replicate the LUNs over resignaturing only occurs for VMFS LUNs and not RDM, how do we get the replicated RDM to work ? You can replicate the RDM to a new array, but the mapping file that is configured on the vm itself will no longer be pointing to the same location it was previously, so the RDM has to be re-mapped to the VM in a DR scenario. Q54) After installing plug-in inside the VC, I am unable to enable the plug-in and it always shows as disabled. Go to services.msc ensure that the Virtual Center Management Webservices is running and then relogin the vSphere Client and enable the plug-in. Q55) What is the difference between ephemeral and dynamic binding on a distributed virtual switch ? Ephemeral a new port on every power-on. The port is destroyed when the VM disconnects from the port. Dynamic assign a port when the VM is powered on, it uses a concept similar to DHCP in that if the same port is available then it will renew that one. Refer to "Networking Deep Dive" for more details. Q56) What is the difference between a thick virtual disk and eager zeroed thick virtual disk ? Thick virtual disk does not format the VMDK at the time of deployment. This means that data, which needs to be written, must pause while the blocks required to store the data are zeroed out. An eager zeroed thick virtual disk actually formats all of its data blocks at the time of deployment. Q57) What kind of permissions do we need to provide when configuring a NAS Server ? We need to configure permission for the administrator group account rights on the NAS Server so that the ESX Server can access the NAS Server. Q58) Storage View tabs in the SAN storage datastore is blank and does not show anything ? Start the vCenter Mount Service and virtual disk service, then restart the vCenter Server service on the Windows OS. Then click on refresh for the storage view tabs. Q59) Can we migrate VMs running on ESX host with VMware Hardware Version 7 to ESX host with VMware Hardware Version 4 ? No we cannot migrate VMs running on hardware version 7 back to hardware version 4. VMware hardware version 7 only exists on ESX4 and greater. However, it is possible to migrate VMs running on ESX host with hardware version 4 to ESX host running on hardware version 7.

Q60) Does VMware have an online page where we can search for all the technical white papers ? Yes.

Please kindly refer to "Technical Resource Center" for more information. Q61) Does VCB supports

Windows Server 2008 ? All The Best ☺ 56

57. Prepared By Sarathi Umakanthan VCB version 1.5 supports Windows Server 2008. Refer to "VCB 1.5 Update 1" release notes for more information. Identifying shared storage issues with ESX 3.x Purpose This article is designed to assist in identifying problems related with the storage subsystem of ESX 3.x. Resolution Troubleshooting ESX host storage issues begins with identifying how far reaching (the scope) the problem is. In many cases, a detected problem may be misidentified until the scope has been ascertained. To identify the scope of the problem: I Verify that the storage device cannot be seen by any or a subset of the ESX cluster. If so, select the appropriate storage technology: For Fibre channel, see Troubleshooting fibre channel storage connectivity (1003680). 1.Troubleshooting fibre channel storage connectivity Symptoms No targets from an array can be seen by: All of the ESX hosts All of the ESX hosts on a specific fabric or connected through an ISL link One ESX host ESX host initiators are not logging into the array You receive any of the following errors: Unknown inaccessible SCSI: 4506: "Cannot find a path to device vmhba1:0:8 in a good state" Purpose This article guides you through the most common steps to identify a connectivity problem to a shared storage device. Resolution Please validate that each troubleshooting step below is true for your environment. Each step will provide instructions or a link to a document, in order to eliminate possible causes and take corrective action as necessary. The steps are ordered in the most appropriate sequence to isolate the issue and identify the proper resolution. Please do not skip a step. These are common items for troubleshooting connectivity issues to the storage array. 1.a Verify that none of the hosts can see the shared storage. For more information, see Obtaining LUN Pathing information for ESX Server 3 (1003973). Obtaining LUN pathing information for ESX hosts Purpose This article explains using tools to determine LUN pathing information for ESX hosts. Resolution There are two methods used to obtain the multipath information from the ESX host: Using the ESX command line. Use the command line to obtain the multipath information when performing troubleshooting procedures. Using VMware Infrastructure (VI) Client. Use VI Client option when you are performing system maintenance. Using the ESX command line to obtain multipathing information To obtain LUN multipathing information from the ESX host command line: Log in to the ESX host console. Type esxcfg-mpath -l and press Enter. The output appears similar to the following: Disk vmhba2:1:4 /dev/sdh (30720MB) has 2 paths and policy of Most Recently Used FC 10:3.0 210000e08b89a99b<->5006016130221fdd vmhba2:1:4 On active preferred FC 10:3.0 210000e08b89a99b<->5006016930221fdd vmhba2:3:4 Standby Disk vmhba2:1:1 /dev/sde (61440MB) has 2 paths and policy of Most Recently Used All The Best ☺ 57

58. Prepared By Sarathi Umakanthan FC 10:3.0 210000e08b89a99b<->5006016130221fdd vmhba2:1:1 On active preferred FC 10:3.0 210000e08b89a99b<->5006016930221fdd vmhba2:3:1 Standby In this example, two LUNs are presented. The following is an analysis of the first LUN: Canonical name Disk vmhba2:1:4 /dev/sdh (30720MB) has 2 paths and policy of Most Recently Used FC 10:3.0 210000e08b89a99b<->5006016130221fdd vmhba2:1:4 On active preferred FC 10:3.0 210000e08b89a99b<->5006016930221fdd vmhba2:3:4 Standby This is the canonical device name the ESX host used to refer to the LUN. Note : When there are multiple paths to a LUN, the canonical name is the first path that was detected for this LUN. vmhba2:1:4 is one of the Host Bus Adapters (HBAs). vmhba2:1:4 is the second storage target (numbering starts at 0) that was detected by this HBA. vmhba2:1:4 is the number of the LUN on this storage target. For multipathing to work properly, each LUN must present the same LUN number to all ESX hosts. Note: If the vmhba number for the HBA is a single digit number, it is a physical adapter. If the address is vmhba40 or vmhba32, it is a software iSCSI device for ESX 3.0 and ESX 3.5 respectively. Linux device name Disk vmhba2:1:4 /dev/sdh (30720MB) has 2 paths and policy of Most Recently Used FC 10:3.0 210000e08b89a99b<->5006016130221fdd vmhba2:3:4 On active preferred FC 10:3.0 210000e08b89a99b<->5006016930221fdd vmhba2:3:4 Standby This is the associated Linux device handle for the LUN. You must use this reference when using utilities like fdisk. LUN capacity Disk vmhba2:1:4 /dev/sdh (30720MB) has 2 paths and policy of Most Recently Used FC 10:3.0 210000e08b89a99b<->5006016130221fdd vmhba2:1:4 On active preferred FC 10:3.0 210000e08b89a99b<->5006016930221fdd vmhba2:3:4 Standby The disk capacity of the LUN. In the example, the LUN capacity is 30GB. Failover policy Disk vmhba2:1:4 /dev/sdh (30720MB) has 2 paths and policy of Most Recently Used FC 10:3.0 210000e08b89a99b<->5006016130221fdd vmhba2:1:4 On active preferred FC 10:3.0 210000e08b89a99b<->5006016930221fdd vmhba2:3:4

Standby This is the policy the ESX host uses when it determines which path to use in the event of a failover. The choices are: Most Recently Used: The path used by a LUN is not be altered unless an event (user, ESX host, or array initiated) instructs the path to change. If the path changed because of a service interruption along the original path, the path does not fail-back when service is restored. This policy is used for Active/Passive arrays and many pseudo active/active arrays. Fixed: The path used by a LUN is always the one marked as preferred, unless that path is unavailable. As soon as the path becomes available again, the preferred becomes the active path again. This policy is used for Active/Active arrays. An Active/Passive array should never be set to Fixed unless specifically instructed to do so. This can lead to path thrashing, performance degradations and crashes. All The Best ☺ 58

59. Prepared By Sarathi Umakanthan Round Robin: This is experimentally supported in ESX 3.x. It is fully supported in ESX 4.x Note: See the additional information section for references to the arrays and the policy they are using. LUN disk type Disk vmhba2:1:4 /dev/sdh (30720MB) has 2 paths and policy of Most Recently Used FC 10:3.0 210000e08b89a99b<->5006016130221fdd vmhba2:1:4 On active preferred FC 10:3.0 210000e08b89a99b<->5006016930221fdd vmhba2:3:4 Standby There are three possible values for LUN disk type: FC: This LUN is presented through a fibre channel device. iScsi: This LUN is presented through an iSCSI device. Local: This LUN is a local disk. PCI slot identifier Disk vmhba2:1:4 /dev/sdh (30720MB) has 2 paths and policy of Most Recently Used FC 10:3.0 210000e08b89a99b<->5006016130221fdd vmhba2:1:4 On active preferred FC 10:3.0 210000e08b89a99b<->5006016930221fdd vmhba2:3:4 Standby PCI slot identifier indicates the physical bus location this HBA is plugged in to. HBA World Wide Port Numbers (WWPN) Disk vmhba2:1:4 /dev/sdh (30720MB) has 2 paths and policy of Most Recently Used FC 10:3.0 210000e08b89a99b<->5006016130221fdd vmhba2:1:4 On active preferred FC 10:3.0 210000e08b89a99b<->5006016930221fdd vmhba2:3:4 Standby These numbers are the hardware addresses (much like the MAC address on a network adapter) of the HBAs. Storage processor port World Wide Port Numbers (WWPN) Disk vmhba2:1:4 /dev/sdh (30720MB) has 2 paths and policy of Most Recently Used FC 10:3.0 210000e08b89a99b<->5006016130221fdd vmhba2:1:4 On active preferred FC 10:3.0 210000e08b89a99b<->5006016930221fdd vmhba2:3:4 Standby These numbers are the hardware addresses of the ports on the storage processors of the array. True path address Disk vmhba2:1:4 /dev/sdh (30720MB) has 2 paths and policy of Most Recently Used FC 10:3.0 210000e08b89a99b<->5006016130221fdd vmhba2:1:4 On active preferred FC 10:3.0 210000e08b89a99b<->5006016930221fdd vmhba2:3:4 Standby This is the true name for this path. In this example, there are two possible paths to the LUN (vmhba2:1:4 and vmhba2:3:4). Path status Disk vmhba2:1:4 /dev/sdh (30720MB) has 2 paths and policy of Most Recently Used FC 10:3.0 210000e08b89a99b<->5006016130221fdd vmhba2:1:4 On active preferred FC 10:3.0 210000e08b89a99b<->5006016930221fdd vmhba2:3:4 Standby Path status contains the status of the path. There are six attributes that comprise the status: On: This path is active and able process I/O. When queried, it returns a status of READY. Off: The path has been disabled by the administrator. All The Best ☺ 59

60. Prepared By Sarathi Umakanthan Dead: This path is no longer available for processing I/O. This can be caused by physical medium error, switch, or array misconfiguration. Standby: This path is inactive and cannot process I/O. When queried, it returns a status of NOT\_READY. Active: This path is processing I/O for the ESX Server host. Preferred: This is the path that is preferred to be active. This attribute is ignored when the policy is set to Most Recently Used (mru). Using VI Client to obtain multipathing information To obtain multipathing information from VI Client: Click on an ESX host. Click the Configuration tab. Click Storage. Click the VMFS-3 datastore you are interested in. Click Properties. All The Best ☺ 60

61. Prepared By Sarathi Umakanthan The following dialog appears: From this example, you can see that the canonical name is vmhba2:1:0 and the true paths are vmhba2:1:0 and vmhba2:3:0. The active path is vmhba2:1:0 and the policy is Most Recently Used. All The Best ☺ 61

62. Prepared By Sarathi Umakanthan Click Manage Paths. The Manage Paths dialog appears: To change the policy, click Change in the Policy section. The Manage Paths - Selection Policy dialog appears. Click OK to return to the Manage Paths dialog. To enable or disable a path, select it and click Change. All The Best ☺ 62

63. Prepared By Sarathi Umakanthan As the policy for this LUN is Most Recently Used, the Preferred

option is unavailable. If you disable the currently active path, it forces a path failover. Click OK to return to the Manage Paths dialog.

1.b Verify that a rescan does not bring the LUNs back. For more information, see Performing a rescan of the storage (1003988). Performing a rescan of the storage

Purpose This article explains how to perform a rescan of the storage devices. A rescan of the storage devices is needed when a storage device has been added, removed, or changed from the array.

Resolution You can perform a rescan in two ways: Using the ESX Server command line. Using the Virtual Infrastructure Client (VI Client). Using the ESX Server command line to perform a rescan There are two stages to a complete rescan process. Search for new LUNs and remove retired LUNs. Search for new VMFS data stores and mount the data stores. Search for new LUNs and remove retired LUNs To perform a rescan from the ESX Server host command line: Log in to the ESX Server host console. Type the following command: esxcfg-rescan <vmkernel SCSI adapter name> Where <vmkernel SCSI adapter name> is the vmhba# to be rescanned. Expected output when rescanning a fibre channel Host Bus Adapter (HBA) or local storage: Rescanning vmhba2...done. On scsi3, removing: 0:0 1:0 1:1 1:2 1:3 1:4. On scsi3, adding: 0:0 1:0 1:1 1:2 1:3 1:4. Expected output when rescanning an iSCSI HBA: Doing iSCSI discovery. This can take a few seconds ... Rescanning vmhba1...done. On scsi2, removing: 0:0 0:10 1:0. On scsi2, adding: 0:0 0:10 1:0. Note: You do not need to rescan local storage. Note: Performing a rescan does not cause a service interruption. Although the first pass states that it is removing LUNs, no LUN is removed until after the adding phase is complete. Any LUN that was not marked as adding is removed. The rescan must be performed on each HBA that is attached to the storage that changed.

Search for new VMFS data stores and mount them To search for new VMFS data stores: Log in to the ESX Server host console. Type the following command: vmkfstools -V This command does not generate any output. If a new data store has been detected, it is mounted in /vmfs/volumes using its friendly name (if it has one) or its UUID. Using the Virtual Infrastructure Client to perform a rescan From the VI Client: Click on the ESX Server host that you want to perform the rescan on. Click the Configuration tab. Click Storage Adapters. Click the Rescan link. All The Best ☺ 63

64. Prepared By Sarathi Umakanthan Click OK to begin the Rescan. Note: This performs a rescan of every HBA, regardless of the HBA that is selected in the Storage Adapters windows. You can monitor the progress of the rescan by opening an SSH session to the service console and executing the following command: tail -f /var/log/vmkernel Press CTRL+C to exit the tail command. The Rescan in the VI Client, by default, combines the rescan for new LUNs (and removal of retired ones) with the detection of new VMFS data stores, depending on which check boxes are selected when the rescan is initiated. Caution: The rescan and data store detection are asynchronous processes. This means that the detection process for new data stores may complete before the detection process for new LUNs is complete. You may need to perform the rescan twice if the newly added LUN has a VMFS data store on it.

1.c Verify that the fibre switch zoning configuration permits the ESX host to see the storage array. Consult your switch vendor if you require assistance.

1.D Verify that the fibre switch propagates RSCN messages to the ESX hosts. For more information, see Configuring fibre switch so that ESX Server doesn't require a reboot after a zone set change (1002301). Configuring fibre switch so that ESX Server doesn't require a reboot after a zone set change

Details A change was made to the active zone set of the fabric switches. After a rescan from the Virtual Infrastructure Client or the ESX Server command line, all targets affected by the zoning configuration changes are not visible. These targets become visible after the ESX Server has been rebooted.

Solution When a change occurs on an active zone set of a fabric switch, most fibre channel switches issue a Register for State Change Notification (RSCN) event to the devices attached to them, such as ESX Servers and storage arrays. The Host Bus Adapter (HBA) drivers used on ESX Server register with the fabric switch to receive RSCN events. However, the fabric switch may be configured to not issue these events, preventing the ESX Server from receiving these events. This causes target visibility and failover problems on the ESX Server. The following activities are examples of zone set changes:

- Adding a zone
- Removing zones
- Modifying zones
- Activating zone sets
- Deactivating zone sets

Enabling and disabling the default zone set

The following switches can be configured to suppress RSCN events:

- Brocade SilkWorm 4100 series switch (re-branded McData Sphereon-3232 series switch)
- EMC connectrix ED-140M switch

To enable RSCN events, configure the Switch Operating Parameters so that the Suppress Zoning RSCN on Zone Set Activations is disabled. Other fibre switches may also be configured to suppress or allow RSCN events. For more information on configuring the fabric switch operating parameters, please contact your switch vendor.

1.e Verify that the storage array is listed on the Storage/SAN Compatibility Guide for ESX 3.x found at Verifying ESX Server hardware (System, Storage and I/O) devices are supported (1003916). Verifying that ESX host hardware (System, Storage,

and I/O) devices are supported Details This article provides links to ESX host Hardware Compatibility Documents (HCLs) so that you can verify your System, Storage, and I/O devices are on the VMware Certified and Supported Hardware Compatibility Lists. All The Best ☺ 64

65. Prepared By Sarathi Umakanthan Additionally, you can also verify if your systems and hardware require specific BIOS and firmware versions. If your System, Storage, or I/O devices are not listed or no specific BIOS or firmware versions are listed, contact your OEM or third party vendor for further verification and support. Solution Confirm Hardware Compatibility To confirm hardware compatibility: Check the ESX host logs (/var/log/vmkernel or /var/log/dmesg) for system identifier information. Run the following command on the ESX host service console as root: cat /var/log/dmesg |less Type /Vendor and press Enter when the contents of the dmesg file are displayed to the console. The output appears similar to: BIOS Vendor: Dell Computer Corporation BIOS Version: A05 BIOS Release: 01/09/2006 System Vendor: Dell Computer Corporation Product Name: PowerEdge 2850 Version: Serial Number: BMQRLB1 UUID 44454c4c4d0010518052c2c04f4c4231 Board Vendor: Dell Computer Corporation Board Name: 0NJ023 Identify the SCSI shared storage devices by doing the following: For ESX 3.x, run the command: cat /proc/vmware/scsi/vmhba## Note: The vmhba## represents the canonical name for the path. For more information, see Identifying disks when working with VMware ESX (1014953). ESX 3.X Use these commands to collect disk and LUN information from within ESX. The command esxcfg-mpath -l generates a compact list of the LUNs currently connected to the ESX host. The output appears similar to: Disk vmhba32:0:0  
/vmfs/devices/disks/vml.020000000060060160c0521501065cacf13f9fdd11524149442035 (512000MB)  
has 2 paths and policy of Most Recently Used iScsi sw iqn.1998-01.com.vmware:esxhost-41e85afe-> iqn.1992-04.com.iscsi:a0 vmhba32:0:0 Standby preferred iScsi sw iqn.1998-01.com.vmware:esxhost-41e85afe<-> iqn.1992-04.com.iscsi:b0 vmhba32:1:0 On active The command esxcfg-vmhbaudev -m generates a compact list of the LUNs currently connected to the ESX host. The output appears similar to:  
vmhba1:0:0:3 /dev/sda3 48f85575-5ec4c587-b856-001a6465c102 vmhba2:0:4:1 /dev/sdc1 48fdb8e5-c04f6d90-1edb-001cc46b7a18 vmhba2:0:3:1 /dev/sdb1 48fdb8be-b9638a60-aa72-001cc46b7a18  
vmhba32:0:1:1 /dev/sde1 48fe2807-7172dad8-f88b-0013725ddc92 vmhba32:0:0:1 /dev/sdd1 48fe2a3d-52c8d458-e60e-001cc46b7a18 All The Best ☺ 65

66. Prepared By Sarathi Umakanthan The command ls -alh /vmfs/devices/disks lists the possible targets for certain storage operations. The output appears similar to: lrwxrwxrwx 1 root root 58 Oct 16 12:54 vmhba2:0:3:0 -> vml.0200030000600805f300124a90ca40a0bcd05c00294d5341313030 lrwxrwxrwx 1 root root 60 Oct 16 12:54 vmhba2:0:3:1 ->  
vml.0200030000600805f300124a90ca40a0bcd05c00294d5341313030:1 lrwxrwxrwx 1 root root 58 Oct 16 12:54 vmhba2:0:4:0 -> vml.0200040000600805f300124a9006d5bbdeb08b002a4d5341313030  
lrwxrwxrwx 1 root root 60 Oct 16 12:54 vmhba2:0:4:1 ->  
vml.0200040000600805f300124a9006d5bbdeb08b002a4d5341313030:1 lrwxrwxrwx 1 root root 58 Oct 16 12:54 vmhba2:1:3:0 -> vml.0200030000600805f300124a90ca40a0bcd05c00294d5341313030  
lrwxrwxrwx 1 root root 60 Oct 16 12:54 vmhba2:1:3:1 ->  
vml.0200030000600805f300124a90ca40a0bcd05c00294d5341313030:1 lrwxrwxrwx 1 root root 58 Oct 16 12:54 vmhba2:1:4:0 -> vml.0200040000600805f300124a9006d5bbdeb08b002a4d5341313030  
lrwxrwxrwx 1 root root 60 Oct 16 12:54 vmhba2:1:4:1 ->  
vml.0200040000600805f300124a9006d5bbdeb08b002a4d5341313030:1 The following are definitions for some of the identifiers and their conventions: vmhba<Adapter>:<Target>:<LUN> This identifier can be used to identify either a LUN or a path to the LUN. When ESX detects that paths associated to one LUN, each path is assigned this identifier. The entire LUN then inherits the same name as the first path. When using this identifier for an entire LUN, the identified is called the canonical name. When this identifier is used for a path it is called the path name. These naming conventions may vary from ESX host to ESX host, and may change if storage hardware replaced. This identifier is generally used for operations with utilities such as vmkfstools. Example: vmhba1:0:0 = Adapter 1, Target 0, and LUN 0. vmhba<Adapter>:<Target>:<LUN>:<Partition> This identifier is used in the context of a canonical name and is used to identify a partition on the LUN or disk. In addition to the canonical name, there is a <Partition> appended to the end of the identifier. The <Partition> represents the partition number on the LUN or Disk. If the <Partition> is specified as 0, then it identifies the entire disk instead of only one partition. These naming conventions may vary from ESX host to ESX host, and may change if storage hardware replaced. This identifier is generally used for operations with utilities such as vmkfstools. Example: vmhba1:0:0:3 =

Adapter 1, Target 0, LUN 0, and Partition 3. vml.<VML> or vml.<VML>:<Partition> The VML Identifier can be used interchangeably with the canonical name. Appending the <Partition> works in the same way described above. This identifier is generally used for operations with utilities such as vmkfstools.

/dev/sd<Device Letter> or /dev/sd<Device Letter><Partition> This naming convention is not VMware specific. This convention is used exclusively by the service console and open source utilities which come with the service console. The <Device Letter> represents the LUN or Disk and is assigned by the service console during boot. The optional <Partition> represents the partition on the LUN or disk. These naming conventions may vary from ESX host to ESX host, and may change if storage hardware replaced. This identifier is generally used for operations with utilities such as fdisk and dd. All The Best ☺ 66

67. Prepared By Sarathi Umakanthan Note: VMware ESXi does not have a service console; disks are referred to by the VML Identifier. <UUID> The <UUID> is a unique number assigned to a VMFS volume upon the creation of the volume. It may be included in syntax where you need to specify the full path of specific files on a datastore. ESX 4.X Use these commands to collect disk and LUN information from within ESX: The command esxcfg-mpath -b generates a compact list of LUNs currently connected to the ESX host. The output appears similar to: naa.6090a038f0cd4e5bdaa8248e6856d4fe : EQLOGIC iSCSI Disk (naa.6090a038f0cd4e5bdaa8248e6856d4fe) vmhba33:C0:T1:L0 LUN:0 state:active iscsi Adapter: iqn.1998-01.com.vmware:bs-tse-i137-35c1bf18 Target: IQN=iqn.2001-05.com.equallogic:0-8a0906-5b4ecdf03-fed456688e24a8da-bs-tse-vc40-250g Alias= Session=00023d000001 PortalTag=1 The command esxcfg-scsidevs -l generates a list of LUNs currently connected to the ESX host. The output appears similar to: mpx.vmhba0:C0:T0:L0 Device Type: Direct-Access Size: 139890 MB Display Name: Local ServeRA Disk (mpx.vmhba0:C0:T0:L0) Plugin: NMP Console Device: /dev/sdb Devfs Path: /vmfs/devices/disks/mpx.vmhba0:C0:T0:L0 Vendor: ServeRA Model: 8k-I Mirror Revis: V1.0 SCSI Level: 2 Is Pseudo: false Status: on Is RDM Capable: false Is Removable: false Is Local: true Other Names: vml.0000000000766d686261303a303a30 The command ls -alh /vmfs/devices/disks lists the possible targets for certain storage operations. The output appears similar to: lrwxrwxrwx 1 root root 19 Oct 16 13:00 vml.0000000000766d686261303a303a30 -> mpx.vmhba0:C0:T0:L0 lrwxrwxrwx 1 root root 21 Oct 16 13:00 vml.0000000000766d686261303a303a30:1 -> mpx.vmhba0:C0:T0:L0:1 lrwxrwxrwx 1 root root 21 Oct 16 13:00 vml.0000000000766d686261303a303a30:2 -> mpx.vmhba0:C0:T0:L0:2 lrwxrwxrwx 1 root root 21 Oct 16 13:00 vml.0000000000766d686261303a303a30:3 -> mpx.vmhba0:C0:T0:L0:3 lrwxrwxrwx 1 root root 21 Oct 16 13:00 vml.0000000000766d686261303a303a30:5 -> mpx.vmhba0:C0:T0:L0:5 lrwxrwxrwx 1 root root 36 Oct 16 13:00 vml.020000000060060160b4111600624c5b749c7edd11524149442035 -> naa.60060160b4111600624c5b749c7edd11 lrwxrwxrwx 1 root root 38 Oct 16 13:00 vml.020000000060060160b4111600624c5b749c7edd11524149442035:1 -> naa.60060160b4111600624c5b749c7edd11:1 All The Best ☺ 67

68. Prepared By Sarathi Umakanthan The following are definitions for some of identifiers and their conventions: naa.<NAA> or eui.<EUI> NAA stands for Network Addressing Authority identifier. EUI stands for Extended Unique Identifier. The number is guaranteed to be unique to that LUN. The NAA or EUI identifier is the preferred method of identifying LUNs and the number is generated by the storage device. Since the NAA or EUI is unique to the LUN, if the LUN is presented the same way across all ESX hosts, the NAA or EUI identifier remains the same. For more information on these standards, see the SPC-3 documentation from the InterNational Committee for Information Technology Standards (T10). naa.<NAA>:<Partition> or eui.<EUI>:<Partition> The <Partition> represents the partition number on the LUN or Disk. If the <Partition> is specified as 0, it identifies the entire disk instead of only one partition. This identifier is generally used for operations with utilities such as vmkfstools. Example:  
naa.6090a038f0cd4e5bdaa8248e6856d4fe:3 = Partition 3 of LUN  
naa.6090a038f0cd4e5bdaa8248e6856d4fe. mpx.vmhba<Adapter>:C<Channel>:T<Target>:L<LUN> or mpx.vmhba<Adapter>:C<Channel>:T<Target>:L<LUN>:<Partition> Some devices do not provide the NAA number described above. In these circumstances, an MPX Identifier is generated by ESX to represent the LUN or disk. The identifier takes the form similar to that of the canonical name of previous versions of ESX with the mpx. prefix. This identifier can be used in the exact same way as the NAA Identifier described above. vml.<VML> or vml.<VML>:<Partition> The VML Identifier can be used interchangeably with the NAA Identifier and the MPX Identifier. Appending <Partition> works in the same way described above. This identifier is generally used for operations with utilities such as vmkfstools. vmhba<Adapter>:C<Channel>:T<Target>:L<LUN> This identifier is now used exclusively to

identify a path to the LUN. When ESX detects that paths associated to one LUN, each path is assigned this Path Identifier. The LUN also inherits the same name as the first path, but it is now used an a Runtime Name, and not used as readily as the above mentioned identifiers as it may be different depending on the host you are using. This identifier is generally used for operations with utilities such as vmkfstools. Example: vmhba1:C0:T0:L0 = Adapter 1, Channel 0, Target 0, and LUN 0. Note: Generally, multi-port fiber channel adapters are equipped with dedicated controllers for each connection, and therefore each controller is represented by different vmhba#. If the adapter supports multiple connections to the same controller, it is represented by a different channel number. This representation is directly dependant on the capability of the adapter. /dev/sd<Device Letter> or /dev/sd<Device Letter><Partition> This naming convention is not VMware specific. This convention is used exclusively by the service console and open source utilities which come with the service console. The <Device Letter> represents the LUN or Disk and is assigned by the service console during boot. The optional <Partition> represents the partition on the LUN or disk. These naming conventions may vary from ESX host to ESX host and may change if storage hardware replaced. This identifier is generally used for operations with utilities such as fdisk and dd. All The Best ☺ 68

69. Prepared By Sarathi Umakanthan Note: VMware ESXi does not have a service console; disks are referred to by the VML Identifier. The output for ESX 3.x is similar to: Vendor: DGC Model: RAID 5 Rev: 0324 For ESX 4.x, run the command: esxcfg-scsidevs -l | egrep -i 'display name|vendor' The output for ESX 4.0 is similar to: Display Name: Local ServeRA Disk (mpx.vmhba0:C0:T0:L0) Vendor: ServeRA Model: 8k-1 Mirror Revis: V1.0 Run the following command from the ESX host service console to find additional peripherals and devices: lspci -v The output appears similar to: 02:0e.0 RAID bus controller: Dell Computer Corporation PowerEdge Expandable RAID Controller 4E/SI/DI (rev 06) Subsystem: Dell Computer Corporation: Unknown device 016d Flags: bus master, stepping, 66Mhz, medium devsel, latency 64, IRQ 24 Memory at d80f0000 (32-bit, prefetchable) [size=64K] Memory at dfdc0000 (32-bit, non-prefetchable) [size=256K] Expansion ROM at dfe00000 [disabled] [size=128K] Capabilities: [c0] Power Management version 2 Capabilities: [d0] Message Signalled Interrupts: 64bit+ Queue=0/1 Enable-Capabilities: [e0] PCI-X non-bridge device. 06:07.0 Ethernet controller: Intel Corporation 8254NXX Gigabit Ethernet Controller (rev 05) Subsystem: Dell Computer Corporation: Unknown device 016d Flags: bus master, 66Mhz, medium devsel, latency 32, IRQ 25 Memory at dfae0000 (32-bit, non-prefetchable) [size=128K] I/O ports at ecc0 [size=64] Capabilities: [dc] Power Management version 2 Capabilities: [e4] PCI-X non-bridge device. 07:08.0 Ethernet controller: Intel Corporation 8254NXX Gigabit Ethernet Controller (rev 05) Subsystem: Dell Computer Corporation: Unknown device 016d Flags: bus master, 66Mhz, medium devsel, latency 32, IRQ 26 Memory at df8e0000 (32-bit, non-prefetchable) [size=128K] I/O ports at dcc0 [size=64] Capabilities: [dc] Power Management version 2 Capabilities: [e4] PCI-X non-bridge device. Compare your hardware information to the VMware ESX Server Systems, I/O, and SAN Compatibility guides. 1.f Verify that the initiator is registered on the array. You may need to contact your storage vendor for instructions on this procedure. 1.g Verify the physical hardware: The storage processors on the array. The fibre switch and the Gigabit Interface Converter (GBIC) units in the switch. All The Best ☺ 69

70. Prepared By Sarathi Umakanthan The fibre cables between the fibre switch and the array. The array itself. Note: A rescan is required after any change is made to see if the targets are detected. Note: If your problem still exists after trying the steps in this article, please: II. Verify that no more than a single ESX host cannot see the shared storage. If so, select the appropriate storage technology: 2. For Fibre channel, see Troubleshooting ESX Server connectivity to a fibre channel array (1003682) Troubleshooting ESX and ESXi connectivity to fibre channel arrays Symptoms One ESX host or ESXi host cannot see any targets from all storage arrays. The storage array does not report the HBA of the ESX or ESXi as being logged in. Purpose This article is designed to guide you through the most common steps to identify a connectivity problem from ESX or ESXi to a shared storage device. Resolution Please validate that each troubleshooting step below is true for your environment. Each step will provide instructions or a link to a document, in order to eliminate possible causes and take corrective action as necessary. The steps are ordered in the most appropriate sequence to isolate the issue and identify the proper resolution. Please do not skip a step. To troubleshoot connectivity issues to a fibre channel array: Verify that ESX or ESXi cannot see any targets in a shared storage environment. For more information, see Using esxcfg-mpath on the command line and the Virtual Infrastructure Client to obtain LUN pathing information (1003973) . Verify that a rescan does not restore visibility to all the targets. For more information, see Using esxcfg-

rescan on the command line and the Virtual Infrastructure Client to perform a storage rescan (1003988). Verify that the Host Bus Adapter (HBA) firmware is at the certified level and is listed on the I/O Compatibility Guide for ESX Server 3.x found in the Hardware Compatibility List (HCL) index (1003916) . Verify that the initiator is registered on the storage array. You may need to contact your storage vendor for instructions on this procedure. Verify all the fibre channel physical hardware: The fibre switch and the Gigabit Interface Converter (GBIC) units in the switch. The fibre cables between the SAN and the ESX Server. The Host Bus Adapter (HBA). Note: You may need to contact your hardware vendor for more information about verifying correct functionality. Note: If your problem still exists after trying the steps in this article, please: III Verify that the LUN is presented and available. For more information, see Troubleshooting LUN connectivity issues (1003955). Troubleshooting LUN connectivity issues Symptoms Targets on the storage array are visible but one or more LUNs are not. LUN not visible LUN cannot connect LUN is missing All The Best ☺ 70

71. Prepared By Sarathi Umakanthan Purpose This document assists you in troubleshooting a scenario where LUNs are missing. Resolution The following steps assist you in identifying a LUN connectivity issue. Verify that the ESX Server host can see the LUN(s). For more information, see Using esxcfg-mpath on the command line and the Virtual Infrastructure client to obtain LUN pathing information (1003973) . Verify that a rescan restores visibility to the LUN(s). For more information, see Using esxcfg-rescan on the command line and the Virtual Infrastructure Client to perform a storage rescan (1003988) . Verify SCSI reservation conflicts are not in excess. See: Resolving SCSI Reservation Conflicts (1002293) SCSI Reservation Issue with Fibre Channel HBAs (4365932) Insight Manager may cause excessive SCSI reservation conflicts (1004771) Unable to create a VMFS3 partition on a LUSE LUN (1000286) Storage LUNs on NetApp 960 become unresponsive during GFiler takeover/giveback operation (1002905) Verify that the LUN is presented to the ESX Server. You may need to contact your array vendor for assistance. Verify that the LUN is in the same storage group as all the ESX Servers (if applicable to the array). Verify that the LUN is configured correctly for use with ESX Server. Note: Consult the appropriate SAN configuration guide for your array, listed below in the Additional information section. Verify that the LUN is not set to read-only on the array. IV Verify that the ESX host cannot see the datastore. Troubleshooting VMFS-3 datastore issues Symptoms LUN is visible but the datastore is not available in /vmfs/volumes Virtual machines fail to power on Running virtual machines may stop responding, fail, or generate a Blue Screen ESX Server host becomes disconnected from VirtualCenter The following warnings are displayed: WARNING: LVM: 4844: [vmhbaH:T:L:P] detected as a snapshot device. Disallowing access to the LUN since resignaturing is turned off. <Date> esx vmkernel: 10:19:07:07.881 cpu3: 10340 SCSI: 5637: status SCSI LUN is in snapshot state, rstatus 0xc0de00 for vmhba1:0:6. residual R 999, CR 8-, ER3. <Date> esx vmkernel: 10:19:07:07.881 cpu3: <world ID> SCSI 6624: Device vmhba1:0:6. is a deactivated snapshot. Purpose This article is designed to assist with troubleshooting issues where the VMFS-3 datastore does not mount. Resolution To identify the source of datastore issues: All The Best ☺ 71

72. Prepared By Sarathi Umakanthan 4.a Verify that the LUN is presented to ESX Server host. For more information, see Troubleshooting LUN connectivity issues (1003955) . 4.b Verify that the LUN is not being detected as a deactivated snapshot. For more information, see: 4.b.1 Cannot access LUN as it is marked as deactivated snapshot (1003641) . Cannot access LUN as it is marked as deactivated snapshot Symptoms If you are using a EMC CLARiiON storage array and your ESX host is rebooted, you may experience these symptoms: You cannot access LUNs The LUNs are marked as deactivated snapshots All affected LUNs show up in the multipath output: VMFS-3 datastores do not mount. RDM LUNs are inaccessible to the guest operating system they are presented to. They are reported as Unallocated in the computer management view. The following messages are found in the log /var/log/vmkernel for every LUN that is having the problem: In ESX 3.5: Aug 1 03:12:53 esx vmkernel: 10:19:07:07.881 cpu3:1034) SCSI: 8043: vmhba1:0:6:0 status = 2/0 0x5 0x25 0x1 Aug 1 03:12:53 esx vmkernel: 10:19:07:07.881 cpu3:1034) SCSI: 8120: vmhba1:0:6:0 is a deactivated snapshot. Aug 1 03:12:53 esx vmkernel: 10:19:07:07.881 cpu3:1034) WARNING: SCSI: 5637: status SCSI LUN is in snapshot state, rstatus 0xc0de00 for vmhba1:0:6. residual R 999, CR 80, ER 3 Aug 1 03:12:53 esx vmkernel: 10:19:07:07.881 cpu3:1034) SCSI: 6624: Device vmhba1:0:6 is a deactivated snapshot In ESX 4.0: Sep 24 05:05:07 system-name vmkernel: 0:00:01:25.953 cpu1:4097)NMP: nmp\_CompleteCommandForPath: Command <####> (0x4100070dfa40) to NMP device "naa.60060160d56e1b000e696c75b9a8de11" failed on physical path "vmhba1:C0:T0:L22" H:0x0 D:0x2 P:0x0 Valid sense data: 0x5 0x25 0x1. The option

LVM.DisallowSnapshotLun is set to 1 (the default). Changing it to 0 and performing a rescan does not return visibility to the content of the LUNs. For more information, see VMFS Volume Can Be Erroneously Recognized as a Snapshot (6482648) . The Navisphere manager reports that there are snapshots sessions of a source LUN in place and some of them are currently inactive. Those inactive sessions match the UUID of the missing data stores/RDMs. In ESX 3.5, you can find these at /proc/vmware/scsi/vmhba1/X:Y. In ESX 4.0, run this command: esxcfg-scsidevs -l 4.b.2LUN detected as a snapshot because LUN presentation settings were incorrect (1002351) . LUN detected as a snapshot because LUN presentation settings were incorrect Details Unable to see available datastores. All The Best  
© 72

73. Prepared By Sarathi Umakanthan Logs in /var/log/vmkwarning : LVM: 5670: Device vmhbaH:T:LP is a snapshot: LVM: 5676: disk ID: <type Y1, len Y2, lun Y3, devType Y4, scsi Y5, h(id) Y6> LVM: 5678: m/d disk ID: <type X1, len X2, lun X3, devType X4, scsi X5, h(id) X6> WARNING: LVM: 4844: [vmhbaH:T:LP] detected as a snapshot device. Disallowing access to the LUN since resignaturing is turned off. A rescan of the storage does not bring the missing data stores back. Solution The presentation settings for the LUN are incorrect for use with an ESX host. Consult the Setting Up SAN Storage Devices with ESX Server section of the SAN Configuration guide or contact your array vendor for the appropriate settings. A rescan after implementing the correct settings mounts the volume. A reboot is not required. As a workaround, you can set the LVM.DisallowSnapshotLUN to 0. A rescan after this will restore visibility to the data store. 4.c Verify that the data store is not being detected as a snapshot. For more information, see VMFS Volume Can Be Erroneously Recognized as a Snapshot (6482648) . VMFS Volume Can Be Erroneously Recognized as a Snapshot Details In some configurations, a VMFS-3 volume can be recognized as a snapshot even when it is not. The problem was tracked to the following scenario: Server A is presented LUNs 1, 2, and 3 The same LUNs are then presented to server B as LUNs 5, 6, and 7. When a VMFS-3 volume is created on LUNs 1, 2, and 3 via server A, rescanning the SAN from server B results in the latter complaining that volumes on LUNs 5, 6, and 7 are snapshots of those on LUNs 1, 2, and 3. The vmkernel logs on server B show: Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.787 cpu13:1046)LVM: 5670: Device vmhba1:0:5:1 is a snapshot: Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.787 cpu13:1046)LVM: 5676: disk ID: <type 2, len 22, lun 5, devType 0, scsi 5, h(id) 10179760818951437974> Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.787 cpu13:1046)LVM: 5678: m/d disk ID: <type 2, len 22, lun 1, devType 0, scsi 5, h(id) 10179760818951437974> Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.790 cpu13:1046)LVM: 5670: Device vmhba1:0:6:1 is a snapshot: Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.790 cpu13:1046)LVM: 5676: disk ID: <type 2, len 22, lun 6, devType 0, scsi 5, h(id) 11552037668126695191> Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.790 cpu13:1046)LVM: 5678: m/d disk ID: <type 2, len 22, lun 2, devType 0, scsi 5, h(id) 11552037668126695191> Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.794 cpu13:1046)LVM: 5670: Device vmhba1:0:7:1 is a snapshot: Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.794 cpu13:1046)LVM: 5676: disk ID: <type 2, len 22, lun 7, devType 0, scsi 5, h(id) 13372428508588014685> Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.794 cpu13:1046)LVM: 5678: m/d disk ID: <type 2, len 22, lun 3, devType 0, scsi 5, h(id) 13372428508588014685> If the Storage Processors are not configured as required for use with ESX Server (see corresponding vendor for detailed configuration documents), it can result in this behavior. Sample array misconfiguration that could result in this issue include: Symmetrix: All The Best © 73

74. Prepared By Sarathi Umakanthan LUNs presented to two FA ports as 1, 2, and 3 Same LUNs presented to two other FA ports as 5, 6, and 7 Server A is zoned to the first two FAs Server B is zoned to the second two FAs Clarion: ESX Server A is in Storage Group X ESX Server B is in Storage Group Z LUNs are assigned to Storage Group X as LUNs 1, 2, and 3 The same LUNs are assigned to Storage Group Z as LUNs 5, 6, and 7 Solution The LUNs presented to a set of servers must be presented with the same set of LUN numbers to all hosts. For the above sample configurations, do the following: Symmetrix: Present the LUNs to all FAs to use the same LUN numbers. Clarion: Use a single Storage Group and add to it all ESX host that will access the LUNs assigned to that Storage Group. This always presents the same HLU (Host Logical Unit) number to all hosts in the same Storage Group. Other Arrays: Use an equivalent process to maintain the same LUN numbers presented to all hosts that will share it. If this is not possible, see the SAN Configuration Guide for a solution. This solution is presented below for your convenience, with updates from August 9, 2006 that correct some issues in the original text. Issues with Offline VMFS Volumes on Certain Arrays On some arrays, it may not be possible to display the

LUN with the same LUN ID across hosts. As a result, the ESX Server system incorrectly detects the LUN as a snapshot and places it offline. Examples of storage arrays for which the same LUN ID may not be visible for a given LUN across hosts are Clariion AX100 and few IBM TotalStorage Enterprise Storage Systems (previously Shark Storage systems). Note: If you use Clariion AX100 with Navisphere Express, you cannot configure the same LUN ID across storage groups. You must instead use a version of Navisphere software that has more comprehensive management capabilities. For more information regarding Navisphere, please consult EMC support and documentation. For IBM TotalStorage 8000, you need to recreate these LUNS. For more information regarding IBM TotalStorage, please consult IBM support and documentation. To resolve issues with invisible LUNs on certain arrays: In VMware Infrastructure Client, select the host in the inventory. Click the Configuration tab and click Advanced Settings. Select LVM in the left panel and set LVM.DisallowSnapshotLUN to 0 in the right panel.

Warning: When LVM.DisallowSnapshotLUN is set to 0, no snapshot LUNs should be presented to the ESX host. Otherwise, data corruption may result. For details, see State 3 - EnableResignature=no, DisallowSnapshotLUN=no in the SAN Configuration Guide. Rescan all VMFS volumes. After the rescan, all VMFS volumes are available. Note: A ressignature may have occurred leaving certain ESX Server hosts believing that the LUN is now a snapshot. If you decide to perform a ressignature, plan a major outage window to do this. For more information, see Resignaturing VMFS3 Volumes That Are Not Snapshots (9453805) . Resignaturing VMFS3 volumes from VMware Infrastructure Client Details You recently changed the Host Mode setting on a Hitachi Data System (HDS) storage array VMFS3 volumes are seen as snapshot volumes Volumes are disabled or missing unexpectedly Datastores are missing after SAN upgrade Datastores are missing unexpectedly All The Best ☺ 74

75. Prepared By Sarathi Umakanthan You recently set the SPC-2 flag on the EMC Symmetrix storage array You recently downgraded the Perc 4e/Di firmware and local datastores are now missing /var/log/vmkernel contains the entry: vmhba0:0:0:1 may be snapshot You recently performed the steps contained in On ESX Server Systems with Multiple PERC 4 Controllers, LUNs Become Temporarily Inaccessible After Upgrading the PERC 4 Firmware (5966817) Solution Note: This article is for ESX 3.x hosts. If you have an ESX 4.x host, see ESX 4.x handling of LUNs detected as snapshot (1011387). ESX 4.x handling of LUNs detected as snapshot Purpose This article discusses differences with how ESX 4.x handles LUNs detected as a snapshot when compared to ESX 3.x. Resolution Prior to ESX 4.0 Historically, the EnableResignature and DisallowSnapshotLUN were applied server wide and applied to all volumes on an ESX. The new Resignature and Force-Mount are volume specific. This offers much greater granularity in the handling of snapshots. Changes in ESX 4.0 The handling of Snapshot LUNs has changed dramatically in ESX 4.x: Resignature is equivalent to EnableResignature = 1 in ESX 3.x. Force-Mount is equivalent to DisallowSnapshotLUN = 0 in ESX 3.x. The advanced configuration options EnableResignature and DisallowSnapshotLUN have been replaced in ESX 4 with a new CLI utility: ESX 4.x and ESXi 4.x: esxcfg-volume RCLI: vicfg-volume Mounting and resignaturing from the command line The esxcfg-volume command can be used in this way: Execute the following command to list the volumes that are detected as snapshots: # esxcfg-volume -l Execute the following command to mount the volume "Name" without performing a resignaturing of that volume (this volume will not be mounted when the ESX host is rebooted): # esxcfg-volume -m "Name" Execute the following command to mount the volume "Name" without performing a resignaturing of that volume (this volume will be mounted when the ESX host is rebooted): # esxcfg-volume -M "Name" Execute the following command to resignature the volume "Name" (the volume will be mounted immediately after the resignature): # esxcfg-volume -r "Name" Mounting and resignaturing using the vSphere Client It is no longer necessary to handle snapshots via the CLI. Resignature and Force-Mount operations have full GUI support and vCenter Server does VMFS rescans on all hosts after a resignature operation. This functionality is now built into the Add Storage wizard in vSphere Client. Through the GUI, the Add Storage Wizard now displays the VMFS label. Therefore, if a device is not mounted, but it has a label associated with it, you can make the assumption that it is a snapshot, or to use ESX 4.x terminology, a Volume Copy. If you use the GUI to force-mount a VMFS volume, it makes it a persistent mount which remains in place through reboots of the ESX host. vCenter Server does not allow this volume to be resignatured. All The Best ☺ 75

76. Prepared By Sarathi Umakanthan For more detailed information, see Managing Duplicate VMFS Datastores in the ESX Configuration Guide. Making this type of change on the storage array results in assigning a new LUN ID (UUID or Serial Number) to all LUNs presented via the modified ports/FAs.

VMFS3 metadata identifies the volumes by several properties which include the LUN number and the LUN ID (UUID or Serial Number). Because the LUNs now have new UUIDs, the resulting mismatch with the metadata leads to LVM identifying the volumes as snapshots. You must resignature the VMFS3 volumes to make them visible again. Important: If you do not have actual snapshot LUNs presented and have no plans to present any to these hosts, follow the directions in VMFS Volume Can Be Erroneously Recognized as a Snapshot (6482648), then skip to step 9 below. VMFS Volume Can Be Erroneously Recognized as a Snapshot Details In some configurations, a VMFS-3 volume can be recognized as a snapshot even when it is not. The problem was tracked to the following scenario: Server A is presented LUNs 1, 2, and 3 The same LUNs are then presented to server B as LUNs 5, 6, and 7. When a VMFS-3 volume is created on LUNs 1, 2, and 3 via server A, rescanning the SAN from server B results in the latter complaining that volumes on LUNs 5, 6, and 7 are snapshots of those on LUNs 1, 2, and 3. The vmkernel logs on server B show: Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.787 cpu13:1046)LVM: 5670: Device vmhba1:0:5:1 is a snapshot: Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.787 cpu13:1046)LVM: 5676: disk ID: <type 2, len 22, lun 5, devType 0, scsi 5, h(id) 10179760818951437974> Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.787 cpu13:1046)LVM: 5678: m/d disk ID: <type 2, len 22, lun 1, devType 0, scsi 5, h(id) 10179760818951437974> Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.790 cpu13:1046)LVM: 5670: Device vmhba1:0:6:1 is a snapshot: Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.790 cpu13:1046)LVM: 5676: disk ID: <type 2, len 22, lun 6, devType 0, scsi 5, h(id) 11552037668126695191> Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.790 cpu13:1046)LVM: 5678: m/d disk ID: <type 2, len 22, lun 2, devType 0, scsi 5, h(id) 11552037668126695191> Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.794 cpu13:1046)LVM: 5670: Device vmhba1:0:7:1 is a snapshot: Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.794 cpu13:1046)LVM: 5676: disk ID: <type 2, len 22, lun 7, devType 0, scsi 5, h(id) 13372428508588014685> Jul 18 10:58:31 ServerB vmkernel: 0:14:17:59.794 cpu13:1046)LVM: 5678: m/d disk ID: <type 2, len 22, lun 3, devType 0, scsi 5, h(id) 13372428508588014685> If the Storage Processors are not configured as required for use with ESX Server (see corresponding vendor for detailed configuration documents), it can result in this behavior. Sample array misconfiguration that could result in this issue include: Symmetrix: LUNs presented to two FA ports as 1, 2, and 3 Same LUNs presented to two other FA ports as 5, 6, and 7 Server A is zoned to the first two FAs Server B is zoned to the second two FAs Clariion: All The Best ☺

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77. Prepared By Sarathi Umakanthan ESX Server A is in Storage Group X ESX Server B is in Storage Group Z LUNs are assigned to Storage Group X as LUNs 1, 2, and 3 The same LUNs are assigned to Storage Group Z as LUNs 5, 6, and 7 If you have to resignature a datastore spanned across more than one LUN, you must make sure that all the LUNs that comprise the datastore are in a snapshot state. Failing to do so may result in getting the datastore locked into an inconsistent status, which may require VMware support assistance. To resignature the VMFS3 volumes in VMware Infrastructure (VI) Client: Note: You can complete this resignaturing procedure from the command line. For more information, see New ESX host(s) added to cluster are seeing snapshot LUNs despite correct Host LUN ID being presented from the SAN array (1005751). Resignaturing VMFS3 volumes from the command line Symptoms You recently changed the Host Mode setting on an HDS storage array VMFS3 volumes are seen as snapshot volumes Volumes are disabled or missing unexpectedly Datastores are missing unexpectedly You recently set the SPC-2 flag on the EMC Symmetrix storage array You recently downgraded the Perc 4e/Di firmware and local datastores are now missing /var/log/vmkernel contains the entry: vmhba0:0:0:1 may be snapshot You recently performed the steps contained in On ESX Server Systems with Multiple PERC 4 Controllers, LUNs Become Temporarily Inaccessible After Upgrading the PERC 4 Firmware (5966817) Resolution Making this type of change on the storage array results in assigning a new LUN ID (UUID or Serial Number) to all LUNs presented via the modified ports/FAs. VMFS3 metadata identifies the volumes by several properties which include the LUN number and the LUN ID (UUID or Serial Number). Because the LUNs now have new UUIDs, the resulting mismatch with the metadata leads to LVM identifying the volumes as snapshots. You must resignature the VMFS3 volumes to make them visible again. Caution: Before performing the steps in this article: Wait for a maintenance window Make sure all virtual machines are backed up properly Do not deviate from these steps. To resignature the VMFS3 volumes from the command line: Power off all virtual machines on all ESX hosts that are stored on the volume. Run the following command to re-read the volume on each ESX host: # vmkfstools -V If this works, the problem is resolved. If this does not work, proceed to step 3. Remove all of the same virtual machines from the inventory in the VirtualCenter server. Warning: Do

not delete the virtual machines from disk. Remove them from the inventory. Log in to each host. Run the following command to verify which HBAs are providing access to the LUN: # esxcfg-mpath -l | less All The Best ☺ 77

78. Prepared By Sarathi Umakanthan To set the ESX host to resignature all datastores detected as snapshots on the next rescan, run the following command: For ESX Classic: # echo "1" /proc/vmware/config/LVM/EnableResignature For ESXi: # esxcfg-advcfg -s 1 LVM/EnableResignature To rescan the storage and perform the resignature on volumes detected as a snapshot, run the command: # vmkfstools -V To disable the resignature flag, run the following command: Warning: Do not skip this step. For ESX Classic: # echo "0" /proc/vmware/config/LVM/EnableResignature For ESXi: # esxcfg-advcfg -s 0 LVM/EnableResignature To ensure that the volumes stay mounted after resignaturing is turned off, run the command: # vmkfstools -V Reinventory the virtual machines. Open VI Client to the VirtualCenter Server. The virtual machines show as inaccessible. Right-click on the virtual machine and click Remove From Inventory. Double-click the datastore to bring up the datastore browser. Select the folder in which the virtual machines resides. Right-click the virtual machine file (extension .vmx) or template file (extension .vmtn) Click Add to Inventory. Follow the wizard. Caution: This procedure can be time-consuming, depending on the size of the environment. Ensure that you budget time for the outage. Shut down all virtual machines running on the datastores recognized as snapshots. Note: This step is necessary because those datastores are affected by the resignaturing process and it cannot be applied to a datastore that is being used (that is, with active I/O). Unregister all of the virtual machines on the affected datastore(s). This can be done from VI Client by right-clicking on the virtual machine and selecting Remove from Inventory. Rescan. Note: The /var/log/vmkernel file contains snapshot messages. Enable LVM Resignaturing on the first ESX host: Log in to the ESX host with VI Client. Click the Configuration tab. Select the Advanced setting option. Choose the LVM section. Set the value of LVM.EnableResignaturing to 1. Save the change. Click the storage adapter tab. All The Best ☺ 78

79. Prepared By Sarathi Umakanthan Click Rescan Adapter located at the top right corner of the interface. Note: There is no need to select an HBA. All are rescanned. Leave the default option and proceed. You are now able to see the VMFS volumes with labels prefixed with snap. Disable LVM Resignaturing: Log on to the ESX host with VI client. Click the Configuration tab. Select the Advanced setting option. Choose the LVM section. Set the value of LVM.EnableResignaturing to 0. Save the change. No snapshot messages are visible in /var/log/vmkernel. Re-label the volume. Log in to the VirtualCenter Server with VI Client. Note: Connecting directly to the ESX host does not offer the view identified in step b. Click the arrow next to the Inventory menu option and click Datastores. Select the datastore. Right-click and select Remove to remove the old label, which is associated with the old UUID of the volume. Caution: Ensure that you are removing the correct Datastore entry. In the Datastore view the number of connected hosts should be 0 (identified in the red outline) indicating that the Datastore is not being used by a host or virtual machine. For example: In this example, the highlighted datastore has 6 ESX hosts connected to it. This datastore is active and must not be removed. Perform a remove process in any other view to remove that active datastore. Click the arrow next to the Inventory menu option and click Hosts & Clusters. In the Summary tab, you see the list of datastores. All The Best ☺ 79

80. Prepared By Sarathi Umakanthan Click in the name field for the volume and change snap0000 to the original name. You now have the correct original label associated with the resignatured volume. Rescan storage from all ESX hosts. You do not need to rescan from the host that performed the resignature. Because the virtual machines are registered against the old UUID, you must re-register them in VirtualCenter. To re-register the virtual machine in VirtualCenter: Log on to the ESX host with VI client. Click the Configuration tab. Select Storage (SCSI, SAN & NFS). Double-click any of the datastores to open the Datastore browser. Navigate to the .vmx file of any of the virtual machines by clicking the folders. Right-click and select Add to inventory. Remap any RDMs. If you have a virtual machine that uses an RDM, you must recreate the mapping. Caution: If you used multiple RDMs, it may be difficult to identify one from another. If the RDMs are different sizes, you can map them in the correct order by their sizes. If the RDMs are all the same size, this is a more difficult process because you must map the RDMs to one virtual machine at a time, boot the virtual machine, and then verify if it is the correct LUN. To prevent having to map the RDMs to one virtual machine at a time: Make a note of the sizes of the RDMs and which virtual machines they are associated with before starting this process. Make a note of the LUN ID before starting this process. You might be able to use this information to recreate the

mapping. Power on the virtual machines. Reply yes if prompted about a new UUID. If any of the virtual machines refer to missing disks when they power up, check the .vmx file and ensure that the SCSI disk references are not made against the old UUID instead of against the label (or new label, if you changed it). For more information, see Unable to power on a virtual machine after a volume resignature (1007022).

Unable to power on a virtual machine after a volume resignature Symptoms Some virtual machines fail to boot after Virtual machines stored on a datastore that was not ressignatured fail to boot

Resolution The disks for the virtual machines are stored on different datastores than the datastore for the virtual machine itself. While the VMFS where the virtual machine is stored has not been ressignatured, the VMFS where the disks are stored has been ressignatured. This mean the virtual machine still references the old VMFS UUID to access the disk.

To ensure the virtual machine references the new VMFS UUID: Unregister the virtual machine from VirtualCenter. Open a console session to the ESX host. Make a

backup copy of the VMX file. Update the path to the VMDK with the new UUID in the VMX file.

Register the virtual machine in VirtualCenter. Power on the virtual machine. Warning: While it is possible to reconfigure the disk from the graphical interface, it presents only the base disk and not the delta file if the virtual machine has a snapshot. Thus it boots from the base disk and corrupts the snapshot chain. All The Best ☺ 80

81. Prepared By Sarathi Umakanthan Repeat steps 3 through 9 for all subsequent ESX hosts that still see snapshot volumes. If all ESX hosts share the same volumes, this step is not necessary. 4.D Verify that the LUN is not larger than 2Tb/2047Gb. This could occur if a LUN was extended. For more information, see Troubleshooting a LUN that was extended in size past the 2Tb/2047Gb limit (1004230) .

Troubleshooting a LUN that is extended in size past the 2TB/2047GB limit Symptoms Cannot create VMFS-3 datastore. Existing VMFS-3 datastore unmounted and no longer mounts. Guest operating system cannot access an RDM. Resolution An ESX Server host is limited to a maximum LUN size of 2047GB. This applies to all LUNs being presented to an ESX Server host (VMFS and RDM). Any capacity larger than the limit is not handled. The LUN is not presented as a choice for a data store in the Virtual Infrastructure Client. Attempting to format the LUN from the command line generates an error. A VMFS-3 data store on a LUN that has been extended past the limit is unmounted. All content on that data store is inaccessible. Recovery: Shrink the LUN back to its original size (if possible). Perform a block copy of the old LUN to a new LUN that is within the size limit. Destroy the LUN entirely and recreate the LUN within the limit and restore from back. 4.E Verify that the LUN is not being masked by the ESX Server. For more information, see LUN masking with ESX Server 3 (1004044) . Identifying LUNs masked by ESX 3.x Symptoms Cannot see a presented LUN. The LUN is not visible. Resolution To identify LUNs that are masked by an ESX host: Log in to the Virtual Infrastructure Client. Select the ESX Server. Click the Configuration tab. Click Advanced Settings. All The Best ☺ 81

82. Prepared By Sarathi Umakanthan Click Disk and scroll to Disk.MaskLUNs. If Disk.MaskLUNs is not blank, this can account for missing LUNs. Removing all text from that field and clicking OK removes all LUN masking from the ESX Server host side. This does not affect LUN masking implemented on the array. 4.f Verify that write caching is not disabled on the array. This is verified using the storage array management interface. Consult your storage array vendor if you require assistance. Also, see: Write-cache disabled on storage array causing performance issues or failures (1002282) . Write-cache disabled on storage array causing performance issues or failures Details Poor disk I/O performance to the storage array, causing very slow or even failure of: Template deployments Cold migrations VMotion VMware Consolidated Backup All The Best ☺ 82

83. Prepared By Sarathi Umakanthan In the case where the ESX environment is large, write caching suddenly becoming disabled can result in a performance degradation makes communication to the LUNs impossible. If this occurs, you may experience these symptoms: Virtual machines fail or stop responding. VMFS datastores go off-line with the following error message in the logs: Lost heartbeat Solution Write caching must always be enabled. It is always recommended to have a battery backup connected to ensure that write caching does not become disabled. On many arrays, write caching is automatically turned off when the battery backup is disconnected, fails, or if one of the redundant power supplies disconnects or fails. 4.g Verify that the partition type for the VMFS-3 partition is set to FB. For more information, see Partition showing up as type 42 or SFS after being connected to the VCB proxy server (1002168) . ESX cannot access VMFS datastore after the VMware Consolidated Backup proxy server is connected to the VMFS volume Details Unable to access the VMFS datastore. The partition is not set to

type fb. Affected volumes are showing up with a partition type of 42 (SFS). Verify this by running fdisk -l from the service console. Error message in the log /var/log/vmkernel: Aug 22 15:55:44 esx01 vmkernel: 145:20:59:19.562 cpu1:1037)WARNING: SCSI: 6693: Partition vmhba3:0:12:1 is active: partition table was not updated Solution The Consolidated Backup proxy server is the only Windows server that can see the VMFS volumes. When the automatic drive letter assignment function (automount) is enabled within diskpart on the VMware Consolidated Backup (VCB) proxy (default setting), the Windows diskpart initializes the volume on discovery and autoassigns a driveletter to the volume which results in the change of the partition type to 42 (SFS) and ESX losing access to the datastore volume. To setup VCB properly, see Virtual Machine Backup Guide. After the VCB proxy configuration is corrected, log in to the ESX console and double-check which volumes are affected. This example shows how the partition looks after being connected to VCB proxy where diskpart autoassigned the drive letter and changed the partition type to 42 (SFS): [root@localhost root]# fdisk -lu To correct this issue, change the partition type back to fb on all the LUNs that are supposed to be VMFS datastores. Warning: The following step must be performed only after creating backups as the result might lead to complete data loss. All The Best ☺ 83

84. Prepared By Sarathi Umakanthan After this change, perform a rescan. [root@localhost root]# esxcfg-rescan vmhba1 If the volume does not appear as VMFS datastore on the ESX, you may need to align the partition start to the block 128 as this is the default when ESX does create partitions and this is another aspect that Windows does change when initializing the discovered volume. To set the starting sector to 128 instead of 63 (the default) on the ESX host. First to confirm that the current Start is 63 This is how the actual change from 63 to 128 is performed. All The Best ☺ 84

85. Prepared By Sarathi Umakanthan This is the result after successfully changed. Rescan at this point and the volume appears on the ESX as VMFS datastore. [root@localhost root]# esxcfg-rescan vmhba1 Additional Information Troubleshooting flow chart: All The Best ☺ 85

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