Image Extraction and Booting VMware ESXi Installable

VMware ESXi Server is currently distributed in an ISO format designed to install into flash memory or a local hard drive. These instructions help extract the image files to enable boot-from-flash or network PXE booting. The process takes ~ 5 minutes.

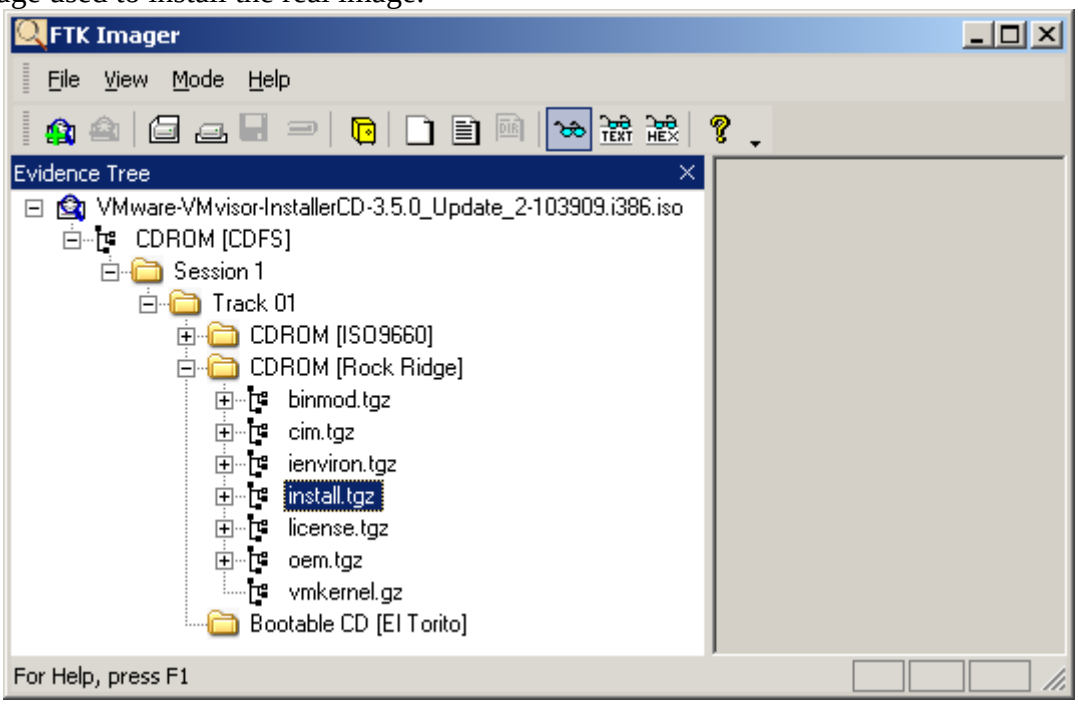
These instructions assume basic familiarity with images and formats. Although other tools are available, we used a free lite version of Access Data's Forensics Tool Kit and a trial version of RARLAB's WinRAR:
http://downloads.accessdata.com/current_releases/imager/imager-ftk_imager-2.5.1.lite.exe
http://www.rarlab.com/rar/wrar371.exe.

1 Download the ESXi ISO image from VMware

VMware ESXi is currently available for free from VMware's web site at http://www.vmware.com/download/esxi/ (it may move in the future). The download requires registration and includes a license (requires activation). The downloaded image will be named something like:
`VMware-VMvisor-InstallerCD-3.5.0_Update_2-103909.i386.iso`

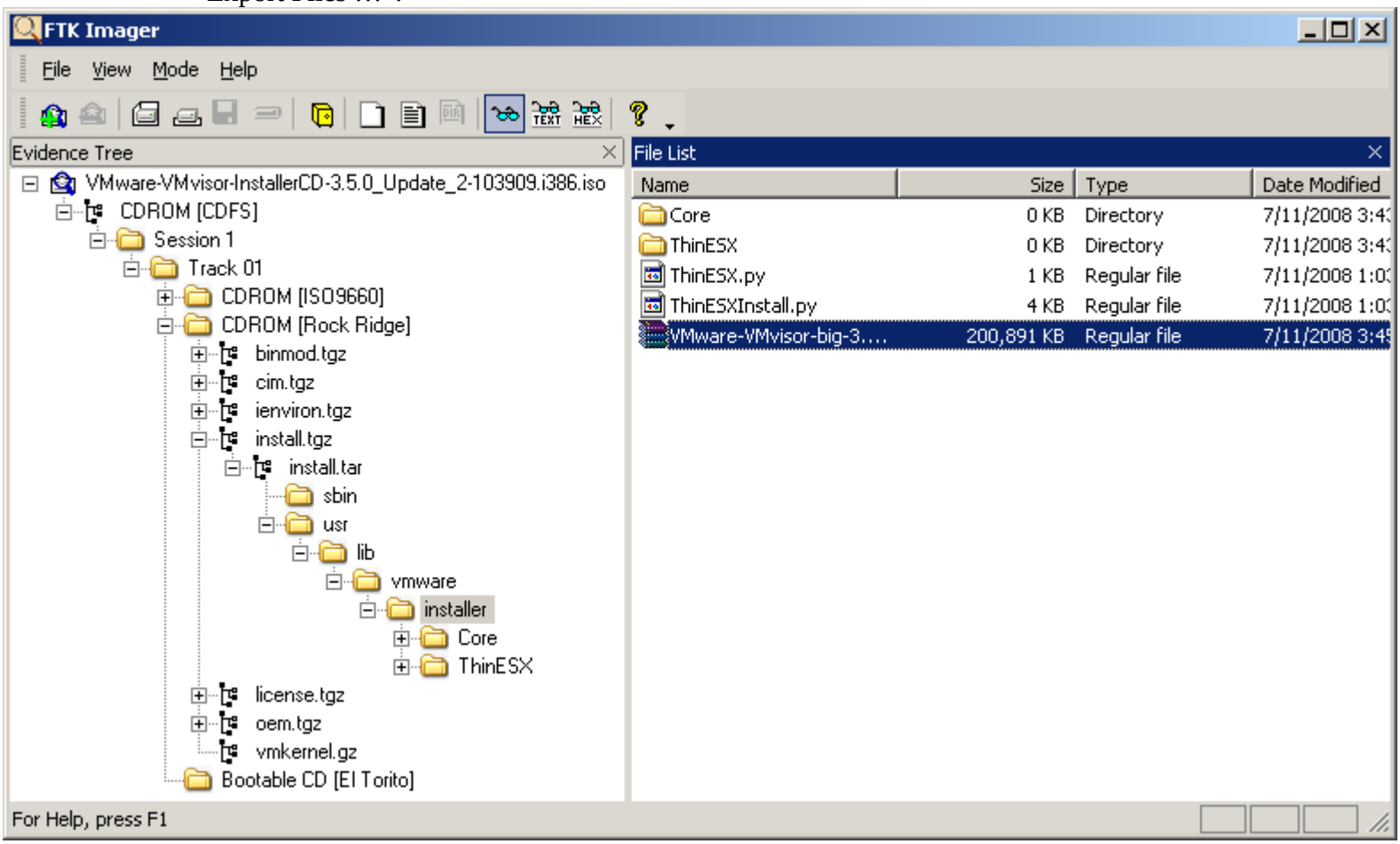
2 Extract install.tgz

Using a tool like the Forensic Tool Kit (FTK) open the ISO as an Image File, browse to `\CDROM\Session 1\Track 01\CDROM` and extract `install.tgz` (if using FTK just open `install.tgz`). **Do not use the first image you find in CDROM top level**– that is the image used to install the real image:



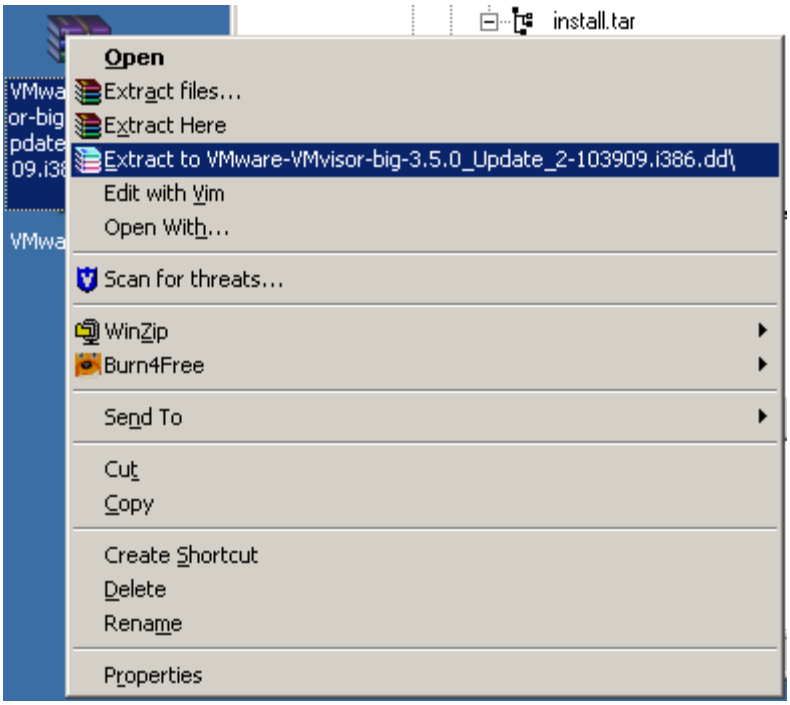
3 Extract VMware-VMvisor…dd.bz2

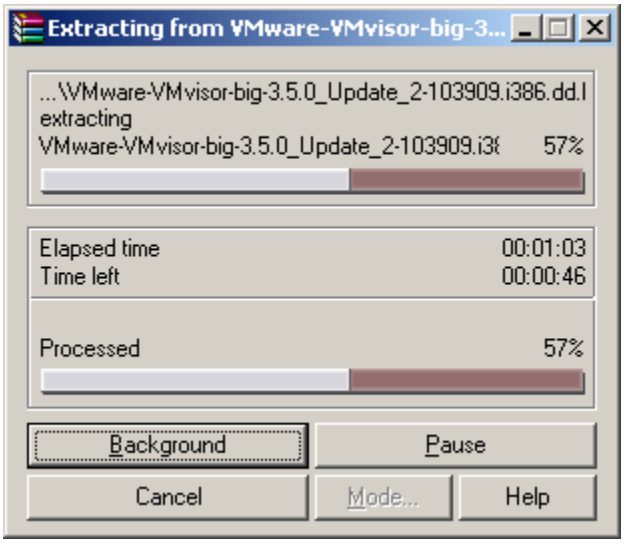
Unzip install.tgz (or open it in FTK – this takes a while, then use "View File List") and extract the ESXi FAT image from `usr\lib\vmware\installer` (right click on file and "Export Files …":



4 Extract dd image from .bz2

Using something like WinRAR uncompress the bz2 image, which will put the .dd into its own directory:





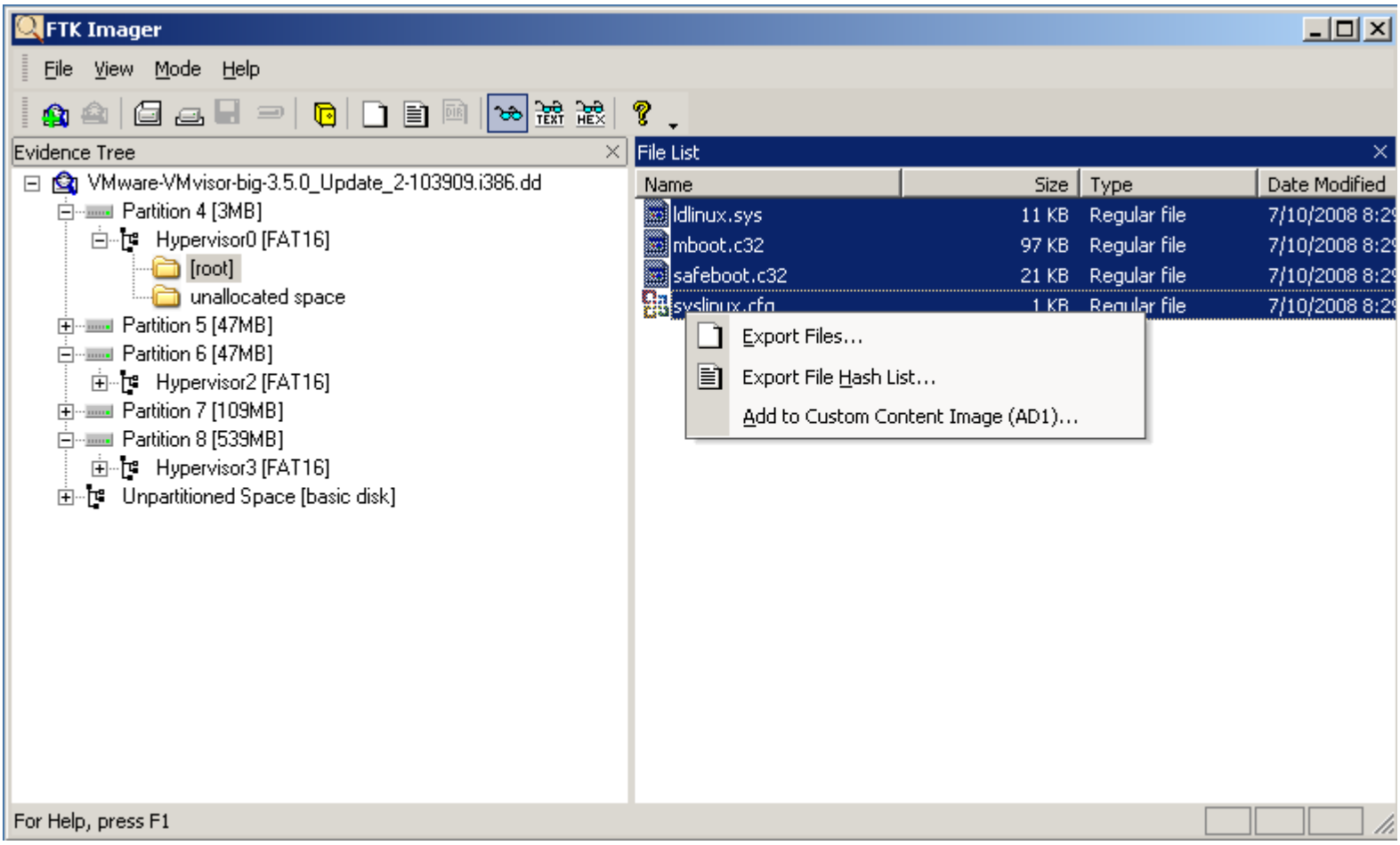
5 (Optional) Extract files from dd Image

There are multiple sets of files in the dd image - the booter files are in Partition 4 and the ESXi files are in Partition 5. Partition 8 contains tools useful tools not needed for booting such as the VMtools and the Virtual Infrastructure Client. FTK Imager or similar tools can be used to extract the files in this section.

ESXi uses H. Peter Anvin's excellent SYSLINUX (http://syslinux.zytor.com/) package for booting (this does not make ESXi Linux in any way). SYSLINUX is split into multiple pieces for booting from local storage, ISO images (CD-ROMs), PXE, etc.

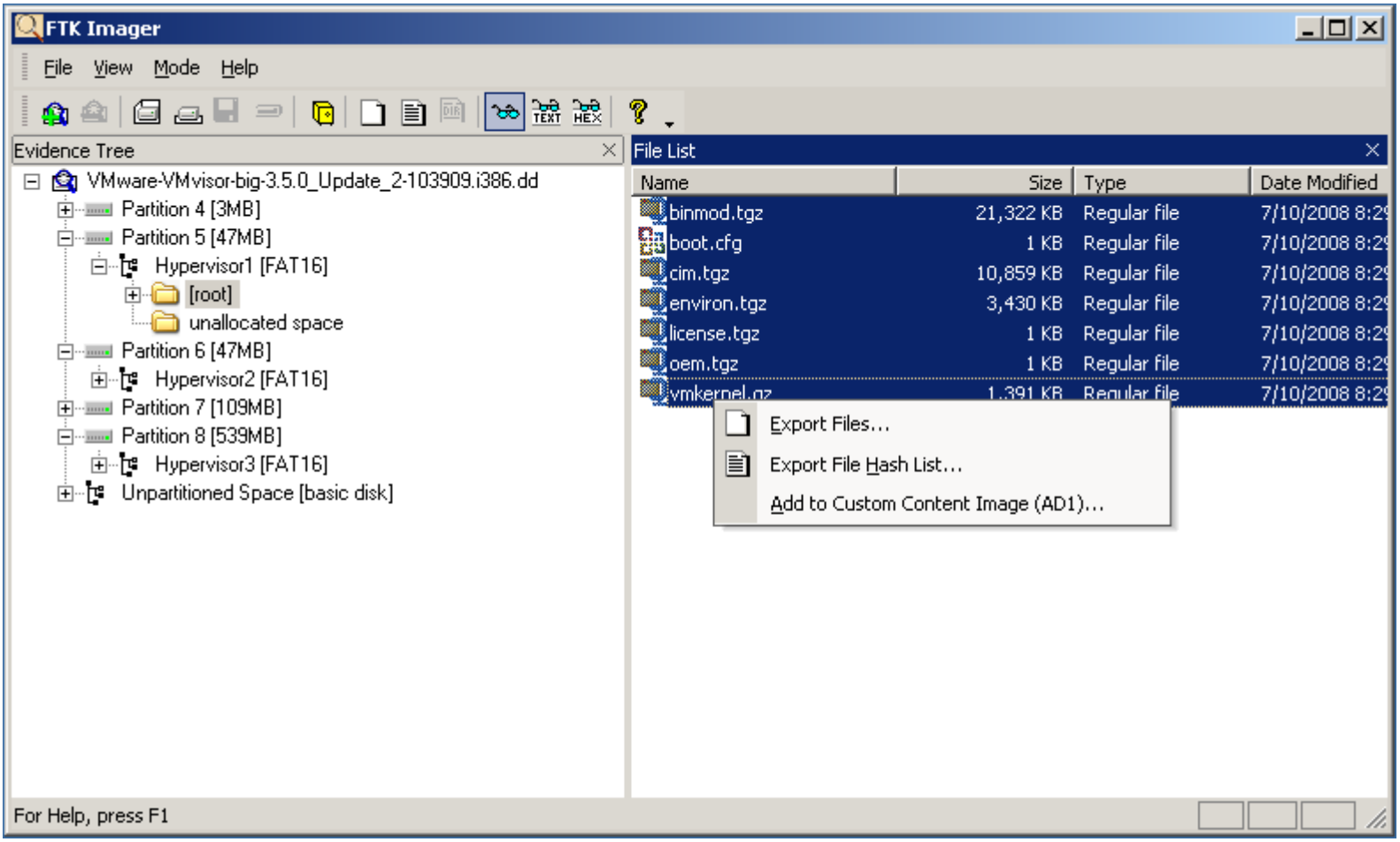
6 (Optional) Extract SYSLINUX Booter and Configuration from dd Image

Depending on your final installation/configuration strategy, you may need the configuration and boot files from Partition 4.



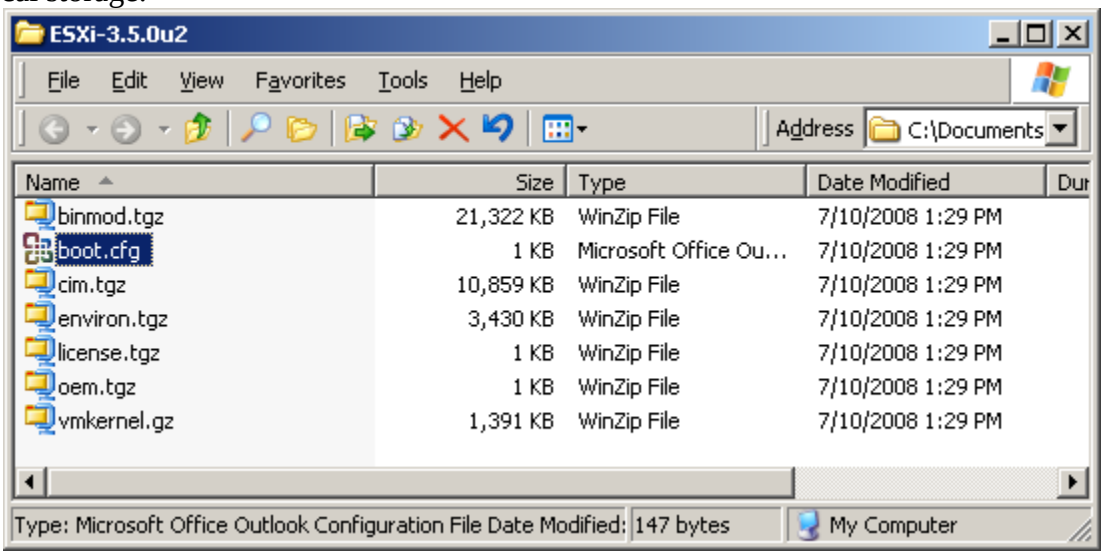
6.1 Extract ESXi from dd Image

The ESXi image files are in Partition 5 (Hypervisor1):



7 Voila!

You now have ESXi suitable for PXE booting, ISO or flash installation, or booting from local storage:



8 Flash Drive Booting

ESXi can be run from a USB flash drive (aka thumb drive) that's at least 1GB, is USB 2.0 certified, and does not have "U3" or other extra features. "U3" or any other Windows security standards can cause problems. The USB flash disk should be wear-leveled or use other technologies that enable the drive to extend flash media lifespan using cells from the unpartitioned portion of the key.

To create the flash image from Windows you need a program such as WinImage (shareware) or the free dd from http://www.chrysocome.net/dd. dd is a low level tool that is very dangerous. **Choosing the wrong partition will overwrite system data and is unrecoverable. So be careful.**

```
C:\>dd --list
rawwrite dd for windows version 0.5.
Written by John Newbigin <jn@it.swin.edu.au>
This program is covered by the GPL.  See copying.txt for details
Win32 Available Volume Information
\\.\Volume{57242bbe-2e6f-11dd-b3ed-806d6172696f}\
  link to \\?\Device\HarddiskVolume1
  fixed media
  Mounted on \\.\c:

\\.\Volume{8ae3947e-5ec7-11dd-b424-005056c00008}\
  link to \\?\Device\Harddisk1\DP(1)0-0+9
  removeable media
  Mounted on \\.\d:


NT Block Device Objects
\\?\Device\Harddisk0\Partition0
  link to \\?\Device\Harddisk0\DR0
  Fixed hard disk media. Block size = 512
  size is 100030242816 bytes
\\?\Device\Harddisk0\Partition1
  link to \\?\Device\HarddiskVolume1
\\?\Device\Harddisk1\Partition0
  link to \\?\Device\Harddisk1\DR8
  Removable media other than floppy. Block size = 512
  size is 1030750208 bytes
\\?\Device\Harddisk1\Partition1
  link to \\?\Device\Harddisk1\DP(1)0-0+9
  Removable media other than floppy. Block size = 512
  size is 4177920 bytes

Virtual input devices
 /dev/zero   (null data)
 /dev/random (pseudo-random data)
 -           (standard input)

Virtual output devices
 -           (standard output)

C:\>cd ESXi

C:\ESXi>dd if=VMware-VMvisor-big-3.5.0_Update_2-110271.i386.dd of=\\?\Device\Har
ddisk1\Partition0 bs=1M --size --progress
rawwrite dd for windows version 0.5.
Written by John Newbigin <jn@it.swin.edu.au>
This program is covered by the GPL.  See copying.txt for details
786,432,000
750+0 records in
750+0 records out

C:\ESXi>_
```

8.1 Copying to Flash

Run "`dd --list`" to see the disk partitions available on your system. The USB drive will be labeled as "`Removable Media`". In the above example it's Harddisk1, mounted

on `\\d:`. Be careful if you have multiple hard disks or other media on your system – getting the harddisk argument wrong can result in data loss and/or destroy your system.

Copy the dd image extracted in Section 4 to the flash drive with:

```
dd if=VMware-VMvisor-big-3.5.0-XXXXX.i386.dd of=\\?\Device\Harddisk1\Partition0 bs=1M --size --progress
```

Remember to eject the drive cleanly to ensure that all data has been written. The drive can now be tested on systems that support boot-from-USB.

9 PXE Booting

ESXi can be booted directly onto bare metal using any system that supports PXE using the PXELINUX boot tools. PXELINUX is compatible with other PXE-boot systems including open source Linux tools such as xCAT, Windows programs such as tftbd32, and proprietary systems like Altiris. The PXELINUX web site has comprehensive instructions for enabling and configuring the required services on Linux. **Consult with your network administrator before enabling any PXE-related services as they may affect other services and systems on your network**.

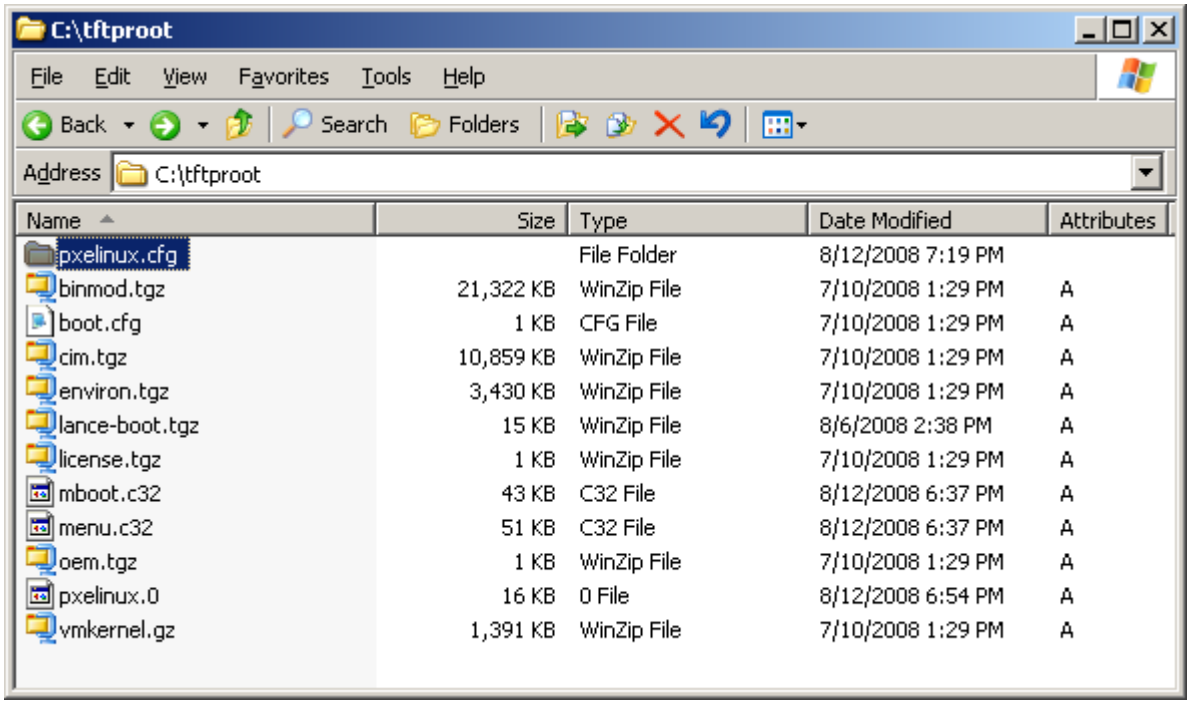
PXELINUX information: http://syslinux.zytor.com/wiki/index.php/PXELINUX
SYSLINUX distribution: http://www.kernel.org/pub/linux/utils/boot/syslinux/
xCAT: http://xcat.sourceforge.net/
tftpd32: http://tftpd32.jounin.net/

9.1 Get PXELINUX Booter files

PXE requires a few files from the PXELINUX distribution that are not in the VMware ESXi ISO. Copy the ESXi image and these files from the SYSLINUX distribution and to your TFTP repository:

```
com32\modules\mboot.c32
com32\menu\menu.c32
core\pxelinux.0
```

You should have something like this:



9.2 Create pxelinux.cfg

In your TFTP repository create the directory pxelinux.cfg and a file called “default” with this configuration text:

```
default menu.c32
menu title PXE Boot VMware ESXi
timeout 100

label ESXi
menu label Boot VMware ESXi
kernel mboot.c32
append vmkernel.gz --- binmod.tgz --- environ.tgz --- cim.tgz
ipappend 2

label Hard
menu label Boot from local drive
localboot 0
```

This will boot VMware ESXi by default onto any system requesting PXE service. The PXELinux system is very flexible and can be configured to map MAC or IP addresses to images, give users menus of which image to boot (with timeouts to a default), etc.

9.3 Start PXE Server and Boot a Machine

If your DHCP and TFTP services are correctly configured you should now be able to boot a system – remember to enable PXE booting in its boot options, possibly changing the boot order to place PXE before local media.

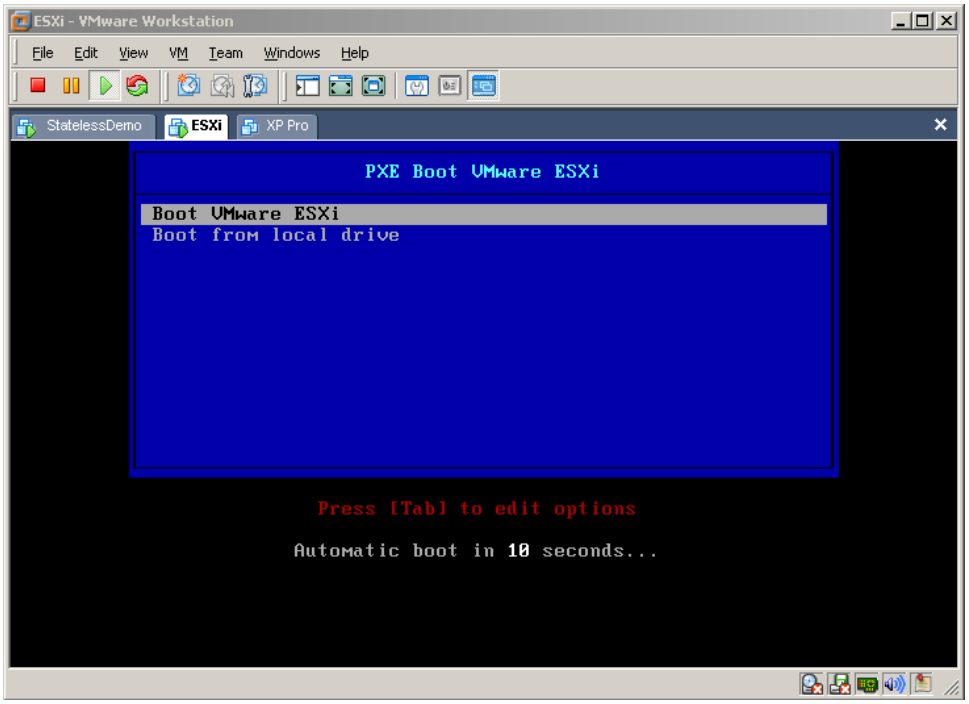


Figure 1 - PXELINUX boot menu

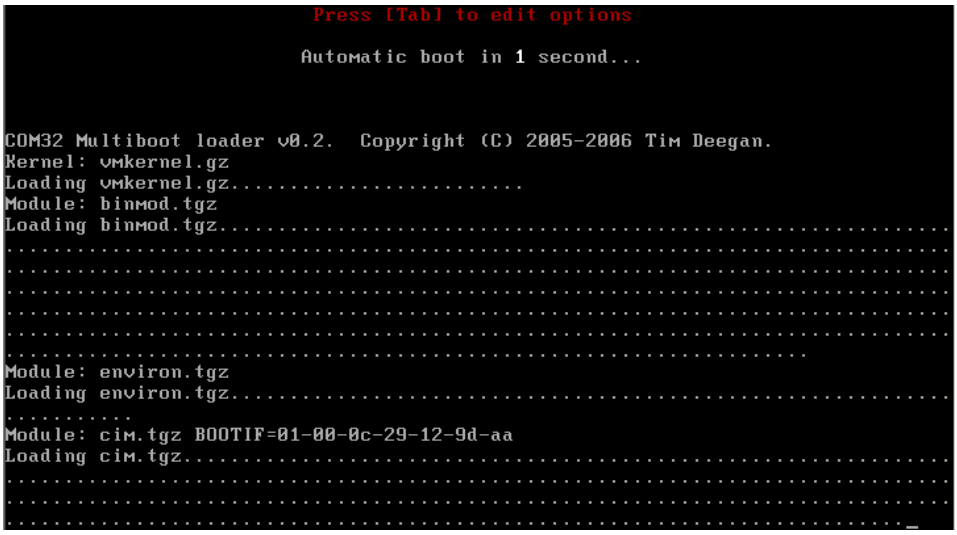


Figure 2 - Downloading ESXi over Network

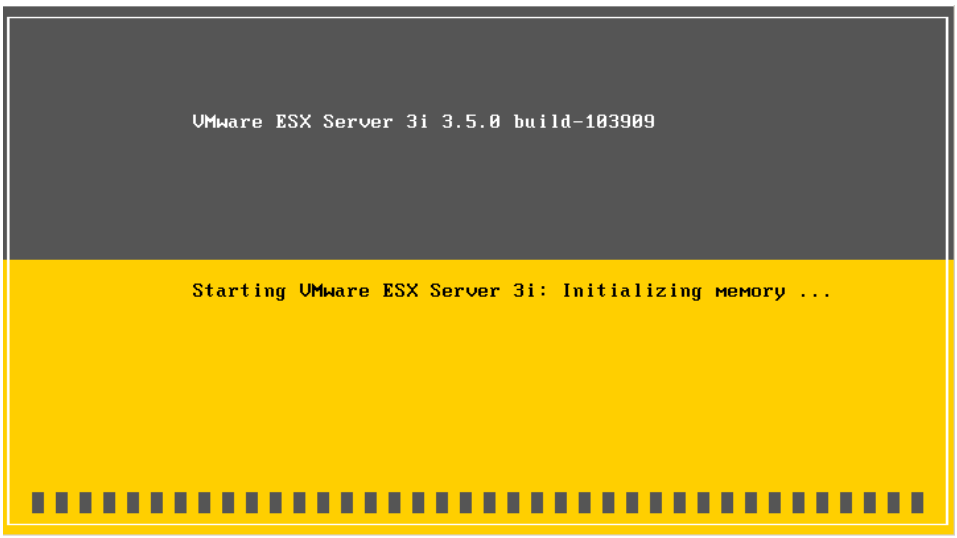


Figure 3 - ESXi Initializing

Enjoy!