

How To Add a New VMware ESX Server 2.5 to Your Production Environment

Paco Abal

Systems Administrator

San Sebastian Town Council

SPAIN



VMWORLD 2006

Introduction

- Topics discussed in this presentation are:
 - **Upgrading** to the most up to date patch level
 - Automatic host time **synchronization**
 - **Vmkusage**. Utility to monitor server performance
 - **Vmbk.pl** backup program (installing, configuring, scheduling, restoring)
 - **Ethernet redundancy** for service console and virtual machines

- Tools and pre-requisites to fully configure ESX Server 2.5:
 - Putty
 - WinSCP
 - Direct access to ESX Server console

- Appendix 1 to 4 include the exact syntax for all the topics.

a) Upgrading To The Most Up To Date Patch Level

- Main reasons to upgrade your ESX server are:
 - **Bugs get corrected**, so you avoid unpredictable errors.
 - **New drivers for new O.S**, mainly for Linux versions.
 - **Support for new hardware**, for instance dual-core processors.

- **Appendix 1** shows the steps to upgrade from ESX Server 2.5.2 to 2.5.2. patch 4.

- Check specific instructions for other update patches.

b) Automatic Host Time Synchronization

- There are at least three reasons to keep time in your ESX server:
 - Virtual machines can synchronize with ESX server clock.
 - Your scheduled jobs, including backups, start as expected.
 - Your log entries are synchronized which helps audit process.

- **Appendix 2** shows the exact syntax of the commands

- Phases of this task are:
 - Configuring the ntp service
 - Configuring the local zone
 - Setting up a programmed task to re-synchronize from time to time

c) Installing Utilities To Monitor Server Performance (I)

- **Vmkusage** is the monitor package that comes with ESX server. It shows graphics in a daily, weekly and monthly basis of the most important parts of your server: CPU, memory, network, disk ... It offers overall performance results of the whole ESX server and individual virtual machines running on it.
- **To install vmkusage:**
 - 1) Connect to the ESX server using **Putty** program and login as **root**.
 - 2) Type: **vmkusagectl install**
- To view all the statistics of your ESX server just connect to the following URL: <https://your-ESX-host/vmkusage>

c) Installing Utilities To Monitor Server Performance (II)

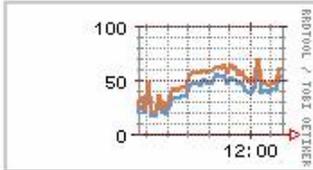
VMware ESX Server vmb11 @ 2006-09-12 13:40:00 vmkusage-v2.5.2v1
 [ESX MUI] Time Horizon: [Recent] [Daily] [Weekly] [Monthly] Viewpoints: [Storage] [Network] [Summary Report] [Text Report]

System Overview

2 Running Virtual Machines

VM		CPU					Memory				Network			Storage
WID	Name	VCPUs	Shares	Aff	Uptime	Used	Size	Target	Shared	Active	NICs	Pkts	Bytes	HBA
143	NOTESREAL2	2	2000	0,1,2,3	47d20h20m44s	27d18h18m51s	2.9G	2.9G	138M	1020M	2	2.3G	1.9T	2
168	SRVDESAPRULINUX	2	2000	0,1,2,3	4d4h40m38s	5h18m40s	596M	2.0G	62M	40M	1	17M	1.1G	1

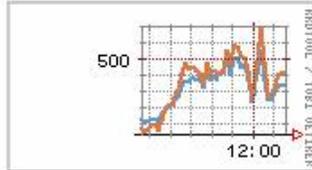
CPU System



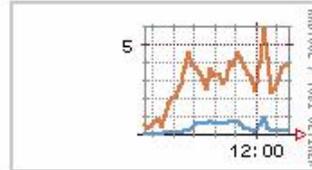
Memory



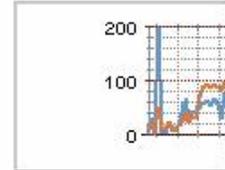
Net Pkts



Net Mb



Disk Ops



VM Resources

CPUs	HT	Mem	Free	VMkernel	NICs	HBAs
2	Y	7.6G	4.0G	19M	4	3

VMNIC Configuration

NIC	State	Config
vmnic0	Up	100 Mbps, full duplex
vmnic1	Down	
vmnic2	Down	
vmnic3	Up	100 Mbps, full duplex

VMFS Usage

Volume	Name	Size	Free
vmhba0:0:0:6	Local	132G	116G

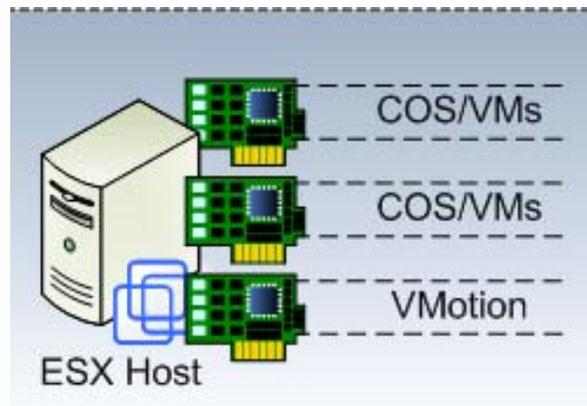
Fig. 2: View of vmkusage

d) vmbk.pl Backup Program for ESX Server 2.5

- Vmbk.pl has some **good features** for a backup program:
 - It works for Windows or Linux virtual machines
 - Every newly created virtual machine is backed up by default
 - It backs up virtual machines powered on or off
 - Backups can be stored on remote FTP servers or Windows shared folders
 - It is a free backup solution based on standard vmsnap and vmres utilities
- On the other hand, vmbk.pl still has **some limitations**:
 - Slow speed. Not suitable for virtual machines with big disks
 - No incremental backups
- Another programs to do backup of ESX servers are:
 - **ESX ranger** from Vizioncore
 - **esXpress** which has a free basic version
 - VMware consolidated backup for VMware Infrastructure 3

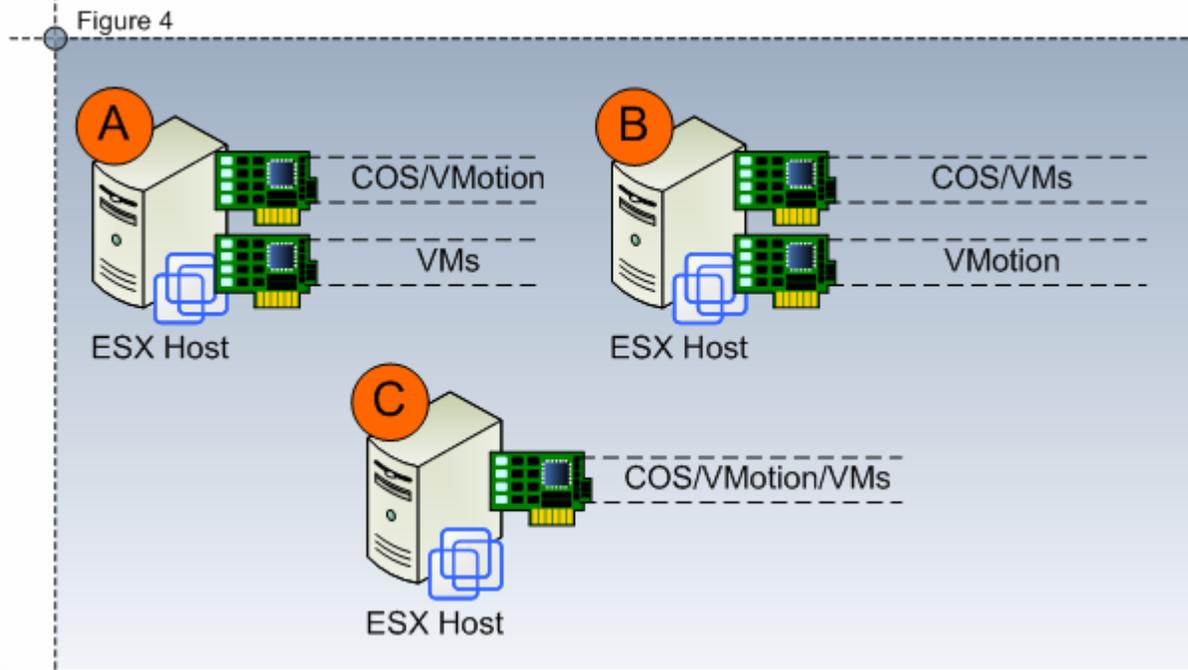
e) Ethernet Redundancy (I)

- In VMware ESX server 2.x there is one ethernet port attached to service console and another ethernet port shared between all the virtual machines inside the ESX server. This is the minimum configuration.
- Many datacenters add ethernet redundancy to their critical servers for **failover** and **load balancing** reasons.
- With ESX server 2.x is it possible to add ethernet redundancy to virtual machines but there is no way to do the same with service console. That configuration will also require at least **three** ethernet adapters.
- If VMotion need to be used then another ethernet adapter will be required.



e) Ethernet Redundancy (II)

- New server blades have a limited number of ethernet adapters.
- **Appendix 4** explains a way to join service console ethernet traffic and virtual machines traffic into a single ethernet adapter, allowing real failover protection with just **two** ethernet adapters.
- Another possible configurations explained in Scott Herold's article are:



Summary

- Key points of this presentation:
 - Offer administrators of ESX server 2.5 a set of basic tasks needed in production environments.
 - Explain the advantages of implementing those tasks
 - Show the exact command syntax they have to type

References

- <http://www.vmts.net/vmbk.htm> Here you will find all about vmbk.pl. Thank you Massimiliano Deneri for your software.
- <http://www.vmguru.com/blogs/vmguru/archive/2006/06/26/75.aspx> InDepth Analysis: vmxnet_console. Scott Herold. Brilliant article about ethernet adapters and services routed to them in VMware ESX server 2.x. Many thanks.
- Virtualization with VMware ESX server. Al Muller, Seburn Wilson, Don Happe, Gary J. Humphrey. Syngress. A must read book for ESX administrators.
- http://www.vmware.com/support/kb/enduser/std_adp.php?p_faqid=1339 A technical note from VMware explaining how to synchronize ESX hosts.

Presentation Download

Please remember to complete your
session evaluation form
and return it to the room monitors
as you exit the session

The presentation for this session can be downloaded at
<http://www.vmware.com/vmtn/vmworld/sessions/>

Enter the following to download (case-sensitive):

Username: cbv_rep
Password: cbvfor9v9r

VMWORLD 2006



Appendix 1 – Updating ESX Server

- This is **how to update** from ESX server 2.5.2 to 2.5.2 patch 4
 - 1) Connect to <http://www.vmware.com/download/esx>, click the update/patches pane and download patch 4 to your PC.
 - 2) Copy downloaded file **esx-2.5.2-21059-upgrade.tar.gz** to **/tmp** directory of ESX server using **winSCP**.
 - 3) Move physically to local server console and press Alt+F2.
 - 4) Login as **root** and type command **reboot**. All user activity will finish at that moment.
 - 5) Select **linux-up** option when boot dialog box appears during the boot process.
 - 6) Press Alt+F2 when ESX server finishes boot task and login as **root**.
 - 7) **cd /tmp** Move to patch directory
 - 8) **md5sum esx-2.5.2-21059-upgrade.tar.gz** Verify the integrity of the patch
 - 9) **tar -xvzf esx-2.5.2-21059-upgrade.tar.gz** Uncompress the file
 - 10) **cd esx-2.5.2-21059-upgrade** Move to the newly created directory
 - 11) **./upgrade.pl** Install the patch
 - 12) Answer yes at the end of the installation to **reboot** the server.

Appendix 2 – Synchronizing ESX Server (I)

- This is **how to synchronize** time with an external NTP server
 - 1) Connect to the ESX server using **Putty** program and login as **root**.
 - 2) **nano -w /etc/ntp.conf** Edit file /etc/ntp.conf
 - 3) Look for section **# --- OUR TIMESERVERS ---** and add two new lines to that section with the NTP server IP you want to use, as indicated in the following example:

```
# --- OUR TIMESERVERS ----  
# Permit time synchronization with our time source but do not  
# permit the source to query or modify the service on this system  
restrict NTP-SERVER-IP mask 255.255.255.255 nomodify notrap noquery  
server NTP-SERVER-IP
```
 - 4) **nano -w /etc/ntp/step-tickers** Edit file /etc/ntp/step-tickers
 - 5) Add a line with the IP of the NTP server you are using.
 - 6) **/sbin/chkconfig --level 345 ntpd on** Enable NTP service to auto-start
 - 7) **/sbin/service ntpd restart** Start NTP service
 - 8) **/usr/sbin/hwclock -systohc** Synchronize BIOS server clock
 - 9) Properly adjust your time zone:
ln -sf /usr/share/zoneinfo/Europe/Madrid /etc/localtime

Appendix 2 – Synchronizing ESX Server (II)

- This is how to **re-synchronize** every hour:
 - 1) **nano -w /etc/cron.d/vmntp-cron.sh** Edit a new file vmntp-cron.sh
 - 2) Add these two lines to the new file and save them
#!/bin/bash
0 * * * * root /sbin/service ntpd restart > /dev/null 2>&1
- The last 2 steps create a scheduled task which executes every hour at minute 0 and force ESX server to resynchronize against the NTP server.
- The syntax for the first five values of the scheduled task is as follows:
 - First value = minute (from 0 to 59)
 - Second value = hour (from 0 to 23)
 - Third value = day (from 1 to 31)
 - Fourth value = month (from 1 to 12)
 - Fifth value = day of week (from 0 to 7, where 0 and 7 are Sunday)
 - More info about syntax at: <http://www.vmts.net/article/crontab.htm>

Appendix 3 – vmbk.pl (Installation)

- This is **how to install vmbk.pl** into your ESX server:
 - 1) Download vmbk.tar.gz from <http://www.vmts.net> to your PC.
 - 2) Copy vmbk.tar.gz to /tmp directory of ESX server using **winSCP**.
 - 3) Connect to the ESX server using **Putty** program and login as **root**.
 - 4) Move to /tmp directory and uncompress the installation file:
cd /tmp
tar zxf vmbk.tar.gz
 - 5) Move to newly created directory vmbk and install program:
cd vmbk
./install.sh

Appendix 3 – vmbk.pl (Configuration)

- This is **how to configure vmbk.pl** to leave backups in a Windows shared folder placed on a NAS server with the following features:
 - Netbios name of NAS server: **SRVNAS**
 - IP of NAS server: **192.168.1.1**
 - Name of shared folder: **MYFOLDER**
 - Windows username with full permissions on shared folder: **domain\user**
 - Windows password for that username: ********
- 1) Connect to the ESX server using **Putty** program and login as **root**.
- 2) Edit lmhosts file of ESX server:
nano /etc/samba/lmhosts
- 3) Add at the end of the file the following line and save it:
192.168.1.1 SRVNAS
- 4) Create in ESX server a new directory, named vmbk, to use it as the mount point for the Windows shared folder:
cd /
mkdir vmbk

Appendix 3 – vmbk.pl (Configuration)

- 5) Copy the basic vmbk configuration file vmbk-default.conf, located at the installation directory, to working directory /usr/local/etc:
cp /tmp/vmbk/vmbk-default.conf /usr/local/etc
- 6) Edit the configuration file:
nano -w /usr/local/etc/vmbk-default.conf
- 7) Locate and modify the following options in configuration file:
BackupAllGuest=true

```
# mount a samba volume  
smb=true  
smbserver=//SRVNAS/MYFOLDER  
smbuser=domain\\user  
smbpasswd=***  
smbmountpoint=/vmbk  
  
forcedismount=true
```

Appendix 3 – vmbk.pl (Configuration)

- 8) (Optional) If you want to receive a notification email when vmbk finishes backup, locate and modify also these options:

```
email=true  
smtpserver=ip-address-of-your-smtp-server  
to=your-email-account  
from=esx_backup@vmts.net
```

- 9) Finally, test that the program works fine:
vmbk.pl -C /usr/local/etc/vmbk-default.conf

- Once vmbk.pl finishes doing backup of ALL the virtual machines, there will be a subfolder inside \\SRVNAS\MYFOLDER with the name of each virtual machine.

Appendix 3 – vmbk.pl (Scheduling)

- This is **how to schedule vmbk.pl** to do backups of all the virtual machines of an ESX server:
 - 1) Connect to the ESX server using **Putty** program and login as **root**.
 - 2) Copy the scheduled task file which comes in the vmbk installation directory to the cron.d working directory:
cp /tmp/vmbk/vmbk-cron.sh /etc/cron.d
 - 3) Edit the file:
nano -w /etc/cron.d/vmbk-cron.sh
 - 4) Modify values, as indicated in appendix 2 of this presentation, to adjust day and time of your backups.

**1 2 * * * root /usr/local/bin/vmbk.pl -C /usr/local/etc/vmbk-default.conf > /dev/null
2>&1**

Appendix 3 – vmbk.pl (Restoring)

- This is **how to restore** a virtual machine called **MYVIRTUAL** from a backup stored at **\\SRVNAS\MYFOLDER** using the Windows account **domain\user** with password ******** to access the shared folder:
 - 1) Connect to the ESX server using **Putty** program and login as **root**.
 - 2) Mount the shared folder where is the backup file onto /vmbk directory:

```
cd /  
smbmount //SRVNAS/MYFOLDER /vmbk -o rw,username=domain\\user,password=****  
cd /vmbk
```
 - 3) Move to the backup we want to restore and execute the installation script:

```
cd MYVIRTUAL  
./MYVIRTUAL.restore
```
 - 4) Answer the questions proposed by the restore script: name of the imported disk, name of the imported virtual machine, directory to store new virtual machine, etc. All the questions offer a default answer to help user in the restoring task.
 - 5) Wait until restore finishes and dismount /vmbk volume

```
cd /  
umount /vmbk
```

Appendix 4 – Ethernet Redundancy (I)

- This is **how to add full ethernet** redundancy to your ESX server.
 - 1) Move physically to local server console, press Alt+F2 and login as **root**.
 - 2) Edit file /etc/modules.conf
nano -w /etc/modules.conf
 - 3) Comment out line that begins with: **alias eth0** and save the file.
 - 4) Run command:
vmkpcidivv -i

Answer all the questions with the showed default values until question about service console ethernet adapter appears. Default answer is “c” but it has to be replaced by “v”. Answer the rest of the questions with default values.

- 5) Edit file /etc/vmware/hwconfig
nano -w /etc/vmware/hwconfig
- 6) Add the following lines if you want ethernet 0 and ethernet 1 to be your team adapters:
nicteam.vmnic0.team = “bond0”
nicteam.vmnic1.team = “bond0”

Appendix 4 – Ethernet Redundancy (II)

- 7) Edit file: /etc/vmware/netmap.conf if you had defined previously a switch name in your ESX server. If you have not yet configured any switch jump to step 9)
nano -w /etc/vmware/netmap.conf
- 8) If the name of your defined virtual switch in ESX server is **switch0** add these lines to tell your switch the new team:
network.name = “switch0”
network.device = “bond0”
- 9) Edit file: /etc/rc.d/rc.local
nano -w /etc/rc.d/rc.local
- 10) If VLAN ID of your service console network is 100, add these lines to install service console module into the new team and configure it properly:
insmod vmxnet_console devName=“bond0.100”
ifconfig eth0 up
- 11) Reboot the ESX server and check that VLAN 100 is routed to your ethernet adapters:
reboot