## This is Lab Worksheet/Installation 7

This Lab Worksheet/Installation contains essential installation work needed for your upcoming Assignments. You do not have to hand in this Lab Worksheet, but there is a mandatory checklist at the end. You must do this installation work before you can do future assignments in this course. See your instructor for assistance.

#### Materials needed before you begin

- 1) You need a working virtual machine manager installation such as VMware or VirtualBox.
- 2) 10-50 GB of disk space to hold Linux Virtual Machines and Snapshots (backups).
- 3) A College Internet connection or a copy of the Fedora 12 32-bit DVD disk or the downloaded 3GB Fedora 12 32-bit ISO file. You will download this disk in Step Two below if you have an Algonquin College Internet connection. If you are at home, you may have to search the Internet for a copy of this Fedora 12 32-bit DVD. The ISO file is about 3GB in size. You can skip forward to Step Two on Page 6 to start downloading the ISO file now, while you work on Step One of the install process below.
- 4) A separate hard disk for **backups** of your course work and virtual machines. *Back up your hard disks!* (Space for backups is optional but highly recommended!)

#### Procedures

Follow these procedures **carefully**. Read **all** the lab instructions (**all the words**) **before** starting. Not everything in this lab is presented in strict chronological order. Read it **all**, then proceed in a logical order. Don't forget to have your instructor mark your checklist on the last page of this Worksheet.

# Fedora 12 GNU/Linux O/S Installation

The two steps are to first create an empty **Linux** style virtual machine, then install **Fedora 12 Linux** in it using the Fedora 12 installation DVD. The virtual machine creation instructions below are for VMware Workstation; you may also install Fedora 12 Linux into any other Virtual Machine manager (such as **VirtualBox** or **Fusion**) though faculty are only prepared to offer full assistance with VMware Workstation.

## Step One: Creating a new Virtual Machine for Linux in VMware 7, 8, or 9

The steps to create a Linux style virtual machine are similar for VMware versions 7, 8, and 9. The exact dialog boxes and options may vary slightly. (Mac VMware Fusion users should also see similar option choices.)

- 1. In your Windows host O/S, locate and start VMware Workstation.
- 2. Go to the VMware File menu and click New Virtual Machine or select: New Virtual Machine from the Home panel.
- 3. Select Next Custom installation in the New Virtual Machine Wizard dialog window that appears, then click <u>Next</u>.



4. In the Virtual Machine Hardware Compatibility dialog box, you have several choices. The Algonquin T126 machines have a given version of VMware installed on them, so if you want the most flexibility to run your virtual machines off your external disk caddy using T126 hardware (e.g. in case you forget your laptop or your laptop is dead), you must choose the same VMware version for your laptop as is installed on the T126 lab machines. (Go check what version that currently is!) If you will *never* use the T126 machines, so you don't care what version of VMware is running in the lab, you can leave the VMware compatibility setting on your laptop at the highest version offered (e.g. Workstation 9, if you have it).

Choose the VMware compatibility version wisely, then click Next.

ľ	New Virtual Machine Wiza	rd		×
	Choose the Virtual Ma Which hardware fea	achine Hardward atures are needed	e Compatibility for this virtual machine?	
	✓Virtual machine hardware o Hardware compatibility: Compatible with: Compatible products: ACE 2.5-2.7 ESX 4.× Fusion 2.× Fusion 3.× Server 2.× Workstation 6.5 Workstation 7.×	ompatibility Workstation 6.5- Workstation 6.5- Workstation 5 Workstation 5 Workstation 4	7. x v 7. x 32 GB memory limit 8 processor limit 10 network adapter limit 2 TB disk size limit	Ă
	Help	< <u>B</u> ac	:k <u>N</u> ext >	Cancel

5. Select I will install the operating system later, then click Next.

New Virtual Machine Wizard	×
Guest Operating System Installation A virtual machine is like a physical computer; it needs an operating system. How will you install the guest operating system?	
Install from:	
C Installer disc:	
S DVD-RAM Drive (F:)	
C Installer disc image file (iso):	
C:\Documents and Settings\ungers\My Documents\Alt 💌 🛛 🛛 🖉	
<ul> <li>i will install the operating system later.</li> <li>The virtual machine will be created with a blank hard disk.</li> </ul>	
Help < Back Next > Cancel	

6. Select Linux as the Guest operating system and chose Other Linux 2.6.x kernel, then click Next.



- 7. Change the Virtual machine Name (Other Linux 2.6.X kernel) to Fedora 12.
- Set the Location to the Windows folder containing all of your Virtual Machines. (Create a new folder if needed.) Make a note of this Location folder name and use the same folder name for your .vmdk disk down in Step 17, below. When you have written down the Location folder name, then click <u>Next</u>. The location is:
- 9. The number of processors (and cores, if needed) should be set to One, then click Next

New Virtual Machine Wizard	×		
Name the Virtual Machine What name would you like to use for this virtual machine?			
Virtual machine name		New Virtual Machine Wizard	×
Fedora 12		Processor Configuration Specify the number of processors for this virtual machine.	
Location			_
D:\//irtual Machines	Browse	Processors	1
The default location can be changed at Edit > Preferences.		O Iwo	

X

10. In the Memory dialog box, set the Memory for this virtual machine to 512MB, then click Next.

11. Set the Network connection to Use network address translation (NAT), then click Next

Memory for the Virtual Machine How much memory would you like to use for this virtual machine?         Specify the amount of memory allocated to this virtual machine. The memory size must be a multiple of 4 MB.         32 GB - 16 GB - 9 GB - 2 GB -	ew Virtual Machine Wizard	스	
Specify the amount of memory allocated to this virtual machine. The memory size must be a multiple of 4 MB.       Network Type         32 GB - 16 GB - 36 GB - 4 GB - 4 GB - 4 GB - 4 GB - 16 GB - 2 GB - 2 GB - 16 GB - 2 GB -	Memory for the Virtual Machine How much memory would you like to use for this virtu	ual machine?	
32 GB       Memory for this virtual machine:       512 American MB         16 GB       -       What type of network do you want to add?         4 GB       -       Maximum recommended memory:         2 GB       -       266 MB         1 GB       -       Excommended memory:         2 GB       256 MB       -         1 GB       -       Excommended memory:         2 GB       256 MB       -         1 28 MB       -       Guest OS recommended minimum:         32 MB       -       -         1 MB       -       -         32 MB       -       -         4 MB       -       -         4 MB       -       -         4 MB       -       -         4 Help       <       -         4 Help        -         4 Help        -         -        -         -        -         -        -         -        -         -        -         -        -         -        -         -       <	Specify the amount of memory allocated to this virtual machin must be a multiple of 4 MB.	ne. The memory size	New Virtual Machine Wizard
8 GB -       4 GB -         4 GB -       265 -         2 GB -       2656 MB         1 GB -       2656 MB         512 MB -       256 MB         258 MB -       256 MB         268 -       256 MB         1 GB -       9 Recommended memory:         256 MB -       256 MB         1 GB -       9 Recommended memory:         256 MB -       256 MB         64 MB -       9 Guest OS recommended minimum:         32 MB -       32 MB         16 MB -       32 MB         8 MB -       32 MB         4 MB -       9 Bext >         Help       < Back	32 GB - Memory for this virtual machine: 16 GB -	512 🗮 MB	Network Type What type of network do you want to add?
8 MB -       4 MB -         4 MB -       Connect the guest operating system to a private virtual network on the computer.         Help       < Back	8 GB - 4 GB - 2 GB - 1 GB - 1 GB - 512 MB - 256 MB - 1 GB - 1 GB - 1 GB - 1 GB - 1 GB - 2 656 MB - 2 756 MB - 2		Network connection           Isse bridged networking         Give the guest operating system direct access to an external Ethernet network. The guest must have its own IP address on the external network           Image: Use network address translation (NAT)         Give the guest operating system access to the host computer's dial-up or external Ethernet network connection using the host's IP address.
Help         < Back         Next >         Cancel         Conct use a network connection	8 MB - 4 MB -		<ul> <li>Use host-only networking Connect the guest operating system to a private virtual network on the hi computer.</li> </ul>
	Help < Back Nex	t > Cancel	C Do not use a network connection

- 12. Set (if necessary) the I/O Adapter Types dialog SCSI Adapter to LSI Logic (Recommended). Click <u>Next</u> 13. Choose Create a new virtual disk in the Select a Disk dialog, then click Next.
- 13. Choose Create a new virtual disk in the Select a Disk dialog, then click <u>Next</u>. New Virtual Machine Wizard

	Select a Disk Which disk do you want to use?
New Virtual Machine Wizard	
Select I/O Adapter Types Which SCSI adapter type would you like to use?	Disk Create a new virtual disk A virtual disk A virtual disk is composed of one or more files on the host file system, which will annear as a single bard disk to the quest operation system. Virtual disks
I/O adapter types	can easily be copied or moved on the same host or between hosts.
IDE Adapter: ATAPI	C Use an <u>e</u> xisting virtual disk
SCSI Adapter: O BusLogic	Choose this option to reuse a previously configured disk.
• IST Logic (Recommended)	C Use a physical disk (for advanced users)
C LSI Logic SAS	Choose this option to give the virtual machine direct access to a local hard disk.

- 14. The Disk type should remain SCSI (Recommended). Click Next.
- 15. If you are asked, the **Mode** "Independent" should remain unchecked. Do **not** check Mode "Independent".

New virtual Machine Wizard
Select a Disk Type What kind of disk do you want to create?
Virtual disk type
○ <u>I</u> DE
C SCSI (Recommended)

16. In the **Specify Disk Capacity** dialog box: Set the **Maximum disk size** to **8 GB.** (The image says 15 - use **8** not 15.) Select **Store virtual disk as a single file.** Do **not** select **Allocate all disk space now**. (If you allocate all disk space now, then when you copy the Virtual machine to another location or clone it, it will take a VERY long time.) Click **Next**.

New Virtual Machine Wizard	×
Specify Disk Capacity How large do you want this disk to be?	
Maximum disk size (GB):	
Recommended size for Other Linux 2.6.x kernel: 8 GB	
Allocate all disk space now.	
Allocating the full capacity can enhance performance but requires all of the physical disk space to be available right now. If you do not allocate all the space now, the virtual disk starts small and grows as you add data to it.	
Store virtual disk as a single file	
Split virtual disk into multiple files	
Splitting the disk makes it easier to move the virtual machine to another computer but may reduce performance with very large disks.	
B Pocket ACE size calculator	
Help < Back Next > Cancel	

- 17. In Specify Disk File leave the Disk File name as Fedora 12.vmdk, but make sure this disk file is stored in the same folder as the rest of your Fedora 12 virtual machine files! Some versions of VM ware do not correctly use the same Location parent folder as you set back in Step 8, above. When you have verified that the .vmdk file location folder is in the same Fedora 12 folder and Location as Step 8, then click <u>Next</u>.
- 18. Review the Ready to Create Virtual Machine information and make sure it matches this list exactly:
  - Name: Fedora 12
  - Location: where you store all your virtual machines for this course
  - Version: Workstation 8 (or 9, or whatever version you have)
  - Operating System: Other Linux 2.6.x kernel
  - Hard Disk: 8 GB, Monolithic (make sure this is only 8 GB)
  - Memory: 512 MB
  - Network Adapter: NAT
- 19. Make sure your Virtual Machine has the above settings, then click Finish.
- 20. Read carefully the Virtual Machine Created screen. It tells you what we will be doing next. The next section will install the Guest Operating System and the VMware Tools.
- 21. Close the Virtual Machine Created dialog box.
- 22. In your Windows file explorer, go to the Location folder from Steps 8 and 17 and make sure that the Fedora 12 folder contains both the VMware .vmx file and the VMware disk .vmdk file! If this is not true, delete this virtual machine and recreate it with both the .vmx and .vmdk files in the same folder!
- 23. Did I mention that your .vmx and .vmdk files must be in the same Fedora 12 folder? If not: Start Again!

### Step Two: Installing Fedora 12 into the virtual machine

1. Choose *either* the A: ISO Method or the B: Physical DVD Method below. The ISO Method is likely faster and less prone to errors than trying to use a scratched physical DVD. It also lets you re-install Fedora 12 anytime without needing a physical CD. Use the ISO Method when possible. You must use Fedora 12 for this course. Other versions of Fedora have new bugs that cause problems. Use *only* Fedora 12 32-bit.

#### A: ISO Download Method (best method):

This is the fastest and most reliable way to get your own copy of the **Fedora 12 32-bit DVD** ISO **image Fedora-12-i386-DVD.iso** and connect it to your Virtual Machine.

- a. First, follow these instructions to get your copy of the Fedora 12 32-bit DVD ISO image: <u>http://teaching.idallen.com/cst8207/13w/notes/570\_fedora12.html</u> Remember where on your local machine you downloaded the DVD! Fedora-12-i386-DVD.iso
- b. After verifying the download, select the Fedora 12 virtual machine in the VMware Tabs menu or left Sidebar. Go to the Virtual Machine Settings by selecting Edit virtual machine settings or using the Settings entry under the VM menu (or use keyboard *hotkey* CTRL-D).
- c. In the **Virtual Machine Settings** dialog box, in the left area showing all the virtual devices, click to open the virtual **CD/DVD** device, which will display the **Device Status** and **Connection** information for this **CD/DVD** device on the left.
- d. Select Use ISO image file and Browse to locate and connect the virtual CD/DVD device to the Fedora DVD .ISO image file you just downloaded. The path to the .ISO image will appear in the box underneath the selected Use ISO image file. It should contain Fedora-12-i386-DVD.iso

Hardware       Options         Device       Summary         Memory       512 MB         Hard Disk (SCSI)       1 GB (Pre-alloca)         Hard Disk 2 (SCSI)       1 GB (Pre-alloca)         Hard Disk 3 (SCSI)       1 GB (Pre-alloca)         Hard Disk 3 (SCSI)       1 GB (Pre-alloca)         Hard Disk 3 (SCSI)       1 GB         COnnect at power on       Connection         Connection       Using file G: (Flo)         NAT       Present         Sound Card       Auto detect         Sound Card       Auto detect         Display       Auto detect         Processors       1	Virtual Machine Settings			×
Add	Virtual Machine Settings Hardware Options Device Memory Hard Disk (SCSI) Hard Disk 2 (SCSI) Hard Disk 3 (SCSI) CD/DVD (IDE) Hoppy Network Adapter USB Controller Sound Card Display	Summary 512 MB 15 GB 1 GB (Pre-alloca 1 GB Auto detect Using file G:(flo NAT Present Auto detect Auto detect Auto detect	Device status         □ Connected         ☑ Connect at power on         Connection         ⑥ Use physical drive:         Auto detect         ☑ Use ISO image file:         ☑ Browner on	×
OK Cancel Help	Processors	Auto decet: 1	Adv OK Cancel	vanced

- e. Make sure the CD/DVD Device status at the top right is set to "Connect at power on".
- f. Save the settings.
- g. in VMware, select Power On This Virtual Machine to start (boot) the virtual machine.
- h. Skip over part B (Physical DVD Method) below and proceed to Step 2 below.

#### **B:** Physical DVD Method (not recommended):

Use this physical DVD method only if the ISO Method (above) is not available. We don't recommend it.

- a. Insert the physical Fedora 12 DVD in the physical CD/DVD drive. (Must be Fedora 12!)
- b. Select "Use physical drive" in the VMware Settings for your virtual CDROM.
- c. Make sure the Device status is set to "Connect at power on".
- d. Save the settings.
- e. Select Power On This Virtual Machine to start (boot) the virtual machine.
- f. Watch out for I/O errors from a damaged DVD! If the DVD shows any errors at all during the installation, start over with a different DVD or use the ISO Method. **Do not proceed with a damaged DVD installation, even if it appears to finish correctly!**
- g. Continue to Step 2 below.

# Continue here at Step 2 after you have connected your virtual CD/DVD drive to a Fedora 12 installation CDROM or ISO file:

2. First time boot from the Fedora 12 DVD or ISO file: When you have booted (powered on) the new virtual machine from the Fedora 12 ISO or the DVD, click the mouse in the Welcome to Fedora 12! window and then use the keyboard arrow keys (the mouse does not work on this initial screen) to select Install or upgrade an existing system and press ENTER. (This is the default entry and it will auto-select itself anyway after a 60-second time-out. Using the arrow keys will cancel the time-out and let you wait as long as you want.)



- 3. Skip **Testing the media**, unless you are concerned that your DVD or ISO may be damaged. (If you verified the checksum of the downloaded .ISO file, you can safely skip this step. If you did **not** verify the .ISO file, or if you are using a physical DVD, you must do a verify now, at least once, to make sure the .ISO file is good and not corrupted. Delete or discard any corrupted DVD image and get a new one.)
- 4. When the Fedora title screen appears, select Next. (There are no other options available.)
- 5. Select the language and keyboard system: use the default English and USA settings. Click Next.

6. Re-initialize the drive by selecting **Re-initialize drive**. (There is nothing on the new virtual disk drive yet.) This prepares the Virtual Hard Disk (which is really a virtual machine disk represented by a file) for Fedora.

	Warning
2	Error processing drive: /dev/sda 15359MB VMware, VMware Virtual S This device may need to be reinitialized. REINITIALIZING WILL CAUSE ALL DATA TO BE LOST!
	Device details: pci-0000:00:10.0-scsi-0:0:0:0
	Ignore drive Re-initialize drive

- 7. Set the Linux **Hostname** to be your **Algonquin College eight-character userid** (your Blackboard userid), made up of part of your last name followed by some digits. Use your **Blackboard userid** for the name.
- 8. Select Montreal as the closest city to our time zone, and adjust the time accordingly.
- 9. In some boot sequences, you can select a Time/Date option to have your system time synchronized automatically from Internet time servers. Be careful about setting your machine to do this; Algonquin ITS sometimes blocks access to external network time servers. Internet time synchronization appears to work in early January 2013 when this lab was updated. Algonquin has a network time server here for cases where using Internet servers are blocked: time.algonquincollege.com
- 10. Create a Linux Fedora **root** password. **Do not** forget this root password! This **root** account serves the same purpose under Linux as your Windows **Administrator** account serves under Windows.

The root account is used for administering the system. Enter a password for the root user.
Root Password:
<u>C</u> onfirm:

If you forget your Linux Fedora **root** password, you will need to restart your Linux machine in **single-user** or **Recovery** mode and create a new root password. Details for doing this are in the Class Notes on the course web site. (Look in the Frequently Asked Questions page.) Click Next when you have chosen your password. Write your Linux **root** password here:

11. Did I mention that you shouldn't forget your root password? Write it down!

12. Leave the default **Replace existing Linux** system (even though there isn't one) and check the **Review and modify partitioning layout** checkbox.

<u>Encrypt system</u>		
Select the drive(s) to use fo	r this installation.	
☑ sda 15359 MB VMV	vare, VMware Virtual S	
- <u>A</u> dvanced storage confi	guration	
What drive would you like to	boot this installation from?	

13. Leave the defaults as LVM Volume Groups. (More on this in the lecture.) Click Next.

New     Edit     Delete     Reset     RAID     LVM       Device     Mount Point/ RAID/Volume     Type     Format     Size (MB)       LVM Volume Groups     5156       VolGroup     15156       lv_root     /     ext4     ✓     14132       lv swap     swap     ✓     1024	sda2 15158 MB					
New     Edit     Delete     Reset     RAID     LVM       Device     Mount Point/ RAID/Volume     Type     Format     Size (MB)       LVM Volume Groups     volGroup     15156       v VolGroup     15136       lv_root     /     ext4     ✓       lv swap     swap     ✓     1024						
Device     Mount Point/ RAID/Volume     Type     Format     Size (MB)       LVM Volume Groups	New	Edit	Delete	Reset	RAID	LVM
LVM Volume Groups ▼ VolGroup Iv_root Iv_swap Swap VolGroup 15156 14132 1024	Device	Mount Po RAID/Volu	nt/ Type	Format	Size (MB)	
✓ VolGroup         15156           Iv_root         /         ext4         ✓         14132           Iv_swap         swap         ✓         1024	LVM Volume Groups					
lv_root / ext4 ✓ 14132 lv_swap swap ✓ 1024					15156	
y swap swap 🖌 1024	lv_root	/	ext4	4	14132	
	lv_swap		swap	4	1024	
Hard Drives	→ Hard Drives					

14. A **Format Warnings** dialog will appear for the **sda** (first) disk. (You should only see **one** disk. Contact your instructor if you see more than one disk here.) Click **Format** and then **Write changes to disk.** The formatting may take a minute or two to finish.

Format Warnings			
The fol to be f	owing pre-existing partitions have been selected prmatted, destroying all data.	/	/
/dev/so	a disklabel		
			Writing storage configuration to disk
			The partitioning options you have selected will now be written to disk. Any data on deleted or reformatted partitions will be lost.
	Cancel Format	(	Go <u>b</u> ack <u>W</u> rite changes to disk

- 15. Once the file systems have been created, you will see a **Boot Loader Selection** screen. Leave the **"install boot loader on /dev/sda"** checkbox as is selected by default and select **Next.**
- 16. Select Customize Now, and click Next

The default installation of Fedora includes a set of software applicable for general internet usage. What additional tasks would you like your system to include support for?			
🗙 Office and Productivity			
Software Development			
Web Server			
Please select any additional repositories that you want to use for software installation.			
✓ Installation Repo			
□ Fedora 12 i386 ■			
🗌 Fedora 12 - 💦 86 - Test Updates			
Contanta internet int			
+ Add additional software repositories			
You can further customize the software selection now, or after install via the software management application. O Customize later  © Customize now			

17. Make sure *both* **GNOME** *and* **KDE** are selected in the group of **Desktop Environments**. Do **not** select any other software packages at this time. (You could always add more software later, but **don't** do it with this older Fedora release; install something more recent. You only have 8 GB of space available.) Click **Next.** 

	• · · · · · · · · · · · · · · · · · · ·
Desktop Environments	👸 🗹 GNOME Desktop Environment
Applications	🔣 🗹 KDE (K Desktop Environment)
Development	
Servers	
Base System	
Languages	

- 18. Click Next to start the software installation, which may take 30 to 60 minutes. You will be installing about 1,200 packages. (If you see a smaller number, you've missed something and should Reset your virtual machine, reboot, start over and select the correct options.) Wait until the install finishes. (If you are using an .ISO install, you can safely "Suspend" your virtual machine and resume the machine and installation later, if you run out of time today. If you are using a physical CD, this may not be true.)
- 19. When installation is done and you are prompted to reboot, do the following before your reboot: If you used the ISO Method, above, go to VM Settings, open again the virtual CD/DVD device, and un-check "Connect at power on". If you used the DVD Method, remove the DVD from DVD drive. You may have to "force" the unmounting of the CD/DVD device. Do so. Windows VMware may go unresponsive after forcing the unmounting. In that case, use the VMware Power menu to "Reset" your virtual machine to hard reboot it. Fedora should reboot successfully. If so, skip the reboot in the next step.
- 20. In VMware, select to **Reboot** the Fedora Linux virtual machine. (Do <u>not</u> reboot your Windows host system!) See the previous step to **Reset** your virtual machine if the Reboot hangs.
- 21. If you have successfully disconnected your CD/DVD, the Linux virtual machine will reboot Fedora 12 from the virtual hard drive. (If you see the Fedora Installation screen again, you have not successfully disconnected the CD/DVD at power on. Disconnect the CD/DVD, reboot, and try again.) The first time Fedora 12 boots, you will be asked a few questions before you can log in. Here are the answers:
- 22. You must create a non-administrative (regular) user account. Use your real name for the name and your **eight**-character **Algonquin College userid** for the **userid**, the same **userid** you used for the **Host name** earlier. The **userid** and **host name** will be the same eight characters. Set a password you can remember!
- 23. Now log in to Linux Fedora using your eight-character Algonquin College (Blackboard) userid.
- 24. If you used the ISO Method, above, go to VM Settings, open again the virtual CD/DVD device, and set the device to "Use physical drive", then re-check "Connect at power on". (If you used the physical DVD Method, your virtual CD/DVD is already connected to the physical drive.) Remove any CDROM.

25. Once you have logged in using your Algonquin userid, ensure that you are connected to the network by selecting **System eth0** or **System eth1** from the network menu (dual terminal screens) in the top menu bar:



You may need to select this networking entry any time you **resume** or **reboot** your virtual machine.

- 26. Use the instructions at the end of this lab to configure Linux access to the printer in this room (**T126**). Showing the Linux configured **printer** at the end of the lab is worth one of your lab marks.
- 27. Find the **Terminal** application in the **Applications** menus and drag its icon from its menu location up onto the bar at the top of your Fedora Linux window. This makes terminals easier to start.
- 28. Open a web browser in your host operating system (not in your Fedora 12 guest O/S, since you will be rebooting Fedora 12 and don't want to lose your place) and go to the **Course Home Page** for this course. Enter the **Class Notes Index** page and locate the **VMware Tools** installation and configuration page.
- 29. Find there and follow the instructions for installing **VMware Tools** into your Linux machine. This will let your Fedora Linux window expand to the size of your VMware window. Showing this expanded window to your instructor when you finish this lab is worth one of your lab marks.
- 30. Use VMware to create a "Snapshot" (backup) of the current system. (VM | Snapshot | Take Snapshot) You can return to this snapshot if you have problems in later labs. Using the snapshot will save you from having to re-install the entire system. Showing this snapshot is worth one of your lab marks.
- 31. Do not install any Fedora 12 updates there are too many of them. Do not update Fedora 12.
- 32. Know how to safely shut down your Linux Fedora virtual machine using the **System Shut Down** menu. Use the **Fedora** system menu to shut down Linux *before* you close VMware *before* you shut down your host Windows system. Knowing the correct shut-down order is worth one of your lab marks.

# How to correctly shut down a VMware system

Treat every **virtual** machine as you would a **real** physical computer. You must power on and power off your real and virtual systems **in the correct order** to avoid file system **damage** and **locked** VMware images:

- 1) Go into each and every running Virtual Machine and shut it down, or use the VMware Power menu to "Suspend" the machine and wait until every virtual machine fully shuts down or is suspended. Failure to Shut Down or Suspend will result in corrupted and locked virtual machines!
- 2) Close the VMware application (after you have shut down or suspended all virtual machines).
- 3) Shut down the Windows host (after closing VMware) and wait until the power goes off.
- 4) After the Windows host computer turns off (wait for it!), only then turn off any external caddy.
- 5) After powering off the caddy, wait 15 seconds until the disk inside the caddy stops spinning.
- 6) Unplug the caddy wires and pack the caddy in thick bubble wrap to take away in your backpack.
- 7) Don't drop your backpack with your caddy inside it!

## Use VMware "Suspend" instead of O/S Shut Down

As an alternative to shutting down each operating system inside each of your virtual machines before you close VMware, you may use your VMware **Power** menu to "**Suspend**" each of your virtual machines before you close VMware, which is similar to putting each virtual machine into **Sleep** mode. Suspending and then resuming a virtual machine is much faster than shutting down the O/S and then rebooting it. For most cases where you need to close VMware and power off your computer, suspending all your virtual machines is a much faster choice than shutting them all down. Use VMware **Suspend** instead of O/S Shut Down when possible.

# **Configuring the T126 Printer under Linux Fedora 12**

Make sure your Networking is working before you configure a network printer. (Check the Network icon in the Linux top menu bar, and make sure you can use Linux Firefox to open a Google window inside Linux.) Installing a network printer requires network access.

Although the printer in T126 is a Lexmark model T644, the Lexmark E220 driver is available and works, so we use that below.

- 1. Select System -> Administration -> Printing
- 2. Under the "New" menu select Printer
- 3. Under Devices, open Network Printer
- 4. Under Network Printer, select LPD/LPR Host or Printer
- 5. Put 10.50.16.249 as the Hostname (this IP address is written near the printer)
- 6. Leave the **Queue** empty (blank)
- 7. Select Forward
- 8. In the Choose Driver dialog box, select Lexmark and then click Forward
- 9. Under Models select Optra E220
- 10. Under Drivers select the top (recommended) driver
- 11. Click Forward
- 12. In the Describe Printer dialog box shorten the Printer Name (not the Description) to lp126
- 13. In the Location box enter: Lexmark T644 at 10.50.16.249 in T126
- 14. Click Apply
- 15. Rather than printing a test page, print something you actually need printed!

Note that the printer will only work if your Fedora Linux system is fully connected to the network, as indicated by the Network icon in the Linux top menu bar. Be careful about queueing multiple print jobs with the network disconnected - all those print jobs will rush to the printer when the network becomes active. Go to System -> Administration -> Printing and right-click on lp126 and select "View Print Queue" to see and delete queued print jobs you don't need. Once all the print jobs go to the printer, you have to physically run to the printer and quickly use the front panel buttons to cancel all the unwanted print jobs. Save trees! Don't print!

# Lab Marks – you must demonstrate to your instructor:

VMware Tools working (show window resize)
 Fedora printer configured with correct printer name
 Snapshot taken
 Recite correct shut-down order
 You put your name on your caddy and power supply