Understanding Virtual Infrastructure Upgrade Moving to the new (ESX 3.0/Virtual Center 2.0) release...

Dan Anderson Senior Consultant



### Agenda

- Upgrade Phases
- Before you begin
- Stepping through the "Phases"

- Risk Mitigation
- > Licensing
- > Virtual Center
- ESX server
- > VMFS
- > Virtual Machines

#### **Upgrade Phases**

Regardless of the specific procedures used, one factor will remain constant throughout the process, and that factor is "*Order of Precedence*". Each "Major" component can be attributed to a *phase,* within each phase the steps may change however, the "order of precedence" for each phase will <u>ALWAYS</u> be as follows:

>PHASE 1: Virtual Center, the associated Database, and Virtual Center Client





>PHASE 3: VMFS File system (SAN and/or Local)



>PHASE 4: Virtual Machine "hardware" and VMware Tools



### Before you begin

- Understand the upgrade process
  - Read the manual
  - Create an upgrade plan
  - RE-READ THE MANUAL
  - Perform upgrade based on step YOUR PLAN
    - Virtual Center
    - ESX Server
    - VMFS
    - Virtual Machines





#### Before you begin

- Think about "Potential" Backout Strategies (should be in your upgrade plan)
- Virtual Center
  - Re-Install original version of Virtualcenter
  - Restore Database, requires full backup of VC Database
- ESX Server
  - Re-Install original version of ESX Server
  - Restore Service Console, and files from local VMFS, Requires: Full backup Service Console, and local VMFS
- VMFS (Assume re-install of ESX 2.X and reformat to VMFS-2)
  - A) Backup VMs (OS Level w/Agent), requires recreation of VMX/VMDK
  - B) Clone / copy VM to alternate datastore (including vmx), revert to original
- VM
  - Clone VM, revert to original

### Stepping through the "Phases"

#### Risk Mitigation

- License Server
- Virtual Center
- ESX server
- Bring up Virtual Center 2.0
- VMFS
- Virtual Machines



### **Risk Mitigation**

- Protect yourselves !
- Make sure you have a backup of:
  - > VMX files
  - > VMDK files
  - > VC database
  - Virtual switch configuration (vlan's)



### Understanding upgrade dependencies

Component (Phase)	Upgrade dependencies	VM Downtime?	Caveats
Virtual Center, the associated Database, and Virtual Center Client Virtual Center 1.x Database	Virtual Center Database Virtual Infrastructure Client	NO	During the Upgrade of Virtual Center the Virtual Machines will continue to operate however, no DATA will be collected, and centralized management of the ESX servers (and their associated Virtual Machines) will be unavailable.
ESX Server binaries, Console OS and Local File system	Virtual Infrastructure Client	PROBABLE	All Virtual Machines associated with the ESX server will either DOWN or migrated off of the platform. Once upgraded, ESX 3.0 will have READ-ONLY access to the VMFS-2 Volumes for this reason ESX and VMFS Upgrades are "coupled" together.
VMFS File system (SAN and/or Local) SAN LUN LOCAL VMFS-2 VMFS-2	ESX Server 3.0	YES	All Virtual Machines associated with the VMFS volume will either DOWN or migrated off of the volume (Requiring downtime). Once upgraded, ESX 2.X will be UNABLE to access the VMFS-3 Volumes, for this reason ESX and VMFS Upgrades are "coupled" together.
Virtual Machine "hardware" , VMware Tools	Virtual Center Virtual Infrastructure Client ESX Server 3.0 VMFS-3	YES	Virtual Machines must be offline to upgrade from VM2 - VM3, VMware Tools can be done at the same time (Via Script). At a minimum a Reboot of the VM will be required. <u>Note:</u> VM2 Version VMs CAN run within ESX3.0

### Stepping through the "Phases"

- Risk Mitigation
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#### **License server**



- License server can be installed in a VM
- License server "Should" be installed on the VC server
- Served vs. Un-Served

### **Stepping through the "Phases"**

- Risk Mitigation
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### **Upgrading VC Server**

#### **Upgrade compatibility**

#### Current VC Version

#### Upgrade Support to VC2.0

VirtualCenter beta release (any)	
VirtualCenter release 1.0	
VirtualCenter release 1.1	
VirtualCenter release 1.2	
VirtualCenter release 1.3	
VirtualCenter release 1.4	

\*The database is not preserved unless you first upgrade to at least VirtualCenter version 1.2.

### **Upgrading VC server**



### Stepping through the "Phases"

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Upgrade compatibility

#### ESX Server Version

#### Is the Upgrade Supported?

ESX Server beta release (any) ESX Server release 1.x ESX Server version 2 ESX Server version 2.1 ESX Server version 2.1.1 ESX Server version 2.1.2 ESX Server version 2.1.3 ESX Server version 2.5 ESX Server version 2.5.1 ESX Server version 2.5.2 ESX Server version 2.5.3 ESX Server version 2.5.3

No upgrade support No upgrade support No upgrade support No upgrade support Yes Yes No upgrade support Yes Yes Yes Yes only support for 3.0.x products

Insert ESX 3.0 CD and Boot (or reboot Server) ensure boot from CD-Rom is enabled:





Installation process starts...



#### Drivers are loaded...

Melcome to UMware ESX Server 3
Loading block driver
Loading ipicad_rxx driver
<tab>/<alt-tab> between elements   <space> selects   <f12> next screen</f12></space></alt-tab></tab>

 Graphical installer starts (Unless text mode install selected)...



#### Keyboard selection...

#### ESX Server 3

Select Keyboard What type of keyboard do you want to use for this system?

Keyboard					*
Russian (win)					
Slovakian					
Slovenian					
Spanish					
Speakup					
Speakup (laptop)					
Swedish					
Swiss French					
Swiss French (latin1)					
Swiss German					
Swiss German (latin1)					
Turkish					
Ukrainian					
United Kingdom					×
U.S. English					
U.S. International					*
	 	[		_	
	<u>B</u> ack		Next	×	<u>C</u> ancel

More next clicking...

ESX Se	erver 3			
	Mouse Configuration Select the appropriate mouse for the system.			
Model				<b>^</b>
ATI Bus	5 Mouse			
2 Butto	ton Mouse (PS/2)			
2 Butto	ton Mouse (serial)			
2 Butto	ton Mouse (USB)			
3 Butto	ton Mouse (PS/2)			
3 Butto	ton Mouse (serial)			
3 Butto	ton Mouse (USB)			
wheel	Mouse (PS/2)			
Vineer Genius	a worze (O2R)			*
<u>S</u> erial Mous	ise Port			
/dev/ttyS0 (	) (COM1 under DOS)			
/dev/ttyS1 (	(COM2 under DOS)			
/dev/ttyS2 (	(COM3 under DOS)			
/dev/ttyS3 (	(COM4 under DOS)			
□ <u>E</u> mulate	e 3 buttons			
	4	<u>B</u> ack	▶ <u>N</u> ∰t	🔀 <u>C</u> ancel

 After the installer searches for previous version, select "Upgrade" and continue...

SX Ser	ver 3		
	Select Installation Type What type of Installation do you want to do?		
	Upgrade Upgrade an ESX Server 2.1 or later to ESX Server 3, preserving existing configurations.		
	Install This option installs ESX Server 3. Use this option if you would like to do a fresh installation.		
		<u>B</u> ack	X <u>C</u> ancel

#### Accept EULA...

#### ESX Server 3



#### End User License Agreement

To continue with the installation, please read and accept the end user license agreement.

(b) Assignment. Licensee shall not assign this Agreement or any rights or obligations hereunder, directly or indirectly, by operation of law, merger, acquisition of stock or assets, or otherwise, without the prior written consent of VMware. Subject to the foregoing, this Agreement shall inure to the benefit of and be binding upon the parties and their respective successors and permitted assigns.

(c) Export Regulations. Licensee understands that VMware is subject to regulation by the U.S. government and its agencies, which prohibit export or diversion of certain technical products and information to certain countries and individuals. Licensee warrants that it will comply in all respects with all export and re-export restrictions applicable to the technology and documentation provided hereunder.

(d) Modification. This is the entire agreement between the parties relating to the subject matter hereof and all other terms are rejected. No waiver or modification of this Agreement shall be valid unless in writing signed by each party. The waiver of a breach of any term hereof shall in no way be construed as a waiver of any term or other breach hereof. If any provision of this Agreement is held by a court of competent jurisdiction to be contrary to law the remaining provisions of this Agreement shall remain in full force and effect.

B. CONTACT INFORMATION. If you have any questions about this Software Beta Test Agreement, or if you want to contact VMware for any reason, please direct all correspondence to: VMware, Inc., 3145 Porter Drive, Building F, Palo Alto, CA 94304, United States of America or email info@vmware.com.

Back

X <u>C</u>ancel

Next

VMware is a trademark of VMware, Inc.

☑ accept the terms of the license agreement

#### ENSURE the correct drive is selected for installation...

ESX Server 3	
Advanced Options These advanced options usually do not need to be changed.	
ESX Boot Specification How will the ESX Server boot?	
● From a drive (install on the MBR of the drive): SCSI Disk cciss/c0d0: Compaq Smart Array - 69460 MB	
This is the standard option. Make sure your BIOS settings are correct for the drive you select.	
○ From a partition	
Use this option, for example, if you are using a Boot Menu tool, or if you have the option to run special diagnostic software that runs in a separate partition.	
Boot Options	
If you wish to add default options to boot up, enter them here:	
General kernel parameters:	
Force LBA32 (not normally required)	
•	
A Back Next	<u>C</u> ancel

Settings review, confirm and continue...

n	About to Upgrade					
	The wizard is ready to upgrade the VMware E installation options.	SX Server. Ple	ase review	the summa	y of your selected	
ummary:						
Language English	2.					
Keyboar	4					
U.S. Er	glish					
Mouse:						
Generic	- 3 Button Mouse (PS/2)	I				
Installatio Upgrade	on Type: e VMware ESX Server on cciss/c0d0p2					
Boot Loa	der Record					
Master	Boot Record of cciss/c0d0					

#### Installation...

ESX Server 3
<ul> <li>Installing Packages</li> <li>Please wait while the installation wizard installs VMware ESX Server 3. This may take a few minutes.</li> </ul>
Status: Installing
To stop the installation, click Cancel
因
🚽 <u>B</u> ack Next 🔀 Cancel

### Stepping through the "Phases"

- Risk Mitigation
- License Server
- Virtual Center
- ESX server
- Connect to Virtual Center 2.0
- VMFS
- Virtual Machines



### **The VI client**

<b>vm</b> ware:	0	<pre>P</pre>
irtual Infra	structure Clien	t Ur
<u>S</u> erver:	10.0.1.40	-
<u>U</u> sername:	vc\Administrator	
<u>P</u> assword:	****	
	Log In	Close



- Make a connection to your fresh upgraded VC server
- Or directly to the ESX server itself. (VI client)
- You can manage ESX 2.x servers in VC 2.0

### **Stepping through the "Phases"**

- Risk Mitigation
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#### Stepping through the "Phases"

- Backup THIS IS FILE SYSTEM UPGRADE!!
  - Backup VM's (OS Level w/Agent), will require recreation of VMX and VMDK
  - Clone VM to alternate Datastore, revert to original
- Possible "Backout" Strategy
  - See Above
  - (<u>REQUIRES</u> re-installation of ESX 2.X and reformat to VMFS-2)

#### Things to know about upgrading to VMFS-3

- ALL Virtual machine related files are stored within VMFS-3 on the SAN (Local VMFS-3 if no SAN is present)
- Change from global .vswp file to VM specific .vswp file.
  - In ESX 2.5.x the .vswp file is configured per ESX host, and is stored on the "Local VMFS" partition.
  - In ESX3 each VM will have its own VM specific ".vswp" file, which is based on the amount of memory assigned to that VM.
  - All files relevant to the VM are now stored on the VMFS-3 partition (SAN or Local depending on your environment), this includes the ".vswp" file.
  - ".vswp" file size is configurable, however, the default is to match the VM's assigned physical memory.
  - When the VM is initially powered on, if there is no ".vswp" file present, ESX3 will create one based on the amount of assigned memory to that VM.
    - For example: If a VM has 512M of RAM assigned to it, ESX3 will create a 512MB VSWP file within the VM's directory on VMFS3.
  - This could have a potential impact on available storage space within your VMFS-3 partition.
    - E.g.: 30 VM's, each with 1Gb RAM = 30GB of VSWP !

Attach VI Client directly to ESX Host...(VM's are assumed to be off, if not shut them down)



🚱 192.168.1.177 - Virtual Infrastru	ucture Client		Select Configuration tab, click on Storage
File Edit View Inventory Administ	tration Help		(Hardware Section).
Inventory Admin		ter and the second s	
(† †) 🗗 😂			
esx01.dan-anderson.net  W2K3_Ent_VM01  W2K3_Ent_VM03	esx01.dan-anderson.net VMware ESX Server, 3.0.0, 23447 Summary Virtual Machines Resource Allocation Performance	Configuration Users & Groups Events Permissions Maps	
	General	Resources	
	Manufacturer:     Compaq       Model:     ProLiant DL380 G2       Processors:     2 CPU x 1.396 GHz       Processor Type:     Intel(R) Pentium(R) III CPU family       Hyperthreading:     Inactive       Number of Nics:     4	CPU usage: 11 MHz 2 x 1.396 GHz Memory usage: 0 B 2 GB	
	State: connected	Balastore         Capacity         Pree           Image: WMFS_ESX01         13.25 GB         12.64 GB	Hardware
	Virtual Machines: 2 VMotion Enabled: N/A Active Tasks: Commands Mew Virtual Machine Virtual Machine Virtual Machine	Network       O     Private01       O     Production01	Processors Memory Storage (SCSI, SAN, and NFS) Networking
	1 Enter Maintenance Mode		Storage Adapters
	<ul> <li>Reboot</li> <li>Shutdown</li> </ul>		Network Adapters
Recent Tasks	1	×	
Name Targel	t Status	Reason 🗢 Time	
🖉 Tasks		li.	





 There is no progress bar displayed, to see activity go to the ESX Host's console and watch the VMkernel logs (ALT-F12)

Recent Tasks										
Name		Target	Status	Reason	▽ Tin	ne				
Upgrade VMFS		🗐 esx01.dan-ande.	🕑 🛛 In Progress	Administrator	r 4/22/2006 2:00:54 P	PM				
Enter Maintenance Mod	le (	📮 esx01.dan-ande.	🕑 🛛 In Progress	Administrator	r 4/22/2006 2:00:35 F	PM				
🖉 Tasks 🕑 2 💇	Alarms								Showing a	all entries
	,								, <u> </u>	
					_					
					Complete					
-	_									
5	torage						Rem	ove	Add Storage	
Г	Identification	Dev	ice	Capacity	Free	Туре				
	😭 VMES ESX01	(Rea vmb	ba0:0:0:6	13.42 GB	11.17 GB	vmfs3				
	ee	. (		10112 00						
I										
I										
I										

Upgrade time depends on : ??

### **Stepping through the "Phases"**

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#### **Restore VMX files and reregister**

This is only needed for customers that :

- Installed ESX server 3.x from scratch (Parallel install without Migration)
- > Do not have virtual center
- Used a block level copy at the SAN layer
- Move your .vmx files onto the ESX 3.0 server, and use :
  - vmware-cmd –s register <vmx-path>

- How can we upgrade our VM's ?
  - > Upgrading VMware Tools in Mass
    - From the VI client out
    - From the VC server (command line)
  - Limitations
    - Only virtual machines managed by VirtualCenter 2 can be upgraded.
    - Mass upgrades are available for only Microsoft Windows 2000 and above.
      - Windows NT is not supported.
    - The virtual disk must be on a VMFS-3 volume.
    - Virtual machines must be powered off.
    - The mass upgrade command-line tool is installed as part of the VirtualCenter version 2 installation, on Microsoft Windows.
    - No REDO log files exist
    - No suspend files exist.

- RelocateVMs files
  - The relocation of the VMX files can be found when you right-click the VM and you choose Migrate.

#### 🖁 Migrate Virtual Machine Wizard

#### Select Datastore

Select the destination datastore for this virtual machine migration.

#### Select Destination

Select Resource Pool

Select Datastore

Ready to Complete

- Keep virtual machine configuration files and virtual disks in their current locations
- O Move virtual machine configuration files and virtual disks

#### Bulk Select – and Upgrade

Name	State	Status	% CPU	% Memory	Notes
W2K3_VMLab01	Powered off	000	0	0	
VMIab_XPSP2_01	Powered off	000	0	0	
🔂 W2K3_VMLab03	Powered off	000	0 (	0	
MLab02	Powered off	000	0	0	
🔂 LabVM01	Powered off	000	0	0	
🖞 Windows_XPSP2_02	Powered off	000	0	0 []]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]	
W2K3_DNS	Powered off	000	0	0	

#### Upgrade VMs from VM-2 to VM-3

\_ 🗆 ×

Power On	Ctrl+B		
Power Off	Ctrl+E		
Suspend	Ctrl+Z		
<u>R</u> eset	Ctrl+R		
Shut Down Guest			
Restart Guest			
Upgrade Virtual Hardware	$\supset$		
Snapshot			
Open Console			
Send Ctrl+Alt+Del			
Answer <u>Q</u> uestion			
Report Performance			
Install VM <u>w</u> are Tools			
Edit Settings			
Rena <u>m</u> e			
Remo <u>v</u> e from Inventory			
Delete from Disk			

Bulk Select – and Upgrade (Cont)

Name	Target	Status	Reason	Time
Upgrade Virtual Hardware	🔁 W2K3_DNS	Completed	root	2/7/2006 5:41:54 AM
Upgrade Virtual Hardware	MLab02	0%	root	2/7/2006 5:41:53 AM
Upgrade Virtual Hardware	LabVM01	0%	root	2/7/2006 5:41:53 AM
Upgrade Virtual Hardware	Windows_XPSP	0%	root	2/7/2006 5:41:53 AM
Upgrade Virtual Hardware	W2K3_VMLab01	Completed	root	2/7/2006 5:41:52 AM
Upgrade Virtual Hardware	VMlab_XP5P2_01	0%	root	2/7/2006 5:41:52 AM
Upgrade Virtual Hardware	W2K3_VMLab03	0%	root	2/7/2006 5:41:52 AM
Search Datastore	A ha-datacenter	Completed	root	2/7/2006 5:40:20 AM
Search Datastore	a-datacenter	Completed	root	2/7/2006 5:40:11 AM
Search Datastore	a-datacenter	Completed	root	2/7/2006 5:40:05 AM



- Open the Command Prompt.
  - Start > Programs > Accessories > Command Prompt
- Type the command with your desired options. And use the following command syntax:
  - vmware-vmupgrade.exe -u user [-p password] [-n vmname] [-h host] [-m maxpowerons] [-s] [-q]

- Due to the scope and nature of upgrading DOWNTIME of each component WILL occur.
- How long will depend on several factors that are specific to each customer's environment, which may include but are not limited to:
  - Environment Type
    - For most customers this will ultimately be the deciding factor when making an upgrade path decision.
  - > Availability of new or existing resources
    - Hardware SAN storage, Servers
    - Personnel
  - Change Control
    - Policies, Scheduling
    - Business impact to production ESX Servers and associated VM's
  - Risk Mitigation Strategy used
    - Backups, Revert Procedures etc.

# Local Disk, in-place upgrade



### Local Disk, in-place upgrade

- 4) Upgrade ESX2 -> ESX3.
- 5) In-place upgrade of VMFS2 -> VMFS3
- Relocate all VM's VMX files from ext3 datastore to VMFS datastore.
- 7) Upgrade VM2 to VM3 and tools2 to tools3.
- 8) Power-On VM's

Repeat for remaining Host(s)











**Upgrade Process:** 



• VMotion can't move your vmdk files around

• VMotion between ESX 2.x and ESX 3.x will be supported in future versions of ESX 3.x (not in 3.0)

- 3) Upgrade ESX2 to ESX3 on the previously evacuated system.
- Attach ESX3 host to a NEW VMFS-3 volume of equal or greater size than the volume that will be upgraded



5) Power off VM (or VM's) in preparation for "Cold Migration"

(This can be done on a VM by VM Basis, the diagram shows multiple VMs at one time, however, to more finely control downtime of each VM, a single VM approach should be used.)

 6) Cold Migrate (relocate) VM (or VM's) from ESX2 to ESX3 host. (VMDK file + VMX file are copied over the network)







additional VM's

Repeat steps 3-4 once an ESX2 Host has been cleared of running VM's



- Downside of doing this :
  - Must have necessary storage capacity (2x the base storage)

**VMWORLD** 2006

Cold migration is slow

# Thank You...



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