

## This is Lab Worksheet 7 - not an Assignment

This Lab Worksheet contains some practical examples that will prepare you to complete your Assignments. You do not have to hand in this Lab Worksheet. Make sure you complete the separate Assignments on time. Quizzes and tests may refer to work done in this Lab Worksheet; save your answers.

### 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 from the <http://cstech> web site 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 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.

## 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 into 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).

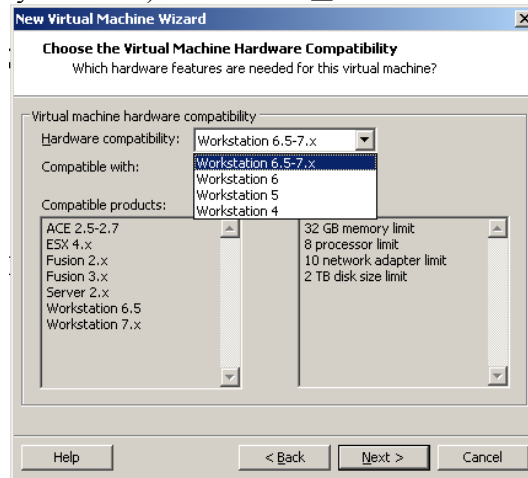
### Step One: Creating a new Virtual Machine for Linux in VMware 7,8,9

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.)

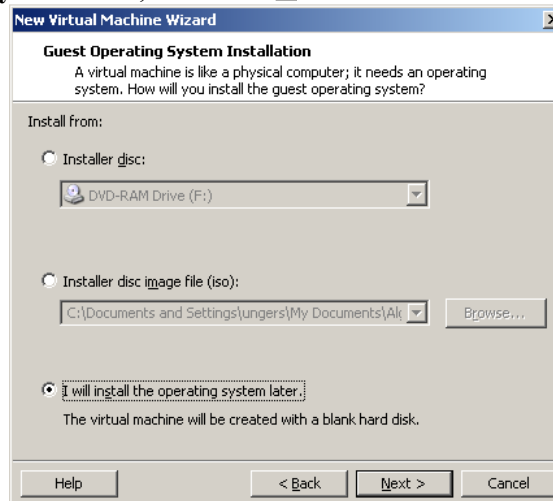
1. In your Windows host O/S, locate and start **VMware Workstation**.
2. Go to the VMware **File** menu and click **New Virtual Machine** or select: **New Virtual Machine** from the **Home** panel.
3. Select **Next Custom** installation in the **New Virtual Machine Wizard** dialog window that appears,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



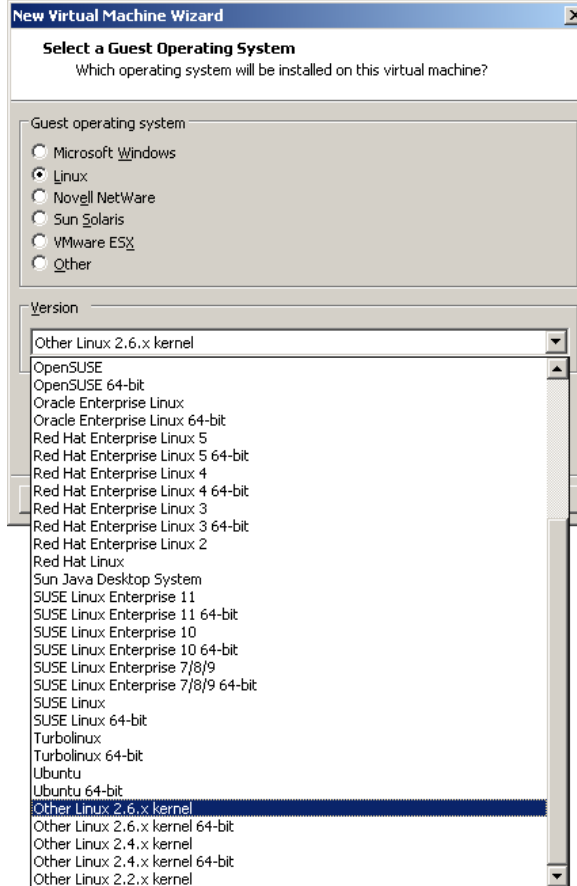
4. In the **Virtual Machine Hardware Compatibility** dialog box, you have several choices. The Algonquin T126 machines have VMware 8 installed on them, so if you want the most flexibility to run your virtual machines using T126 hardware (e.g. in case you forget your laptop or your laptop is dead), you must choose Workstation 8 (or earlier). If you will never use the T126 machines, you can leave the setting at the highest version offered (e.g. Workstation 9, if you have it). Then click **Next**.



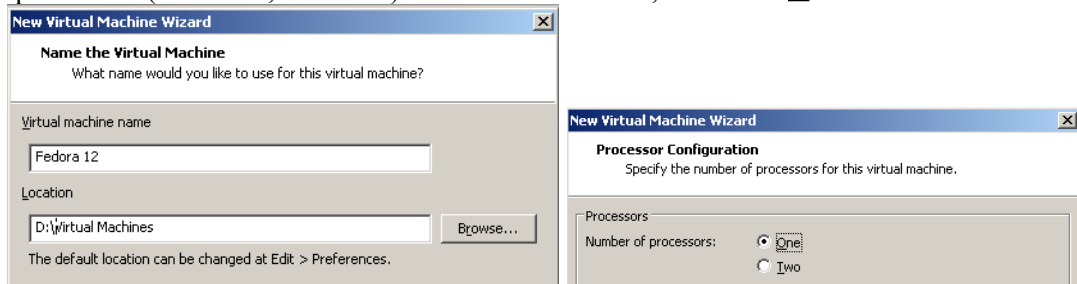
5. Select **I will install the operating system later**, then click **Next**.



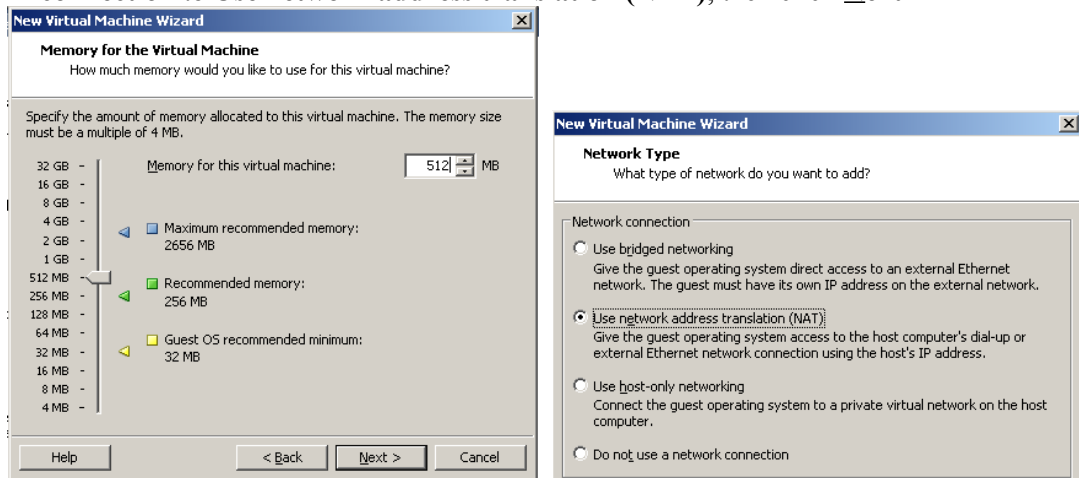
6. Select **Linux** as the Guest operating system and **chose Other Linux 2.6.x kernel**, then click **Next**.



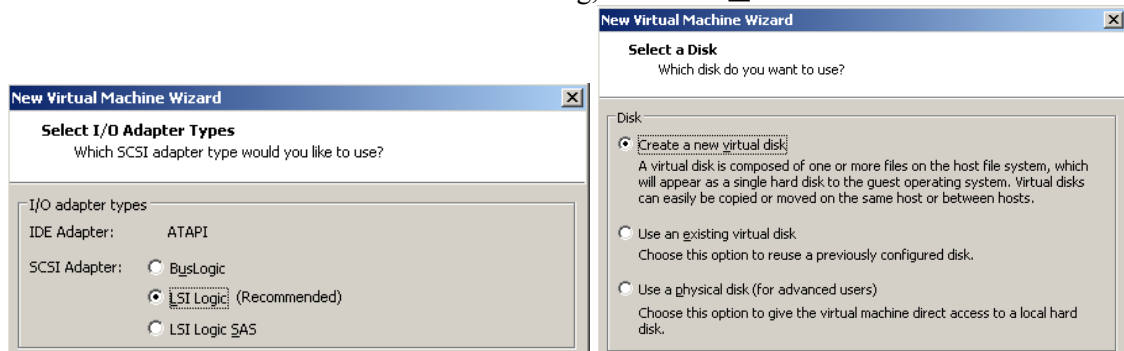
7. Change the **Virtual machine Name (Other Linux 2.6.X kernel)** to **Fedora 12**. Set the **Location** to the Windows folder containing all of your Virtual Machines. (Create a new folder if needed.) Make a note of this **Location** folder name and use the **same** folder name for your **.vmdk** disk down in Step 16, below. When you have written down the **Location** folder name, then click **Next**.
8. The number of processors (and cores, if needed) should be set to **One**, then click **Next**



9. In the **Memory** dialog box, set the **Memory for this virtual machine** to **512MB**, then click **Next**.
10. Set the **Network connection** to **Use network address translation (NAT)**, then click **Next**



11. Set (if necessary) the **I/O Adapter Types** dialog SCSI Adapter to **LSI Logic (Recommended)**. Click **Next**
12. Choose **Create a new virtual disk** in the **Select a Disk** dialog, then click **Next**.

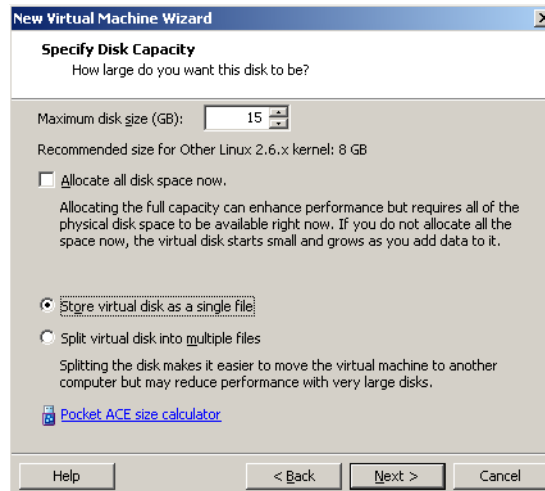


13. The Disk type should remain **SCSI (Recommended)**. Click **Next**.



14. If you are asked, the **Mode** “Independent” should remain unchecked. Do **not** check Mode “Independent”.

15. 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**.



16. 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 VMware do not correctly use the same **Location** parent folder as you set back in Step 7, above. When you have verified that the **.vmdk** file location folder is in the same **Fedora 12** folder and **Location** as Step 7, then click **Next**.
17. Review the **Ready to Create Virtual Machine** information:
- **Name:** Fedora 12
  - **Location:** *where you store your virtual machines for this course*
  - **Version:** Workstation 8 (or whatever version you have)
  - **Operating System:** Other Linux 2.6.x kernel
  - **Hard Disk:** 8GB, Monolithic (make sure this is 8GB)
  - **Memory:** 512MB
  - **Network Adapter:** NAT
18. Make sure your Virtual Machine has the above settings, then click **Finish**.
19. 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.
20. Close the **Virtual Machine Created** dialog box.
21. In your Windows file explorer, go to the **Location** folder from Steps 7 and 16 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!
22. Did I mention that your **.vmx** and **.vmdk** files must be in the same Fedora 12 folder?

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

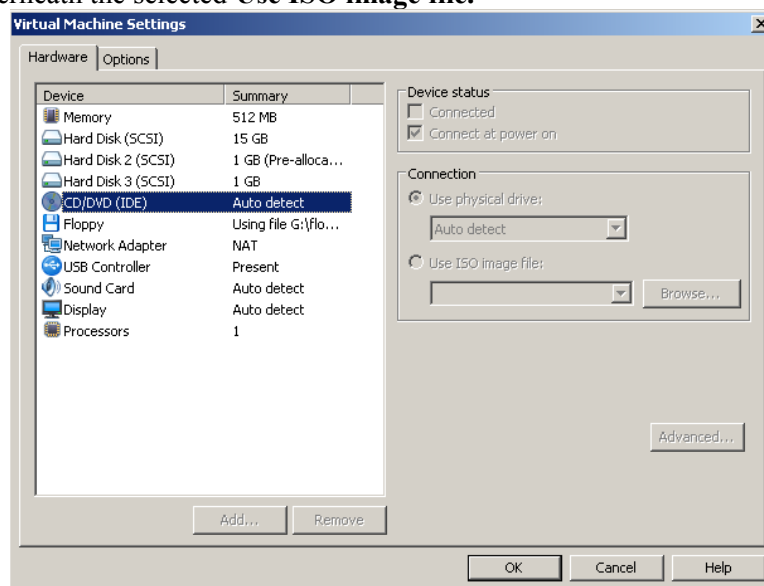
### Choose either the ISO Method or the physical DVD Method

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):

If you are going to be downloading the ISO image in this step, you must be on the Algonquin campus to access the <http://cstech> download web site. Avoid using wireless and avoid downloading while running a laptop on batteries (with power management) that limits download speeds! Rumour has it that Chrome will **not** download the ISO properly. Use Firefox or Safari (or maybe IE, though early versions of IE on early versions of Windows will not work either). The downloaded ISO file should be about 3GB.

- a. Download (once only) into your Windows host the 3GB **Fedora 12 32-bit DVD ISO image** from <http://cstech> (about 6 minutes). To find it, pick any room in the left sidebar, then look under sections such as **Drivers and Downloads, Linux, Fedora**, etc. Remember where you downloaded it!
- b. 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 downloaded from <http://cstech>. The path to the .ISO image will appear in the box underneath the selected **Use ISO image file**.



- 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. Proceed to Step 2 below.

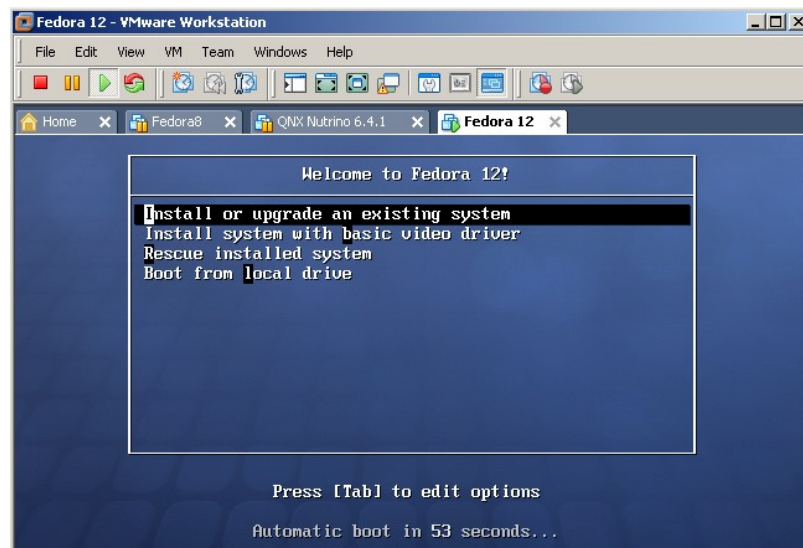
## B: Physical DVD Method (not recommended):

Use this physical DVD method only if the **ISO Method** (above) is not available.

- a. Insert the physical Fedora 12 DVD in the physical CD/DVD drive.
- 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. Proceed to Step 2 below.

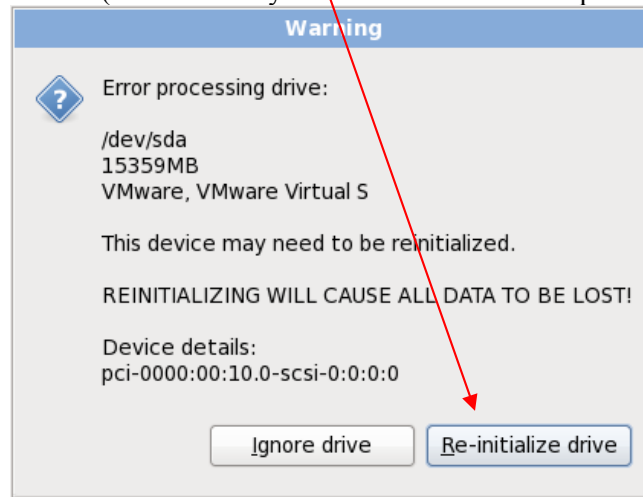
**Continue here at Step 2 after you have connected your virtual CD/DVD drive to a Fedora 12 installation CDROM or ISO file:**

2. **First time boot from the Fedora 12 DVD or ISO file:** When you have booted 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.)

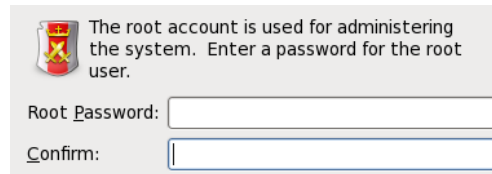


3. Skip **Testing the media**, unless you are concerned that your DVD or ISO may be damaged.
4. When the Fedora title screen appears, select **Next**. (There are no other options available.)
5. Select the language and keyboard system: use the **default** English and USA settings. Click Next.

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.



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 2012 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.

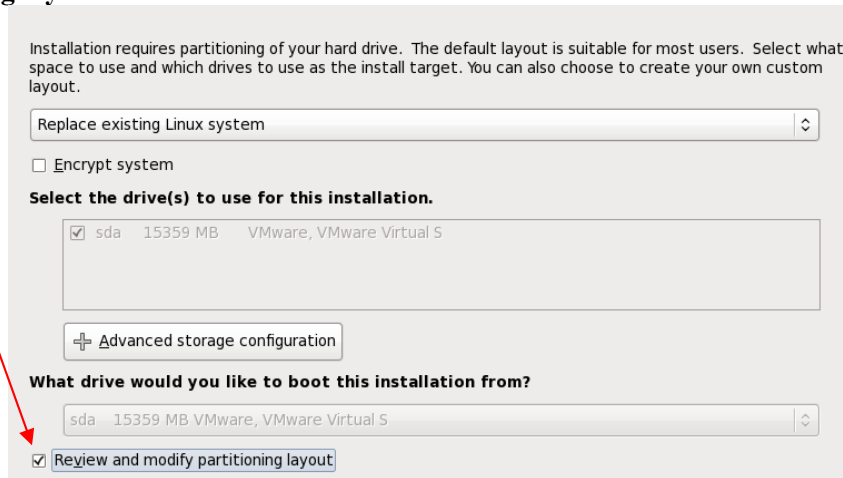
A dialog box with a red shield icon containing a white 'X'. The text reads: "The root account is used for administering the system. Enter a password for the root user." Below this are two input fields: "Root Password:" and "Confirm:".

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: \_\_\_\_\_

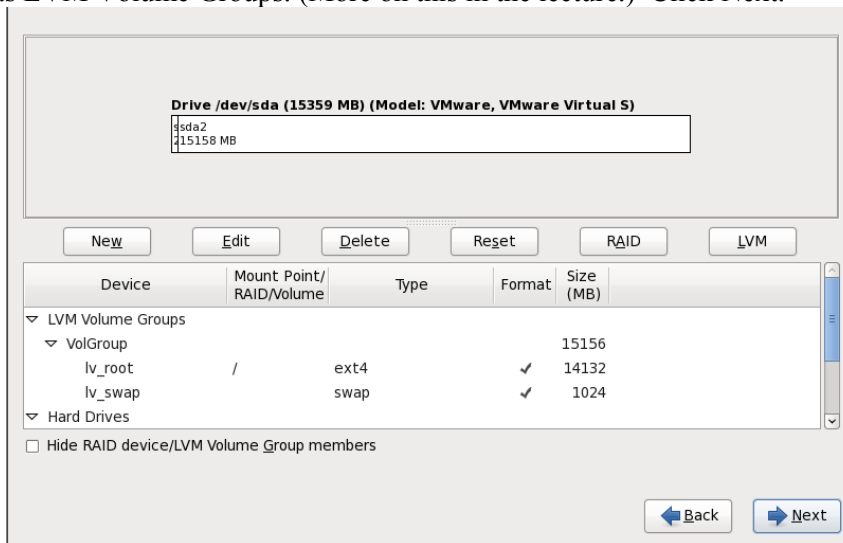
11. Did I mention that you shouldn't forget your **root** password? Write it down!



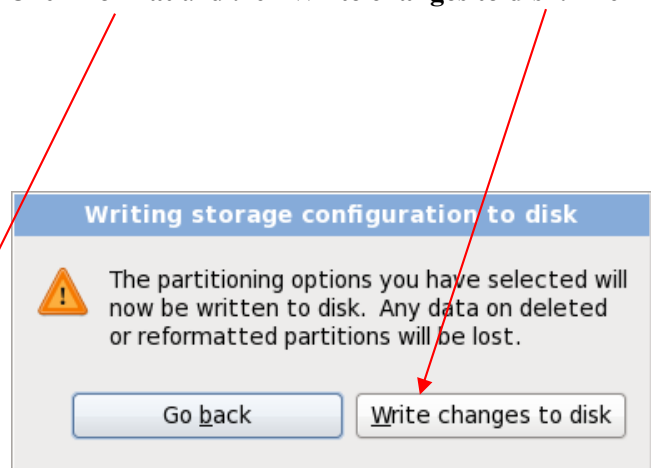
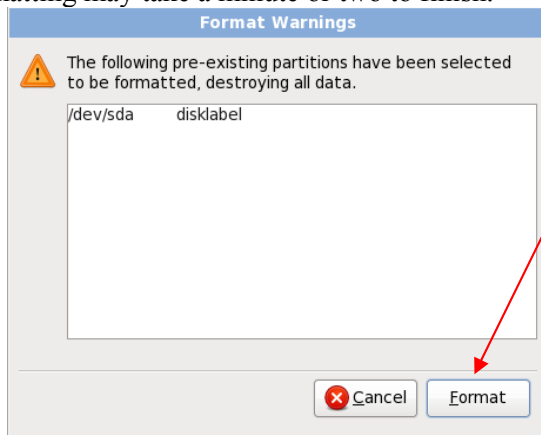
12. Leave the default **Replace existing Linux** system (even though there isn't one) and check the **Review and modify partitioning layout** checkbox.



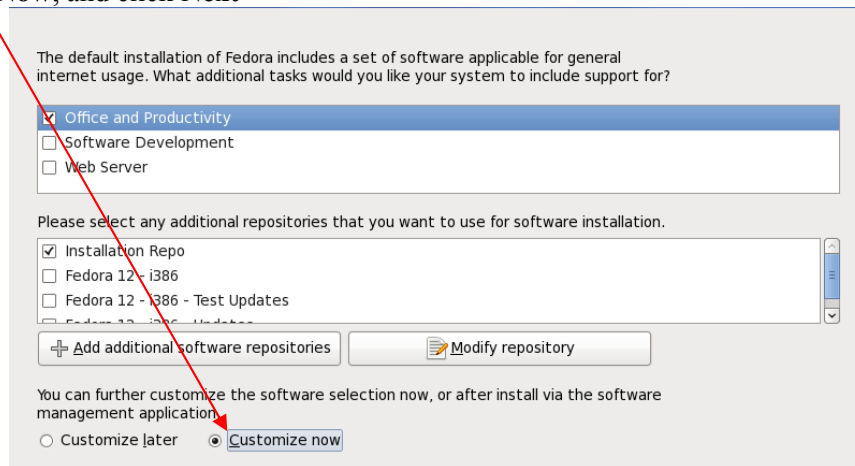
13. Leave the defaults as LVM Volume Groups. (More on this in the lecture.) Click Next.



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.



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**

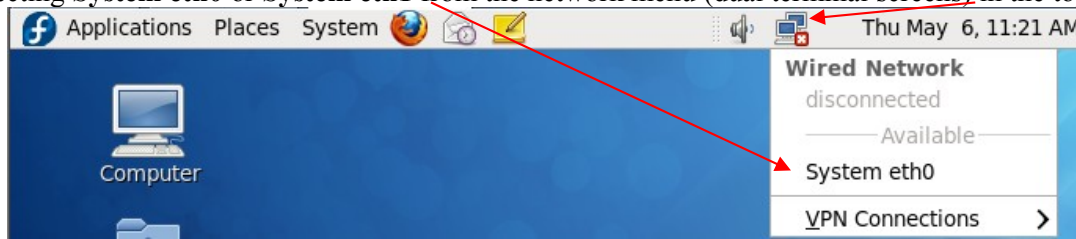


17. Make sure *both* **GNOME and KDE** are selected in the group of **Desktop Environments**. Do **not** select any other software packages at this time. (You can always add more software later, but **don't** do it with this older Fedora release. You only have 8GB of space available.) Click **Next**.



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. (You can safely "Suspend" your virtual machine and resume the machine and installation later, if you run out of time today.)
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 **not** 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 and your **eight-character Algonquin College userid** for the **userid**, the same **userid** you used for the **Hostname** earlier.
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:



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** by **Category** page and locate the **VMware Tools** 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:

1. VMware Tools working (window resize) \_\_\_\_\_
2. Fedora printer configured with correct printer name \_\_\_\_\_
3. Snapshot taken \_\_\_\_\_
4. Recite correct shut-down order \_\_\_\_\_
5. You put your name on your caddy and power supply \_\_\_\_\_