UltimateP2V

using
Qui Hong's FixVM-SCSI and NU2's BartPE

Document Version 1.4

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RTFM Education
Beyond the Manual... with Mike Laverick

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ESX 2.x

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Audience:
Very simple instructions suitable for even a "novice" user to create an Ultimate-P2V CD based on a "Classic BartPE" disk

Objective:
A step-by-step guide to creating a custom BartPE boot CD/ISO – used to clone a physical machine and reconfigure the virtual machine. In short – Free P2V

Disclaimers & Acknowledgements:
Firstly, Qui Hong must take the lion share of the credit for this development/solution. It's he who has done all the whiz bang stuff!

Secondly, it is Chris who was responsible for providing the step-by-step instructions to configuring Qui's BartPE plug-in. He opened my eyes to the possibilities of using Qui's plug-in. I must admit that I didn't quite grasp the purpose of Qui's plug-in until he and I swapped a forum post on the issue.

Software Required:
Windows Server 2003 CD-ROM (Recommended)
Windows XP Professional with Service Pack 2
Symantec Ghost 8

Note:
Not all versions of Symantec Ghost may be supported or work with BartPE. You might wish to investigate other cloning/copying techniques and plug-ins if this is your situation.

Known Issues:
- Diskpart in Windows XP does not work correctly. Reboot after the clone process if your BartPE disk is based on Windows XP

Ultimate-P2V using Qui Hong's FixVM-SCSI

Community Support Statement

- Both myself, Chris and Qui are very busy people – and much of our extra-curricular work is done in our free-time. So please do not expect the same level of support you would expect to enjoy from a vendor bought product
- Home Grown P2V Solutions are intended for those people who cannot afford or justify purchasing a commercial P2V offering
- Commercially available products have features and drivers that add value and the commercial tools are supported and updated to keep them current. This tool is not intended to be used on production systems and if they are—you proceed at your own risk. The authors of this paper also feel that nothing replaces training and experience. You should work with qualified engineers and consultants to ensure that production systems are configured to best practices and to protect the integrity of the systems
- If after completing the P2V process, you find your virtual machine will not boot – this might be due to stale hardware/software which is being detected/loaded and then causes an error. You could find you have the same errors using a commercial product (although many try to disable devices/software which causes known issues).
- So try the P2V Forum on VMware's website--you may get a faster and richer set of responses from them
- Some things to try if your P2V Virtual Machine will not boot…

  - Try safe mode – and disabling/removing the offending devices/services
  - Try connecting your P2V'd disk to a working virtual machine, load-up the registry hive from the disk of the problem virtual machine – and use your registry knowledge to disable the problem hardware/service
  - Try running fdisk /mbr or chkdsk /f on the virtual machine's system partition

Document History

Version 1.1

- First release

How does it work?

- BartPE is a boot CD which uses Windows XP or 2003 source code to give a boot CD-ROM. It's the ultimate replacement to the floppy boot disks of years gone by – with a rich plethora of file system support, network support and storage controller support and so on. It's an open-source project within which anyone can develop "plug-ins" to extended its functionality
- We use a BartPE disc with drivers which allows us to clone a physical machine to a virtual machine. Drivers are added to make virtual disks addressable under BartPE
- Symantec Ghost is used to clone the boot disk of physical machine to virtual machine's virtual disk
- Qui Hong's BartPE plug-in "injects" the appropriate driver to make the virtual machine bootable after the cloning process has been completed
- Without it – the cloned virtual machine would give us a Blue Screen of Death like this:
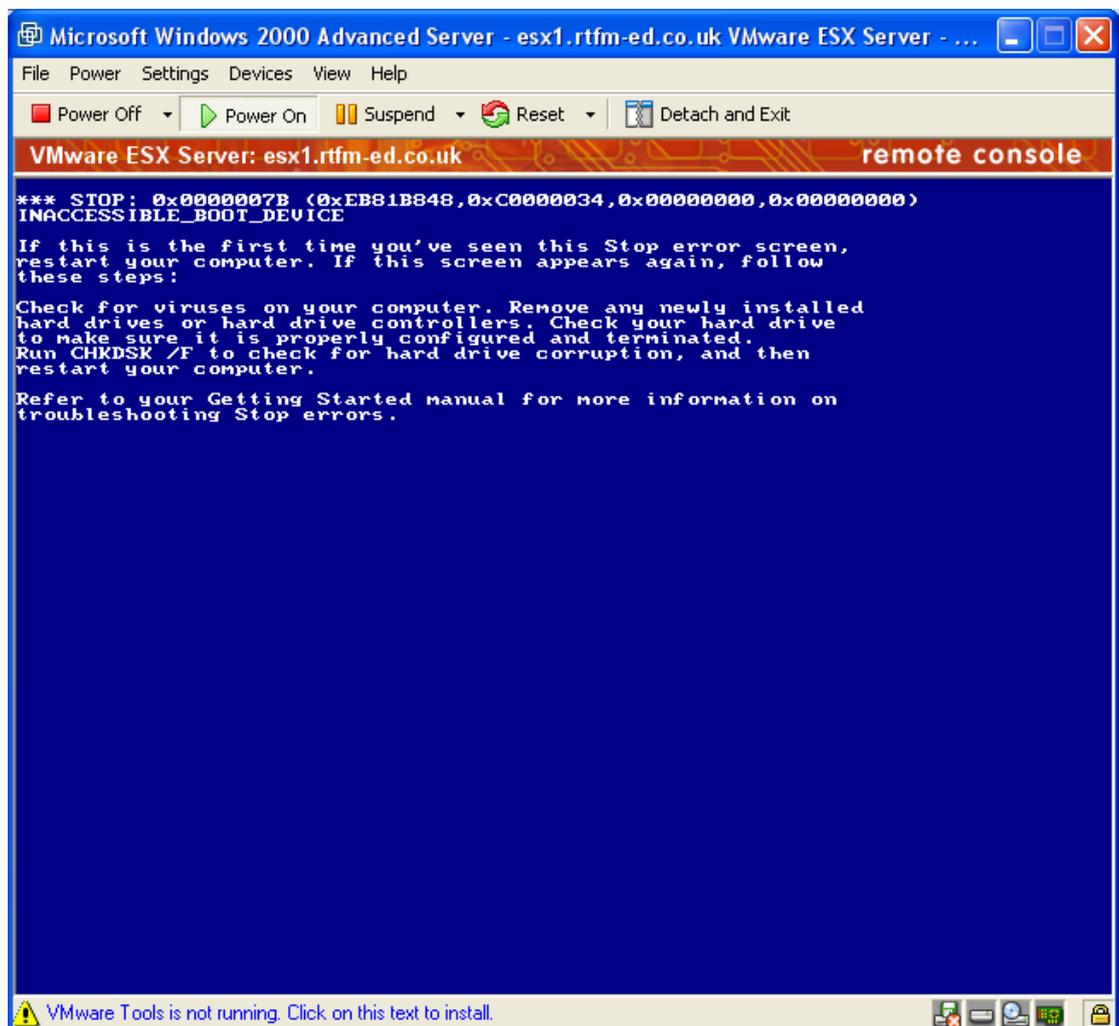
Building a Custom BartPE for P2V

Download and Install BartPE

Note:
- BartPE recommends you use Windows XP with Service Pack 2 as the source for your boot disk. Service Pack 1 for Windows XP is minimum requirement
- Chris and I would recommend using W2K3 instead.
    - As you might recall, a Virtual Machine uses a virtual SCSI adapter, either a BusLogic (Default for W2K) or LSILogic driver (Default for W2K3).
    - Windows XP has a built-in BusLogic driver not a LSILogic driver – whereas Windows 2003 has a built-in LSILogic driver but not a BusLogic driver.
    - If you create a BartPE boot disk with Windows XP and run it inside a Virtual Machine you will NOT be able to access your hard-drives because there will be NO driver for the SCSI Controller. The only way to make WinXP BartPE disk work is supplying a driver at boot time… or by adding both the LSILogic Driver and VMware SCSI "BusLogic" driver to the BartPE
    - There are instructions which explain how to do this
    - Whereas, if we use W2K3 as the source which contains an LSILogic Driver – then the only storage driver you will need to add (as well as ones for your physical machines) is the VMware SCSI "BusLogic" driver
    - W2K3 works perfectly with Diskpart, whereas Windows XP does not – and reboot is required after the cloning process to make the boot partition accessible
    - W2K3 works out of the box with any need to slipstream/integrate a service pack

1. **Download BartPE Software** (this guide was based on 3.1.3 version)
2. **Run/Open the downloaded Package or ZIP** and **Install/Extract to your preferred location**

    Note:
    I installed BartPE to this path C:\Program Files\Pebuilder\

Adding Drivers and Plug-ins

1. **Download these drivers, plug-ins and INF files**

   VMware VMXnet Network Driver
   LSILogic Driver
   VMware SCSI "BusLogic" Driver
   Qui Hong's "Fix-VMSCSI" FreeP2V Plug-in
   VMware Tools & SVGA Graphics Driver (By Sherpya)

2. **Extract the ZIP's to:**

vmxnet-w2k folder to:	C:\Program Files\pebuilder\drivers\net
vmxnet-winnt folder to:	C:\Program Files\pebuilder\drivers\net
lsilogic folder to:	C:\Program Files\pebuilder\SCSIadapter
vmscsi folder to:	C:\Program Files\pebuilder\SCSIadapter
fixvmscsi folder to:	C:\Program Files\pebuilder\plugin
vmware folder to:	C:\Program Files\pebuilder\plugin

Adding Symantec Ghost Support

Note:
- We need a collection of files to run Ghost from the BartPE ISO/CD.
- Remember the Boot CD is Win32 based, so we need Win32 files to run it from the local CD. BartPE support site explains this issue. From a 32-Bit version of Ghost you need the following files:

1. **From machine that has Ghost installed locate these files**

   Ghost32.exe
   Ghostcdr.dll
   Ghostexp.exe
   GhostSrv.exe

   Note:
   You will generally find these files located at **C:\program files\Symantec\Ghost**

2. **Using Windows Explorer, copy these files** to the workstation that has the BartPE software installed to the following location:

   C:\Program Files\Pebuilder\Plugin\Ghost8\Files

Adding Network Support Drivers for Physical Machines (Example)

Note:

- You may also wish this disc to offer network support on the Physical Machine – to do this you may have to add drivers.
- For example there is no support for Intel Pro 1000 cards in the default disc.
- Here's how I added support for multiple Intel Pro 1000 cards on my Dell 1650's:

  Note:
  These instructions would be very similar for any network card type – say for example the BroadCom Network Cards which are popular on some HP Proliant Servers.

  General Instructions are on BartPE's website

1. Download from the Intel's Website the Driver for Intel Pro 1000
2. **Unzip the drivers**, but **cancel the message to install or create boot disks**
3. **Navigate to the unzip location** and **PRO1000\WS03XP2K**
4. **Copy these files** in the **WS03XP2K directory** to: **C:\Program Files\pebuilder\drivers\Net**IntePro1000\

   Note:
   IntelPro1000 is a directory I made – you can name the sub-directory off \net anything you like.

   Note:
   You can use the same method to handle mass-storage device drivers.

   At the end of this process – if you have added every driver and plug-in (including the optionals), you should have directory structure something like this… I have hidden some of the directories in the plugin folder to make this screen capture easier to see…
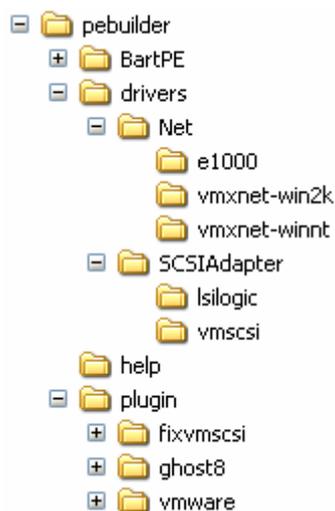
Creating your ISO File

1. **Insert your Windows 2003/XP Server CD-ROM**
2. Run the **Program from your Start Menu** and **Agree the License Agreement**

   Note:
   Apparently, from a Microsoft's perspective, your BartPE CD-ROM constitutes a one license consumed. In other words they treat the BartPE CD-ROM as if it was an installation. The path to your Windows source code should be one directory above the i386 location.

3. In the **PE Build v3.1.3 – Main Window**
4. **Browse to the location of you source code** (just to a path ABOVE i386)
5. **Set the location for your ISO**
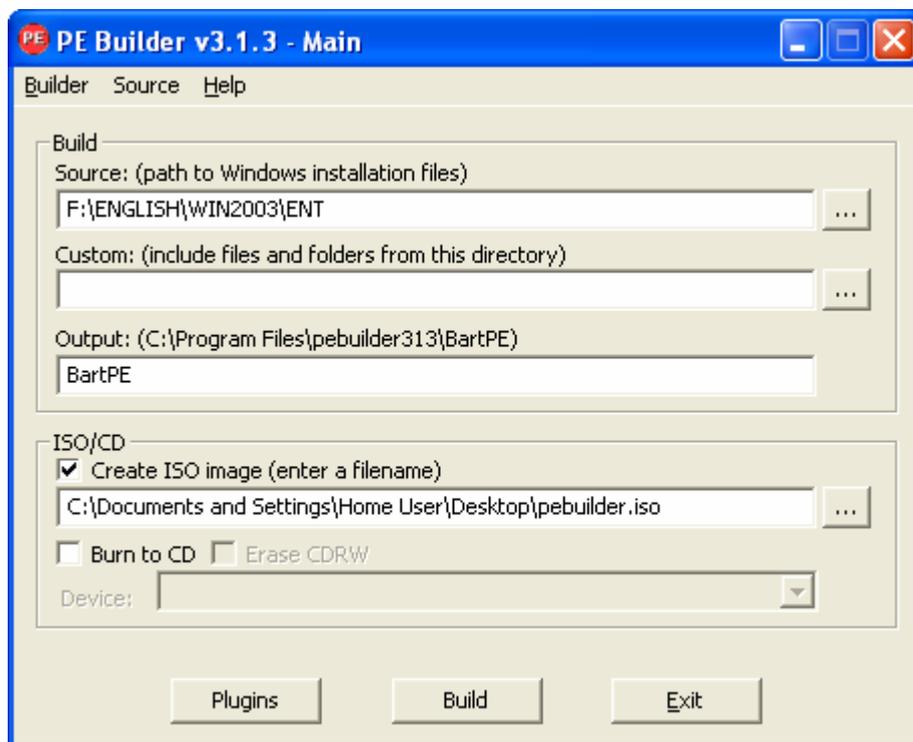
6. Click the **Plugins button**
7. Select **Symantec Ghost 8.0** and Click the **Enable/Disable button**, so **Yes** appears under the enabled column
8. Select **VMSCSI – Add VMware SCSI Driver for P2V**, and Click the **Enable/Disable** button, so **Yes** appears under the enabled column

   Like so:
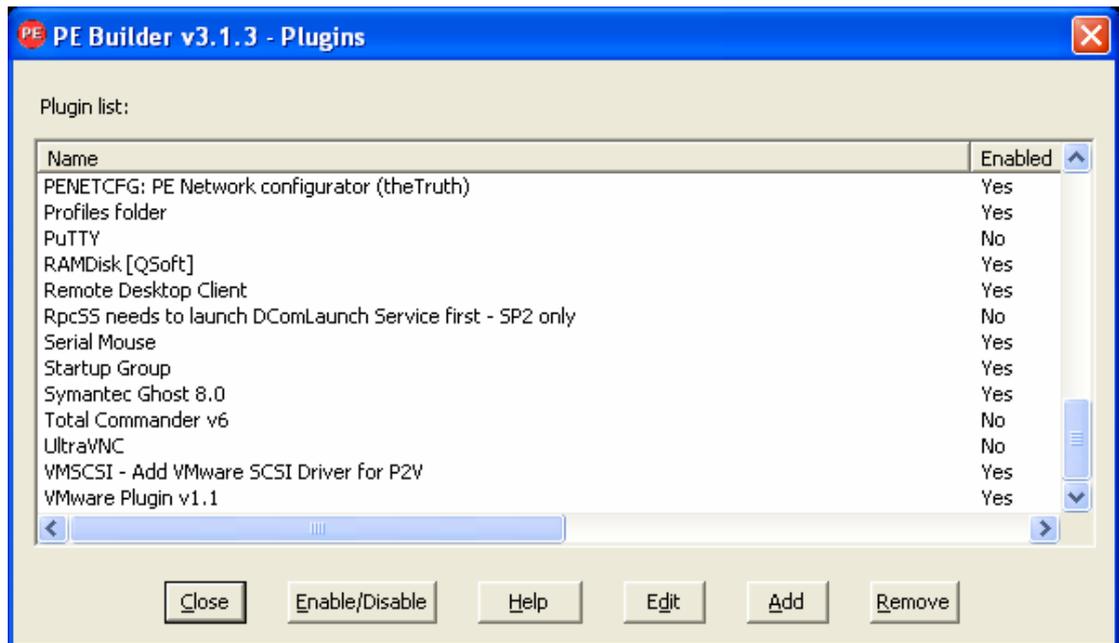
Note:
The VMware Plug-in will only be there if you installed the optional component for VMware Tools support

9. **Accept the Windows License Agreement**
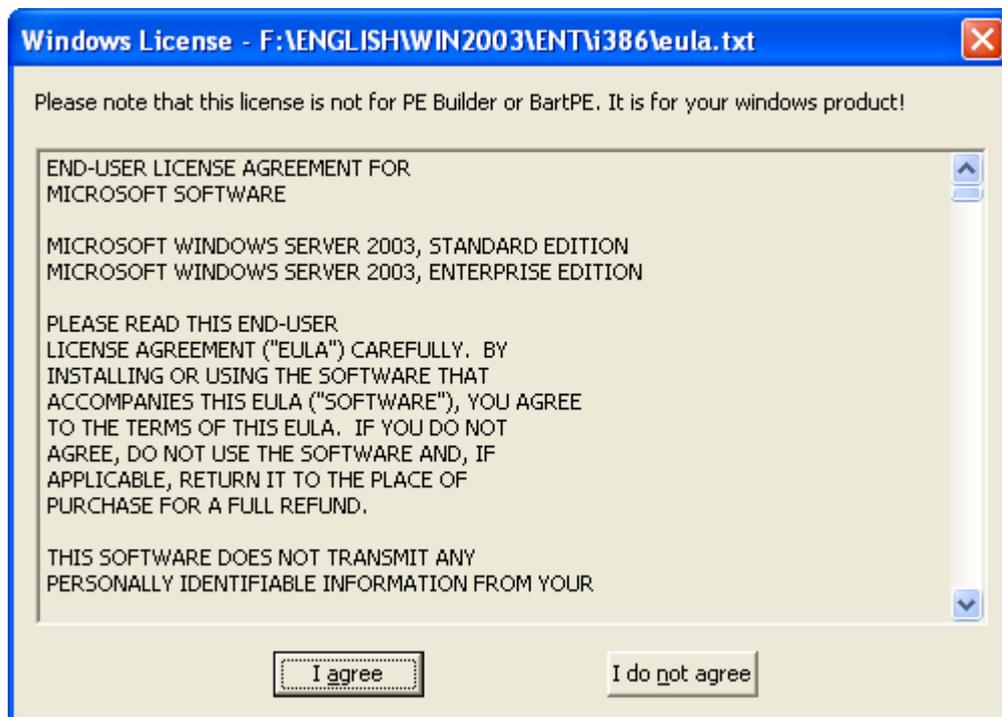
Note:
After accepting the license agreement, there is then a lengthy log window which shows you what BartPE is up to…

PE Builder v3.1.3 - Build

Operation: Building registry

```
PE Builder 3.1.3
Copyright (c) 2002-2004 Bart Lagerweij. All rights reserved.
Running OS Version: 5.1.2600 (Service Pack 2)
Source product is "Windows XP Professional". CD-Rom name is "Windows XP Professional Service Pack 2 CD"
Source build: 2600
Build process started
Building registry
Copying file "F:\i386\setupreg.hiv" to "C:\Program Files\pebuilder313\setuphiv"
```

Close   Stop   <<   >>

Burning your ISO File to a CD-ROM

Note:
• You can now take the ISO file and burn it to a CD-ROM for use in your physical server.

Uploading your ISO file to your ESX Server

Note:
• You can now upload your ISO file to your ESX server (which will run inside your P2V'd virtual machine).

Using the Custom BartPE Disk

Create a New Virtual Machine

Note:
1. When you create the virtual machine it must have the following properties during the cloning process
2. **Network Properties**
   - Connected to a network which allows it to communicate with the physical server
   - Uses the default virtual network driver of vlance
   - Vlance emulates an AMD PC-NET Family network adapter – which is recognized by the BartPE disc. If you use vmxnet (the idealised virtual adapter), your BartPE will not be able to communicate with the physical machine unless you added the vmxnet driver in as an optional component.
   - Once the clone and system reconfiguration process has completed – the P2V'd virtual machine can be switched to vmxnet which will be recognised once "VMware Tools" has been installed.
3. **Virtual Disk properties**
   - Must be connected to SCSI Adapter 0 with an ID of 0 to be the boot disk
   - Must have enough capacity to take the volume of data contained on the physical machine
   - Ghost automatically gives you the ability to make the disk smaller or larger. BUT, you cannot copy from the physical machine a 36GB disk with 6GB of data, to a 4GB virtual disk.
   - Sounds very obvious this – but you be surprised just how many people try! ☺

Boot Physical and Virtual Machine to BartPE

Note:
This task is done on both machines – hence the use of the slashes /.

1. **Insert/Attach** the **CD-ROM/ISO** to your **physical/virtual** machine
2. **During Power On, make sure the physical/virtual machine boot to the CD**

   In the Virtual Machine
   Obtain focus to the **Remote Console**
   Press **[ESC]**
   Choose CD-ROM from the boot options like so:

```
                    Boot Menu

    1.    +Removable Devices
    2.    +Hard Drive
    3.     CD-ROM Drive
    4.     Network boot from AMD Am79C970A

          <Enter Setup>
```
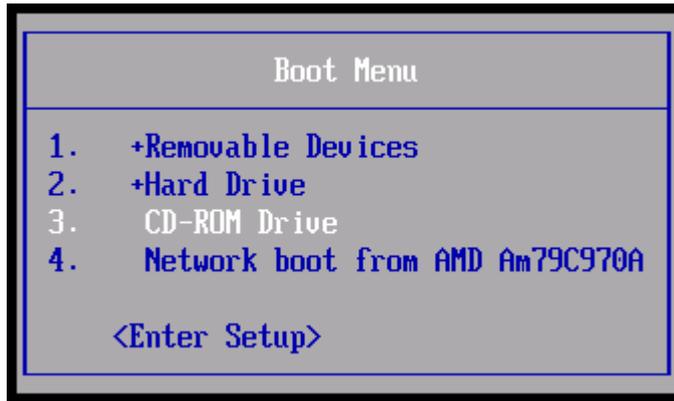
3. In the **Confirm** dialog box, choose **Yes** to **enable network support in BartPE**
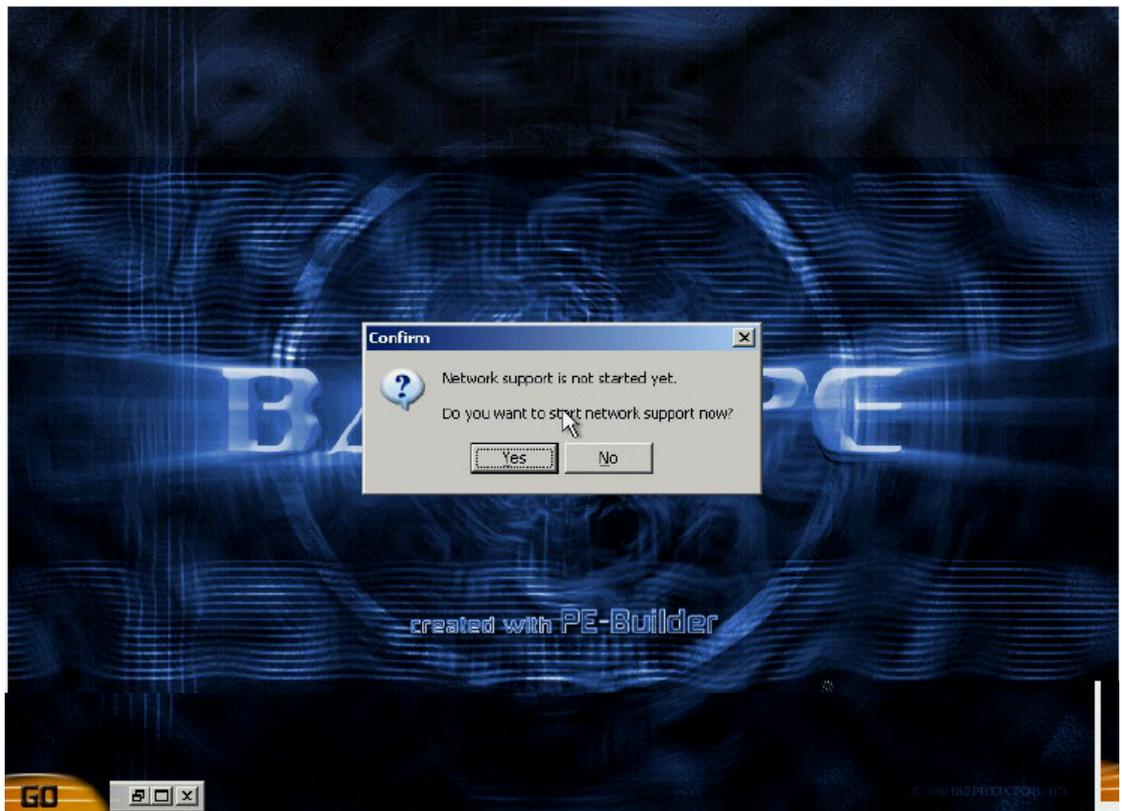
Note:
If you added VMware Tools (Optional) to your build – you can start the service now – by using Go, Run, net start vmtools

4. Choose your **Network Profile**

Note:
It is obviously much simpler if you can pick up IP address from a DHCP server – which is what both Chris and I do. All you have to do if you're using a DHCP server is keep on clicking OK to the Network dialog boxes

If on the other hand you prefer to use static addresses, this is how it is done:

Choose Static IP Address (Manual) from the Network Profiles
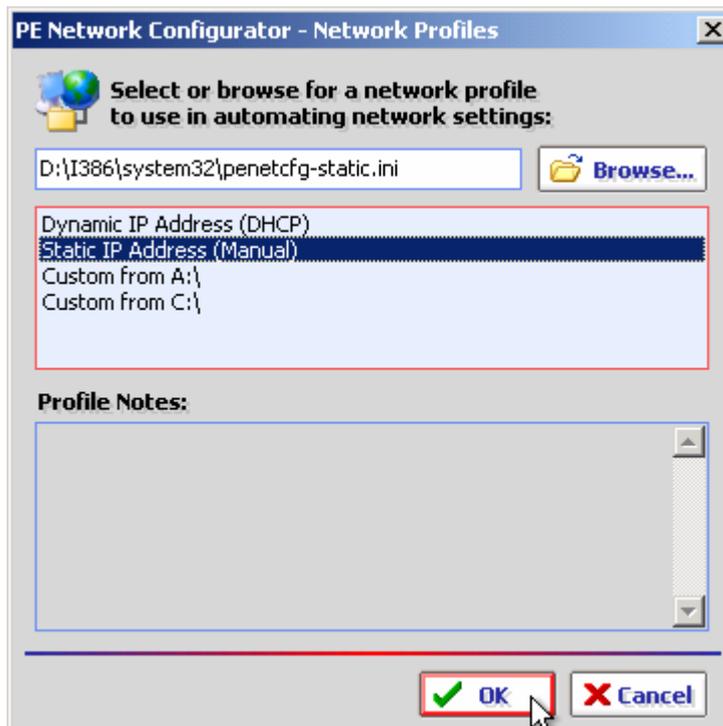
Complete your IP configuration as appropriate, and choose **Apply**
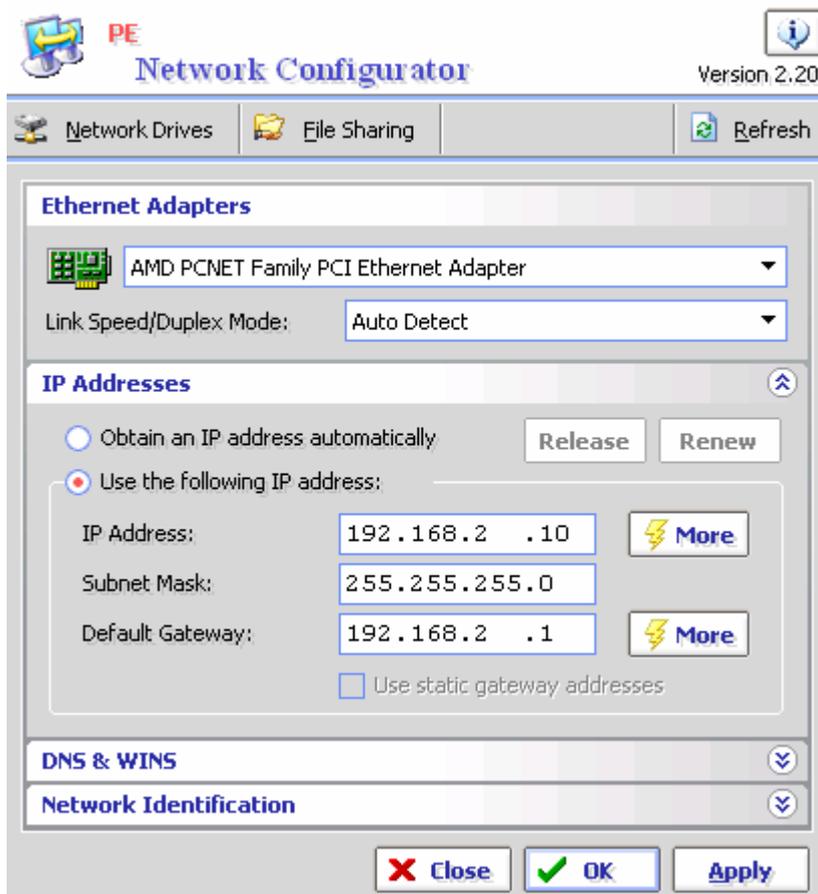
Note:
You might wish to use Go, Command Prompt (CMD) and check that you have an IP address from the DHCP server and that you can ping another host on the network.

Note:
If you are using the vmxnet driver and have installed the vmxnet drivers inside your BartPE, the dialog box will look like this:
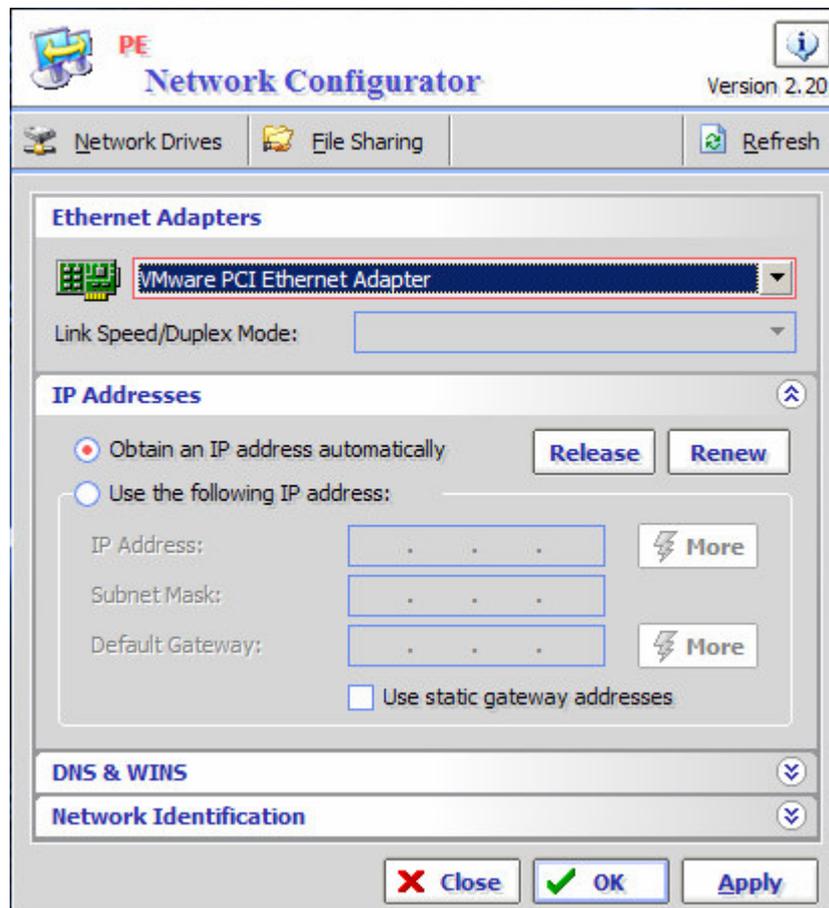
Peer To Peer Cloning (Copying Physical-2-Virtual)

Note:
- Historically, I've always cloned to a separate disk/partition or to a file server – saving the file with the .gho extension. This because in the past I've wanted to re-use that clone over-and-over again. If you still want to do this you could. You can open a command prompt and map drive or use BartPE GUI to map a network drive (System, Network, Map Network Drive) if you wish…
- However, Chris put me on to a much more appropriate method which is the Peer-to-Peer method. Where you clone directly from the physical machine's disk to the virtual machine's virtual disk. It's quicker and requires fewer steps to complete!
- Chris also says "For me, 'disk to disk' has been the more successful method verses "partition to partition".

- **VERY IMPORTANT:**

  Peer-to-Peer uses a Master/Slave concept.

  MASTER is the SOURCE, and SLAVE is the DESTINATION.

  The ghost process is triggered from the master. So…

  The MASTER is the PHYSICAL MACHINE
  The SLAVE is the VIRTUAL MACHINE

  Read this again – and understand it – before you end up with two blank disks – and a physical machine in need of DR and backup tapes!!! ☺

1. On the **Virtual Machine** click **GO**,
2. Choose **Programs, Symantec Ghost 8** and **Ghost32**
3. Select **Peer to Peer and TCP/IP**
4. Choose **Slave Mode**
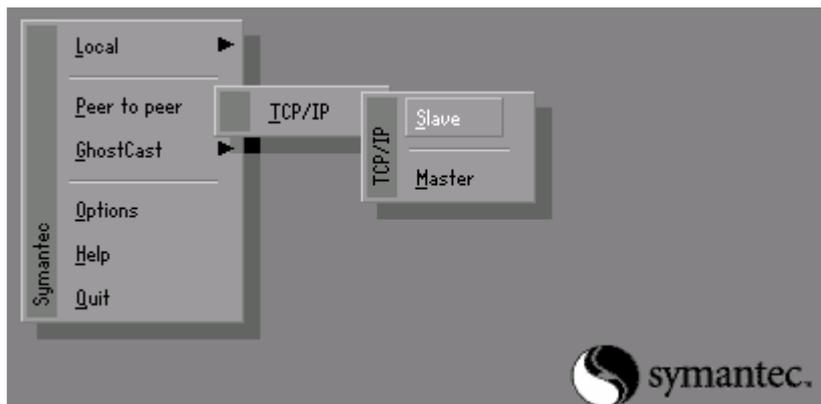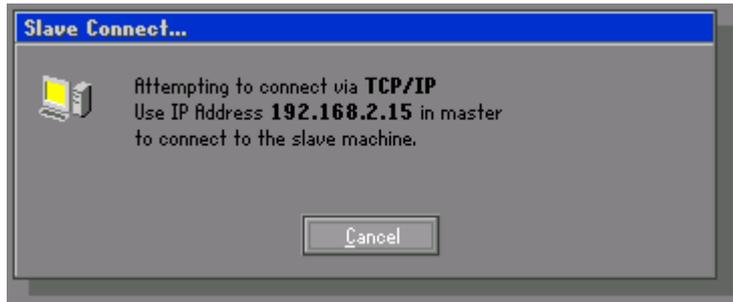
Note:
Make a mental/physical note of the IP address assigned to the slave

1. On the **Physical Machine** click **GO**,
2. Choose **Programs, Symantec Ghost 8** and **Ghost32**

   Note:
   If you are cloning a server with a non-standard drive letter layout – say like something like Citrix server with it's drive letters changed from C: D: E: to M: N: E: You might find it useful to use **Ghost32 with Force Disk Signature Preserve Switch (-FDSP)** instead. Otherwise, you won't be able to login or you will get ctxgina.dll error messages when the virtual machine boots from its virtual disk.

3. Select **Peer to Peer and TCP/IP**
4. Choose **Master Mode**.
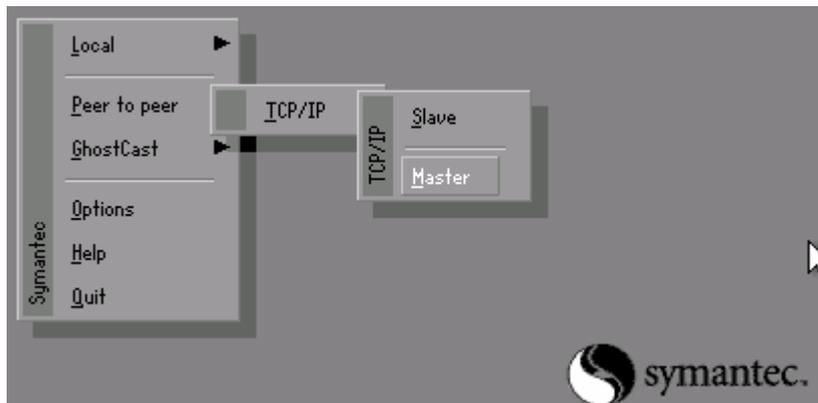
5. In the **Slave TCP/IP Address to Join to** – type the **IP address of the Slave** (Virtual Machine) noted a moment ago and click **OK**
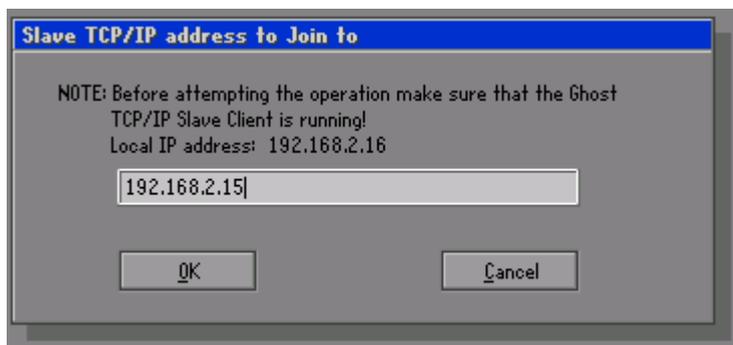
6. **Note:**
   The Slave should respond by showing this status dialog box:

   Connected

   Program connected in TCP/IP slave mode
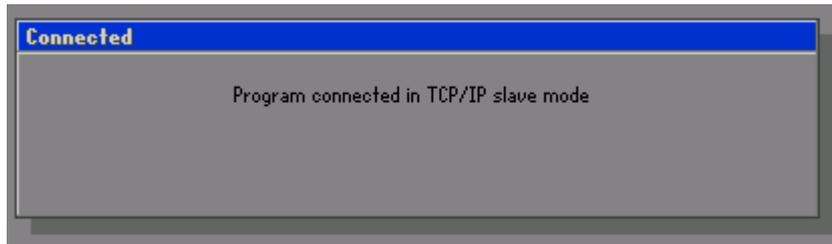
7. **At the physical machine** within **Ghost**, choose **Disk**, **To Disk**
8. In the "**Select local source drive by clicking the drive number**"
   dialog, **select the disk where your OS resides** (this will probably be
   Drive 1) and click **OK**

9. In the "**Select remote destination drive by clicking the drive
   number**" dialog **select the disk which is on SCSI Adapter 0 and ID 0**.
   (this will probably be Drive 1) and click **OK**

10. In the **Destination Drive Details** – use this opportunity to resize the
    partition if necessary.

11. **At the physical machine**, when you are presented with the **Clone
    Complete dialog box**, click **Restart Computer** – and remove the CD-
    ROM – to allow the physical machine to boot normally…

12. **At the virtual machine**, when your are presented with the **Clone
    Completed** dialog box, click **Continue** – and close **Ghost**

Performing a System Reconfiguration of Virtual Machine with Qui Hong's Fix VMSCSI

- Now for the really clever bit…
- You are now ready to inject the LSILogic or VMware SCSI "BusLogic" driver into the VM.
- Which driver you will use will depend very much on whether you have kept VMware's own defaults – or whether you have changed them.
- This guide assumes you sticking with the default SCSI driver for your operating system.
- Although BartPE has helped us clone the physical disk to the virtual disk – BartPE is not aware of the new disk – and will not have assigned a drive letter to make it accessible. Normally, **a reboot would fix this problem** – but we are lazy and don't want to have to do anymore reboots than strictly necessary.

- **Warning:**

  Windows XP+SP2 has been shown to not support Diskpart without error.

  The errors look like this:

  and

5. **In the menu** choose **Select Set OS Target Root (current=).**
6. **Browse to C:** and Select the directory that your Windows is installed under, i.e. WINNT, WINDOWS and click **OK**.
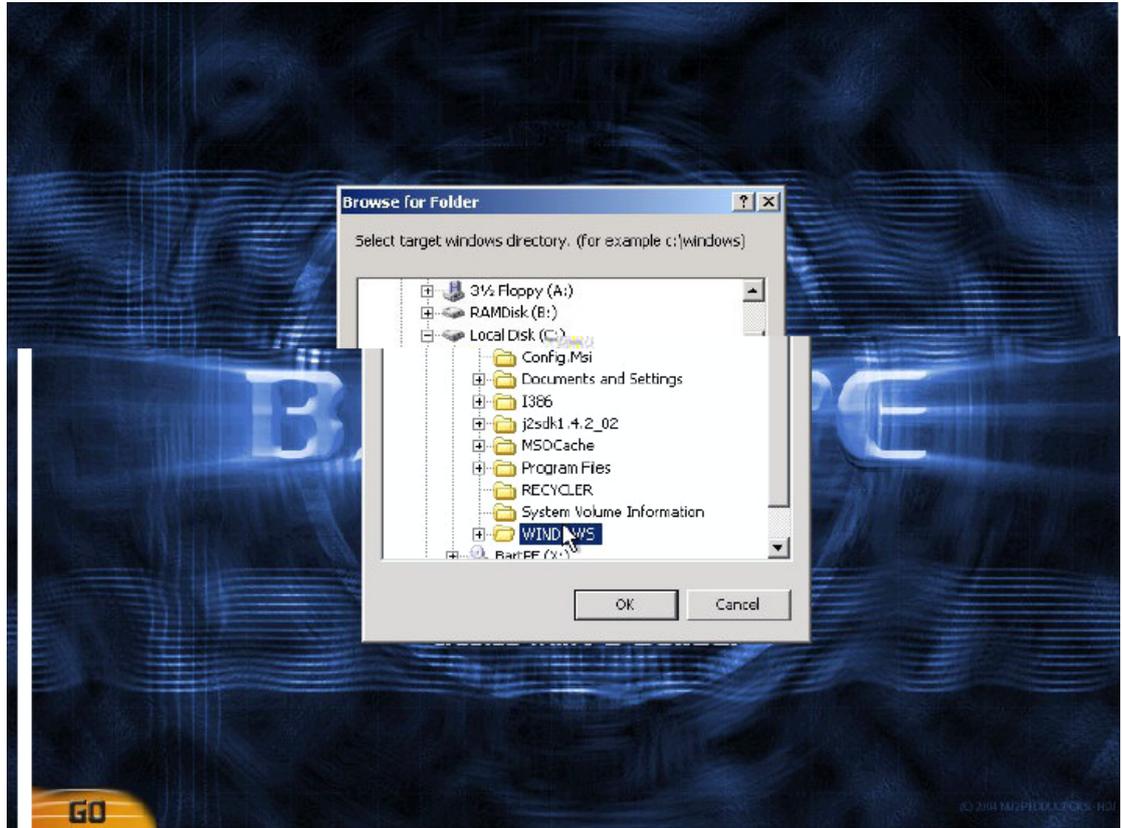
7. **If you go back to the FIXVMSCSI plug-in, you'll notice that the other options are now available.**

   Depending on your OS and whether you have obeyed the defaults from VMware choose:

   Windows 2000   **– (P2V) – ADD VMSCSI (BusLogic)**
   Windows 2003   **– (P2V) – ADD LSILogic SCSI**
   Windows XP   **- (P2V) – ADD LSILogic SCSI**
   Windows NT   **- (P2V) – ADD BusLogic SCSI Windows NT**

   Note:
   Qui Hung's plug-in will work if you have deviated from the default VMware settings when you created your virtual machine. Notice also, that there are options for **V2P** – however, currently only Compaq/HP Raid Controller drivers are supported.

   I was P2V'ing a Windows 2003 physical machine, so I am going to use (P2V) -ADD LSILogic SCSI Windows XP/2000/2003. This is what it does:
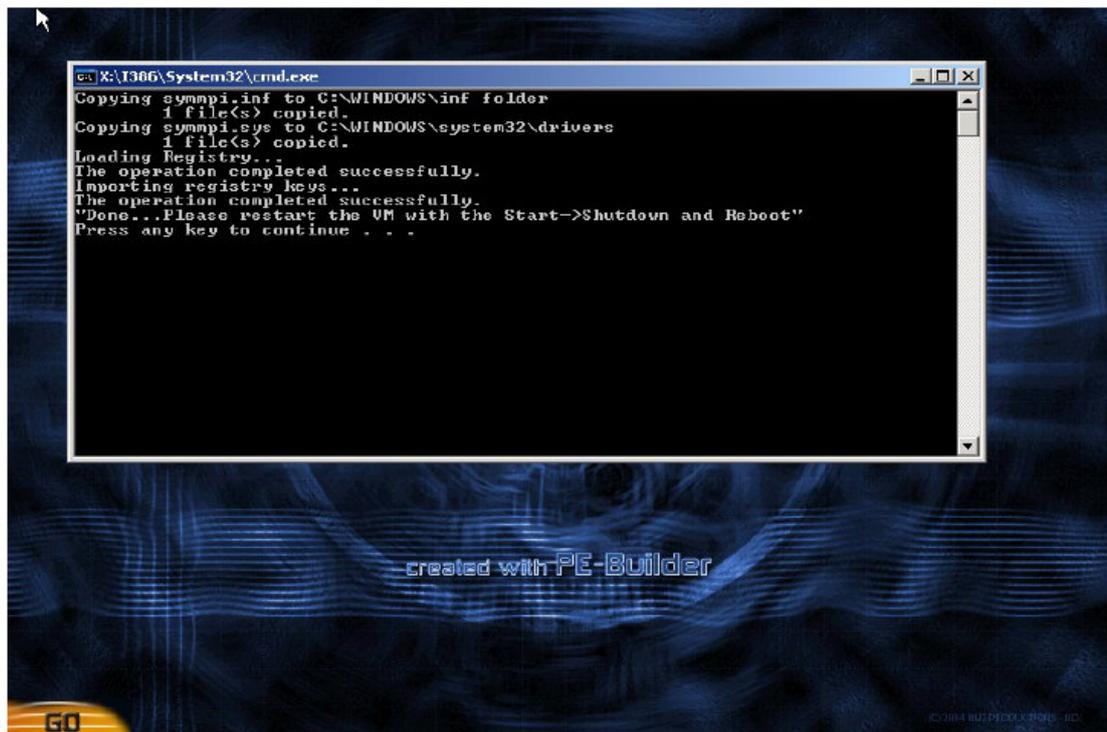
8. The "**system reconfiguration**" process is now over. Choose **GO**, and **Shutdown** and **Shutdown**

Post-Configuration Stages

- The next steps are up to you…
- Personally I would
    1. Switch over to vmxnet
    2. Install VMware Tools
    3. Configure a static IP address
    4. Remove Stale Software
    5. Remote Stale Hardware
    6. Change the ACPI Settings as appropriate – downgrade/upgrade ACPI and HAL.DLL appropriate to Uni-Processor or Multi-Processor VM
- These post-configuration stages are documented in the main P2V Document from both VMware and in RTFM Education Guides.
- Additionally you may wish to look at scripting the above bulleted list. Sample scripts are available on http://www.rtfm-ed.co.uk in the White Papers section.

Credits & Acknowledgements (Again!)

Qui Hung – the developer – the brains behind FIX-VMSCSI
Chris Huss and **Mike Laverick** – Joint Authors of this White Paper