

Student Name: \_\_\_\_\_ Lab Sec: \_\_\_\_\_

<b>/3</b> Marks
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## Hard Disk Preparation and O/S Installation

Instructor's Initials
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**Due Date:** Before the start of your second lab. You can't start the next lab until this lab is fully working.

**Value:** 3 marks – see last page for the marking scheme (most subsequent labs are worth 5 marks)

### Materials needed before you begin

- 1) One “caddy”: an external 3.5” Hard Drive Enclosure (e.g. NexStar) with eSATA interface (supplied by Algonquin College Technology Store), including an eSATA cable, a USB cable, and Power Supply.
- 2) One SATA Hard Drive (200GB or larger, supplied by Algonquin College Technology Store)
- 3) A blank CD (to create a lab boot CD – you may be able to borrow an existing CD during the lab)
- 4) Fedora 12 DVD disk or ISO file (from your textbook or as downloaded from the CSTECH web site)

### Note on the Fragility of Hard Drives in backpacks

Your hard disk is very sensitive to shock. Don't store it **unpadded** in the bottom of your backpack where it will **hit the floor** every time you drop your backpack. Keep it in a **thick bubble wrap envelope** or wrap it in your **clothes**. **Store** it in your locker when you aren't using it – don't carry it around all the time.

### Procedures

Follow these procedures **carefully**. Read all the lab instructions BEFORE going on to do the lab. Not everything in this lab is presented in strict chronological order. Read it all, then proceed in a logical order.

#### A. Examine the Hard Drive (if it is not already installed in the enclosure)

Note the information label on the top of your hard drive indicating manufacturer and/or make of hard disk (Western Digital, Maxtor, Seagate, Quantum, etc.), model number, and capacity in gigabytes (GB) or terabytes (TB). Record this information below:

Manufacturer \_\_\_\_\_ Model Number \_\_\_\_\_

Capacity \_\_\_\_\_

#### B. Assembling the eSATA hard drive enclosure (if necessary)

Before assembling the drive into the enclosure, label your hard drive with your name (see below).

For installation in the caddy, see step-by-step help at: <http://cstech/eSATA.html>

Remove your anti-static wrist strap and disconnect it from the computer when you are finished.

### Label the Hard Drive and Caddy

It is important to label both the hard drive and caddy with your name in case you misplace or forget your drive. Many students forget their drives in labs each week; without your name, we can't contact you.

- Before you put the lid on your caddy enclosure **USE FELT PEN OR A LABEL TO PUT YOUR NAME ON THE HARD DRIVE**. (Only applies if the hard drive is not already installed).
- Then, secure the lid back onto the caddy. **USE A LABEL AND FELT PEN TO PUT YOUR NAME ON THE CADDY ITSELF so that we can return it to you when you leave it in a lab some day.**

## How to safely power on/off your caddy and computer

**How to correctly boot a machine using a caddy:** Make sure the computer and caddy power buttons are both **OFF** before you begin. Next, with the **power OFF**, plug the ESATA and power wires into the caddy, then turn on the caddy, then turn on the computer and let it boot. Reverse this order to shut down. Your caddy should be the *first* thing you turn on and the *last* thing you turn off. Do **\*NOT\*** turn off your caddy before you fully and completely shut down your host Windows system and power off your computer. You may corrupt your disk if you turn off the caddy before Windows has powered down. Do **\*NOT\*** plug/unplug wires unless the caddy and computer are both turned OFF.

### C. Testing the Caddy Hardware

When you first power on your computer, the computer runs the Power-On Self Test (POST), also called the "bootstrap" or "boot" process. During this process, one of the options you have is to push a key to access the BIOS (Basic Input Output System) configuration. The key combination to do this is briefly displayed on the screen during the POST. (DEL is a common key to use, but your machine may differ.)

In the lab classrooms, the BIOS settings are password-locked and set to automatically detect all drives, so you do not need to push any key to configure anything. Your hard drive should be correctly detected, and you should see the manufacturer and model name *very* briefly displayed during the POST messages. (You might be fast enough to use the Pause key on the keyboard to pause the boot process so you can read this disk information. The display goes by *very* quickly.)

If, after the POST, the computer cannot find a connected disk loaded with an operating system, it will pause saying "Reboot and Select proper Boot device". This will happen if your caddy has not yet been initialized, which is the purpose of this lab today. If you can see your hard drive information on the POST screen, and your caddy blue LED light blinks during POST, proceed on to imaging your hard disk using the lab boot CD.

### Caddy Troubleshooting: If Your Caddy Doesn't Work

If your caddy doesn't work on a particular machine in a lab (i.e. your disk drive is not visible during POST, or the blue LED light never blinks during POST to indicate access to the hard disk), follow these steps:

- a) Power down and try a different ESATA cable. (Many of the lab cables are worn and intermittent.)
- b) Power down and try a different caddy power supply.
- c) Power down and move to a different computer. (If this works, label the computer that doesn't work.)
- d) If you are imaging your caddy using the lab boot disk, try using a different boot disk.
- e) Try a USB cable instead of ESATA (but USB will be *\*much\** slower to use than ESATA!)

If your caddy still doesn't work, take your caddy apart, unscrew, remove and re-insert the hard drive, making sure to push it **firmly** against the circuit board for a good connection. Screw it down firmly. Many student drives shift during term and need to be re-seated inside the caddy enclosure.

If after all these attempts, you still can't get the drive to work properly, go to a working machine or an access centre and bring up the CSTECH problem report form and submit a problem report: <http://cstech/> This report will go immediately to the hardware people via pager, and if they are on duty they will come to your lab right away to help you diagnose the problem. You can also try visiting the hardware lab in T110, though paging through the reporting form is probably faster. You cannot return your drive or caddy to the campus store as defective until it has been signed off as defective by our hardware technicians. You must follow the above steps before you can get a replacement.

### D. Host operating system imaging with Windows XP

The base or "host" operating system for your caddy is Windows XP. If you have already imaged your caddy and installed the base Windows XP, skip ahead to the section **Linux Installation**.

Continue on to create a lab boot imaging CD and then use it to install Windows XP on your caddy drive.

Use the following instructions for creating a bootable CD and imaging your caddy hard drive. (Taken from the internal web site: <http://cstech/bootdisk.htm> that has other imaging methods as well.)

## E. Creating a Lab Boot Disk (imaging CD)

Your instructor may have some pre-built lab boot CDs that you can borrow, if you don't have a blank CD of your own. We recommend you make one of these boot CDs for your own use, just in case you need it.

The lab boot disk ISO file from the CSTECH web site is a "disk image". The ISO must be extracted to a blank CD to work. Just copying the ISO file to the CD will not work. It must create a bootable CD.

1. To create a lab boot disk, start by logging on to one of the T-building second floor Windows 7 access center PC's using your Algonquin username and password.
2. Insert a blank CD into the CDROM drive.
3. Go to URL <http://cstech/> and browse to find the **LAB BOOT DISK** file. Download the ISO file to your local computer. The file name is: **Lab\_boot\_disk.iso**
4. Double click the ISO file you just downloaded: **Lab\_boot\_disk.iso**
5. **Windows Disk Image Burner** will open. (If this doesn't happen, try other methods mentioned in the online file <http://cstech/bootdisk.htm> such as using **Nero** to burn the ISO image.)
6. In the **Windows Disk Image Burner** window, select **Verify Disk After Burning**, then click **Burn**.
7. The ISO image will be burned into the CD in about one minute and then verified, then the CD will be ejected. You now have your lab boot CD. Keep it in a CD sleeve or case to prevent scratches.

## F. Imaging your hard drive using the lab boot CD

The lab boot disk you just made can image or re-image all or part of your caddy hard disk. It only works in T building; it will not work anywhere else. The imaging cannot be stopped half-way; it must finish completely or else your drive will be corrupted and must be re-imaged again. **DO NOT USE IT ON ANY DRIVE OTHER THAN YOUR CADDY. READ THE DIRECTIONS THROUGH COMPLETELY BEFORE BEGINNING AND FOLLOW THEM CAREFULLY. FAILURE TO DO SO COULD RESULT IN LOSS OF ALL YOUR FILES AND TERM WORK!** Do NOT use this boot CD in your own laptop computer!

After creating your boot disk, insert it in the CDROM of the system containing the caddy hard drive that you wish to image. Reboot the system. Once the system boots from the lab boot disk, you will see two menus:

### MENU 1

The first menu is where you select the T building lab you are in while imaging the hard disk. You will be given selections to choose the lab from which you're imaging the hard drives. Carefully select the correct lab. If you select the wrong room, the imaging will not work. Select the correct lab room, e.g. **T126**.

### MENU 2

The second menu determines how much of your hard drive to overwrite. If you have **never** imaged your caddy before, choose "A" to image the whole drive, both partitions. If you have **already** imaged your caddy with Windows XP, choose "B" instead, so that you keep your virtual machines intact. **Choose carefully!**

- A. **"Re-image your whole drive"**: This option will completely re-image all of your hard disk. **ALL DATA FROM ALL PARTITIONS WILL BE LOST**, including all your virtual machines. Your drive will be (re-)created to have 2 partitions. The first partition will be about 20Gb in size and have Windows XP

Pro installed with VMware. The second partition will use the rest of your drive and be set up to be your VMware and data partition. The SID and computer name will also be changed to new random names.

- B. **"Re-image only the O/S Partition"**: This option will re-image **only the first**, Windows O/S partition, leaving any other partition(s) alone. Use this option when you need to recover your Windows O/S partition without overwriting the other partition containing all your virtual machines. With this option, your data (including virtual machines) will be **left intact** on the second partition. The SID and computer name will also be changed to new random names. This option preserves your virtual machines.
- C. **"Rename Only"**: This option does not re-image any partitions. It only changes the SID and computer name to randomly generated ones.
- D. **"Abort"**: As the the name says, this will abort all operations. Simply remove the disk and reboot afterward. Nothing will be changed.

If when using the boot CD you find it **hangs for more than a minute** trying to get a DHCP address, check your workstation network wiring: Trace the blue network wire at the back of the computer and make sure it is firmly plugged into both the computer and into the desk or wall. Then reboot. (Remember that the boot CD **only works in T building!** It will not work at home or anywhere else in the College. T building only!)

The entire Windows XP imaging process will take **30 to 60 minutes** depending on networking traffic. Get started early! After it has started, you can eject the boot CD and pass it to someone else. When it's done, you will be prompted to restart your computer and log into Windows XP Professional. The initial password is **password**, which will need to be changed after you log on. **Remember your password**; if you forget it, you have to re-image your O/S again. You may need to reboot Windows after your first login. Do so.

The Windows XP you have installed will include most necessary updates as of approximately August 2011. Windows may want to install more updates – do not install the updates during the lab, because that can take a long time. Install updates at a time when you can busy yourself with other work while the updates are proceeding. Do not spend first lab time waiting for optional updates to finish downloading and installing.

1. In the Windows XP **ESET** window, select **"Strict Protection"**. You are responsible for ensuring that you have a working Anti-Virus and Anti-Spyware protection on your drive as well as installing all Windows Updates. This must be done after every re-imaging of your O/S partition.
2. Put your **name** and contact information in the **OWNER.TXT** file inside your Windows XP host.
3. In Windows XP go to URL <http://cstech/> (NOT the Internet, because it would be too slow) and download OpenOffice (or LibreOffice) for Windows and install it on your base Windows XP system, so that Windows can read and print the Open Office lab documents used in this course..

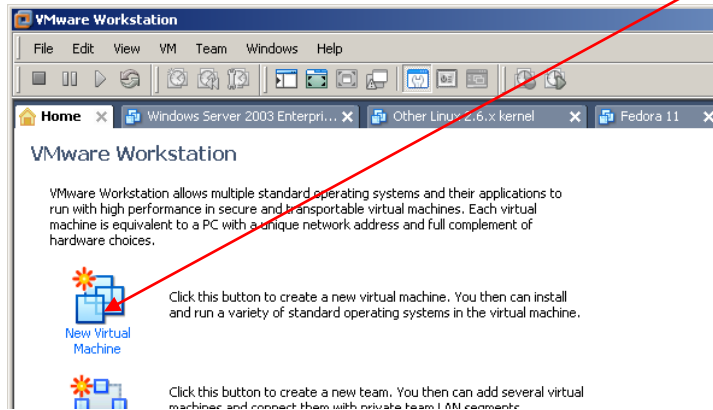
## Linux Installation

After you have Windows XP installed, you can create multiple virtual machines using **VMware Workstation**. The next step is to create a Fedora Linux virtual machine, then install Fedora Linux into it.

### G. Create a new Virtual Machine for Fedora Linux in VMWare

1. In your Windows XP host O/S, locate and start **VMware Workstation** (NOTE: If you are given the option of updating to a newer version of VMware, do not do it at this time)

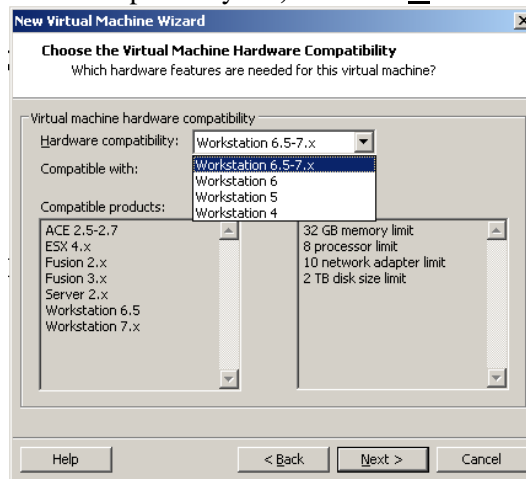
- Go to the VMware **File** menu and click **New Virtual Machine** or select: **New Virtual Machine** from the **Home** panel.



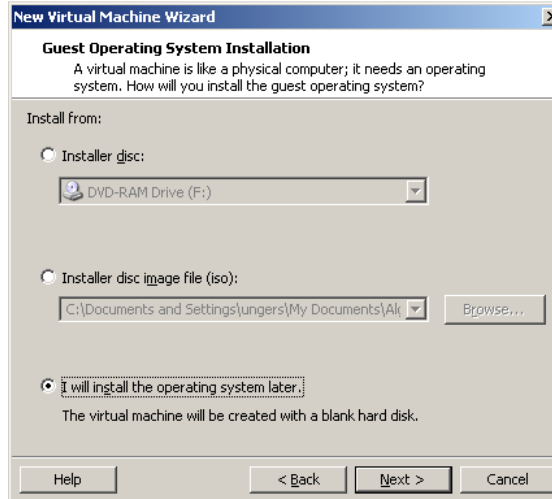
- Select Next **Custom** installation in the **New Virtual Machine Wizard** dialog window that appears then click **Next**.



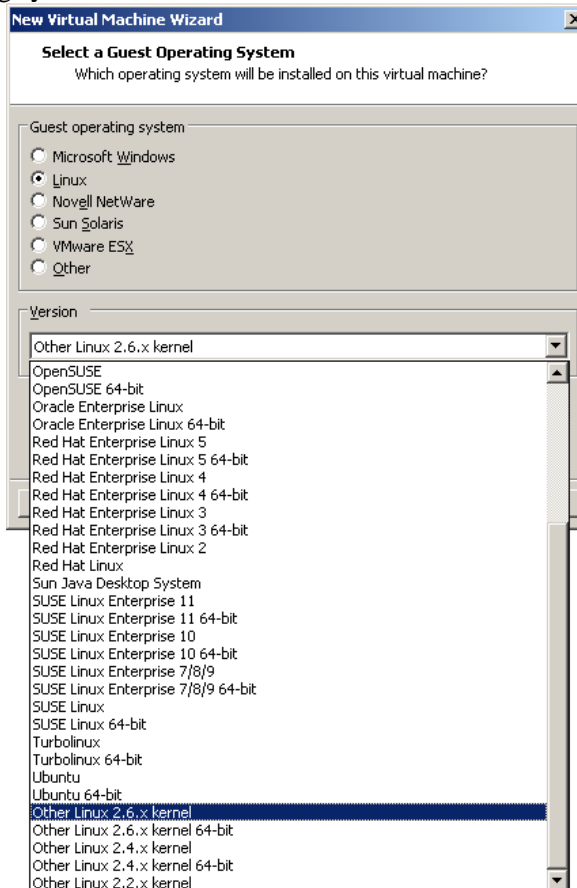
- Select **Workstation 6.5-7.x** from hardware compatibility list, and click **Next**.



5. Select **I will install the operating system later** and select **Next**.

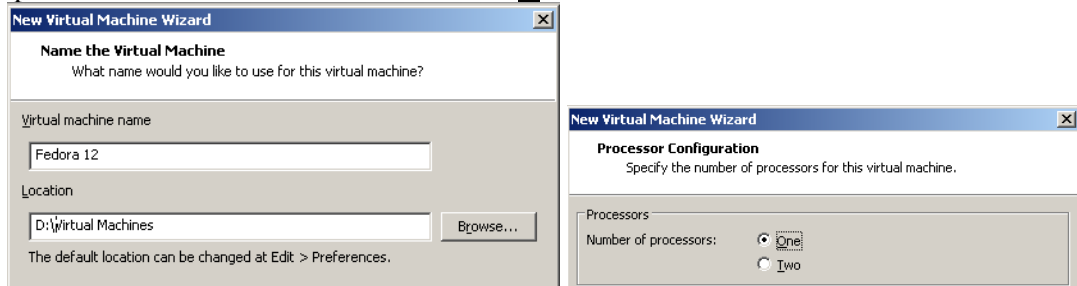


6. Select **Linux** as the Guest operating system and chose **Other Linux 2.6.x kernel** and select **Next**.

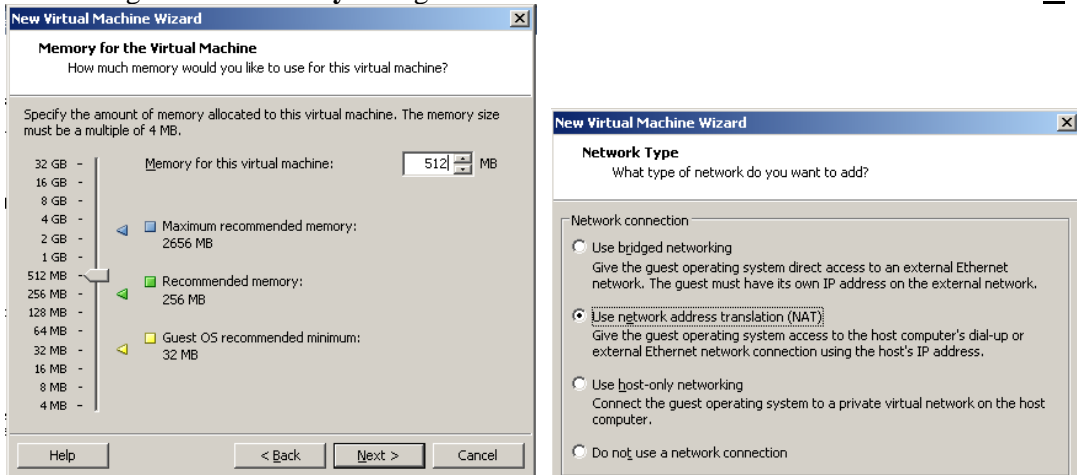


7. Change the **Virtual machine name (Other Linux 2.6.X kernel)** to **Fedora 12** and leave the **Location** unchanged (**D:\Virtual Machines\Fedora 12**) and click **Next**.

8. The number of processors should be set to **One** then click **Next**

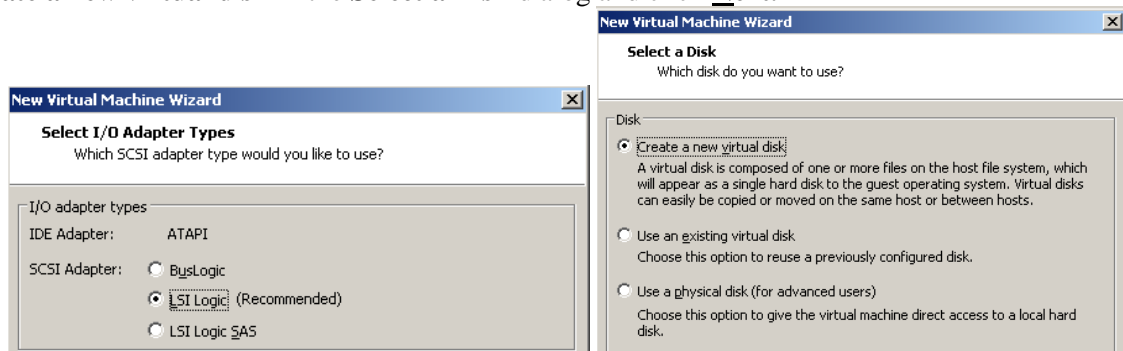


9. Change the default settings for the **memory** dialog to **512** and the **network connection** to **NAT**. Click **Next**



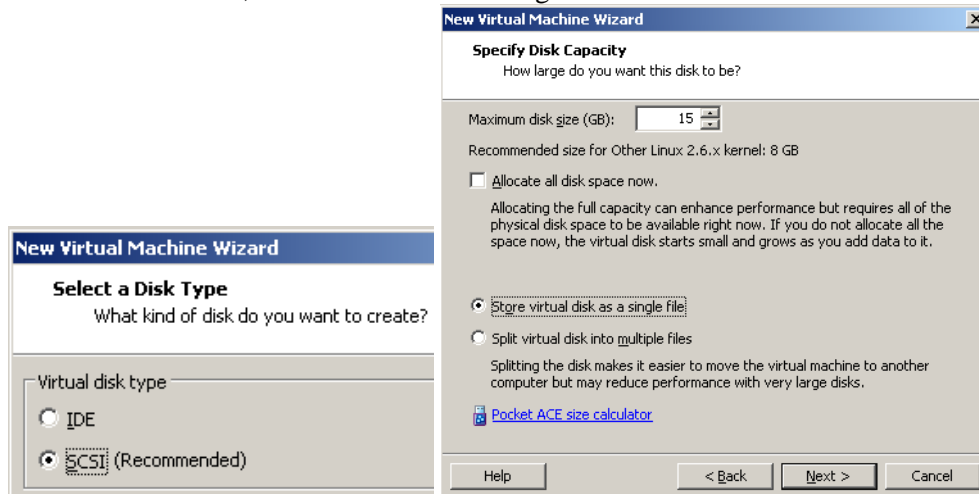
10. Change (if necessary) the **I/O Adapter Types** dialog SCSI Adapter to **LSI Logic**. Click **Next**

11. Choose **Create a new virtual disk** in the **Select a Disk** dialog and click **Next**.



12. The Disk type should remain **SCSI**. Click **Next**.

13. Change the default disk size to **15GB** in the **Specify Disk Capacity** dialog, and click **Next**. NOTE: Leave the disk as a **single file** and **do not** allocate the space now. If you do not do this, when you copy the Virtual machine to another location or clone it, it will take a **VERY** long time.



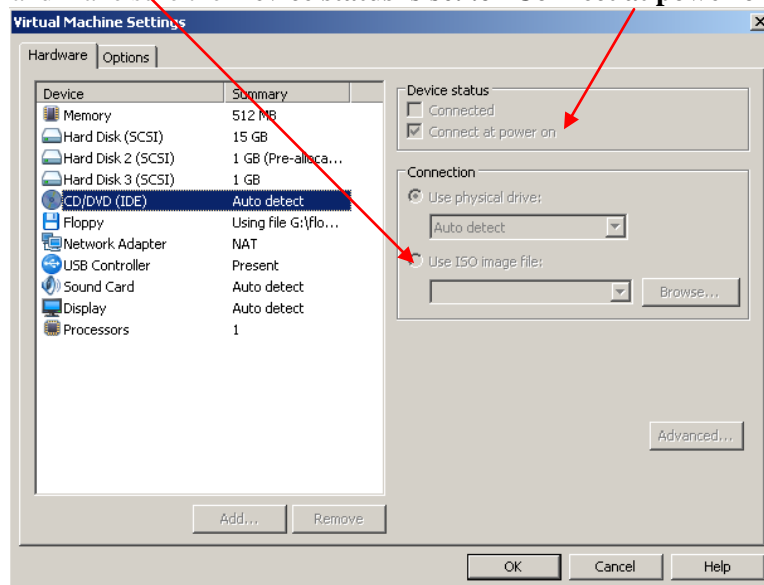
14. Leave the Disk File name as **Fedora 12.vmdk** and click **Next**.  
15. Review the **Ready to Create Virtual Machine** information and click **Finish**.

## H. Installing Fedora 12 – choose the ISO Method or the DVD Method

1. Choose *either* the **ISO Method** or the **DVD Method** below. The **ISO Method** is likely faster and less prone to errors than trying to use the scratched DVD from the back pocket of the textbook. It also lets you re-install Fedora 12 anytime without needing a physical CD. Use the **ISO Method** when possible.

**ISO Method:** Download (once only) the 3GB **Fedora 12** ISO image from <http://cstech> (about 6 minutes). Look for it under obvious sections such as **Drivers and Downloads**, **Linux**, **Fedora**, etc.

- a. In the **VM Settings** for your new virtual machine, double-click to open the virtual CD/DVD device. Use **Use ISO image file** to connect the virtual CD/DVD device to the .ISO image file you downloaded from CSTECH and make sure the **Device status** is set to “**Connect at power on**”.

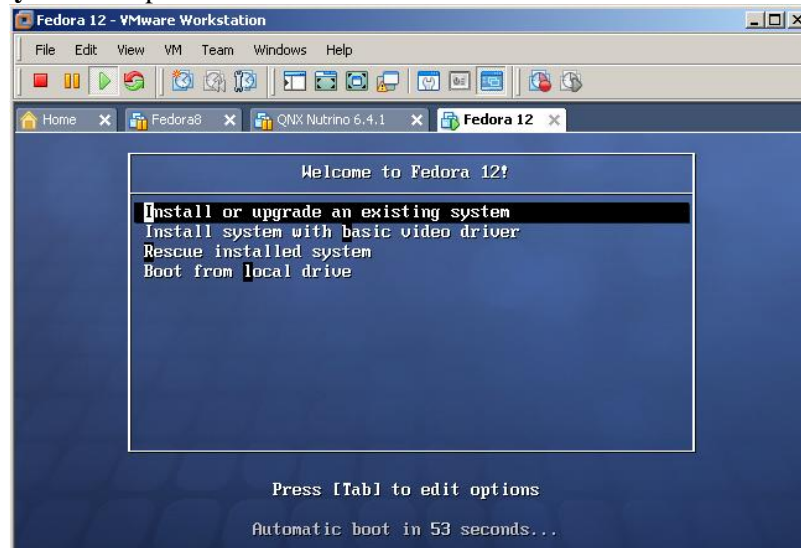


- b. When the ISO image file you downloaded is connected to the virtual CD/DVD via **Use ISO image file**, **Power On** (start, boot) the virtual machine. Proceed to item 2 below.

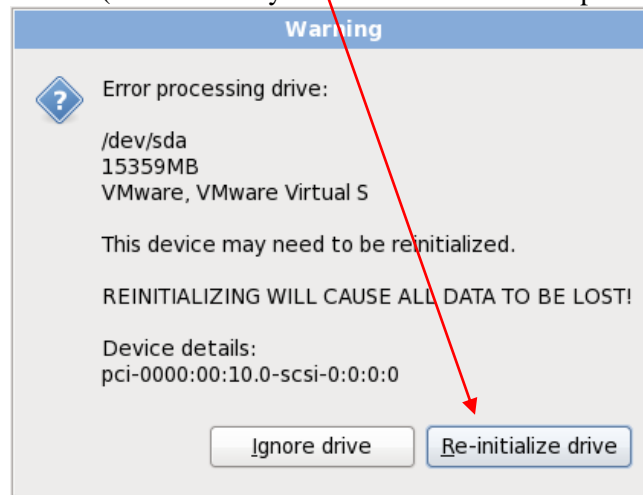


**DVD Method:** Insert the Fedora12 DVD in the physical CD/DVD drive, select “Use physical drive” in the VMware Settings for your virtual CDROM, and **Power On** (start, boot) the virtual machine. Watch out for I/O errors from a damaged DVD! If the DVD shows any errors at all during the installation, start over with a different DVD or use the ISO Method. Do not proceed with a damaged DVD installation!

- When you have booted from the ISO or the DVD, click the mouse in the Welcome to Fedora 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:

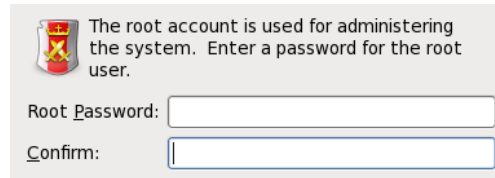


- Skip **Testing the media**, unless you are concerned that your DVD or ISO may be damaged.
- When the Fedora title screen appears, select **Next**. (There are no other options available.)
- Select the language and keyboard system: use the default English and USA settings.
- Re-initialize the drive by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



- Set the Linux Hostname to be your **Algonquin College eight-character userid**.
- Select **Montreal** as the closest city to our time zone, and adjust the time accordingly.
- 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 September 2011 when this lab was updated. Algonquin has a time server here: **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 XP **Administrator** account serves under Windows XP.



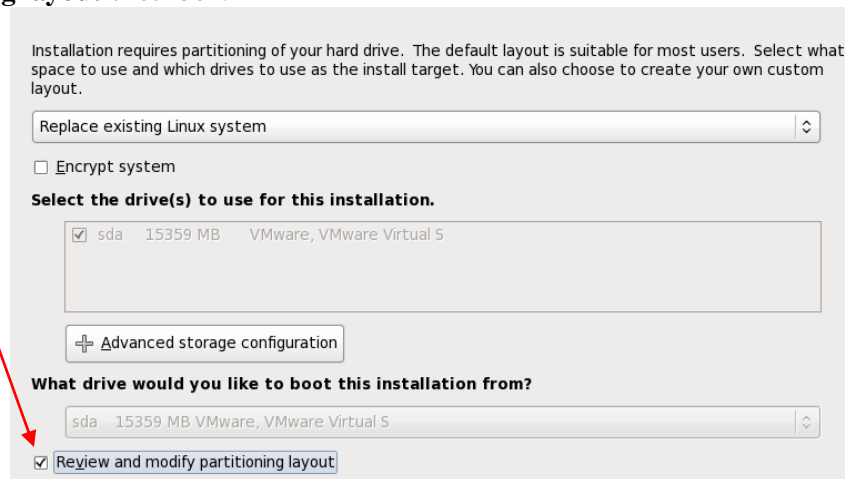
The root account is used for administering the system. Enter a password for the root user.

Root Password:

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 on the course web site.

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



Installation requires partitioning of your hard drive. The default layout is suitable for most users. Select what space to use and which drives to use as the install target. You can also choose to create your own custom layout.

Replace existing Linux system

Encrypt system

**Select the drive(s) to use for this installation.**

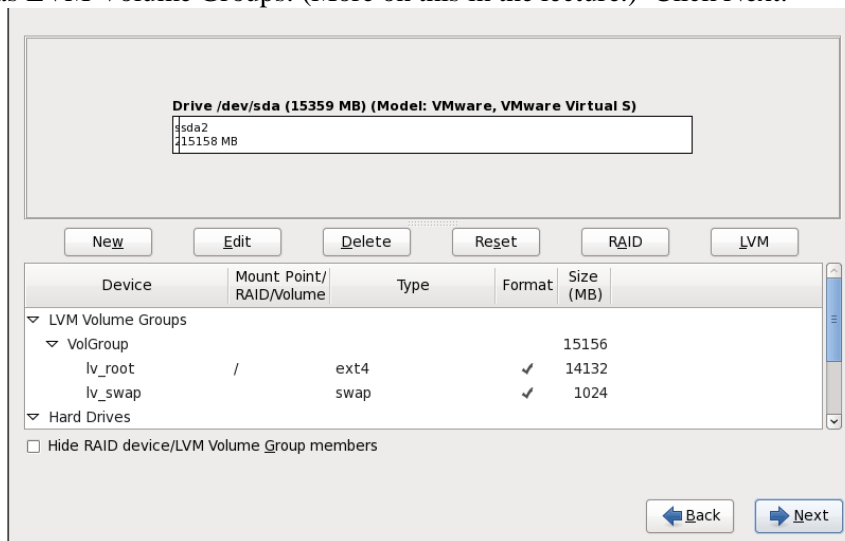
sda 15359 MB VMware, VMware Virtual S

**What drive would you like to boot this installation from?**

sda 15359 MB VMware, VMware Virtual S

Review and modify partitioning layout

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



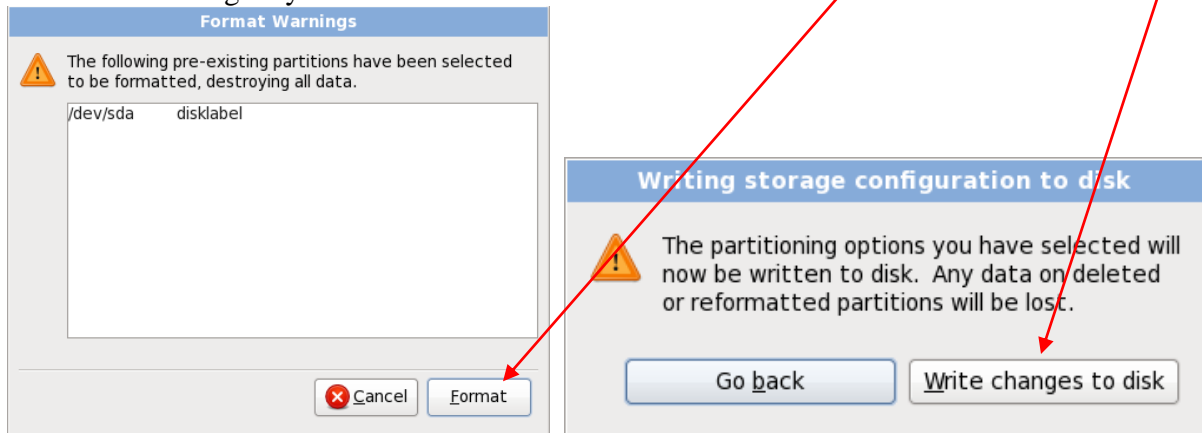
Drive /dev/sda (15359 MB) (Model: VMware, VMware Virtual S)

sda2  
15158 MB

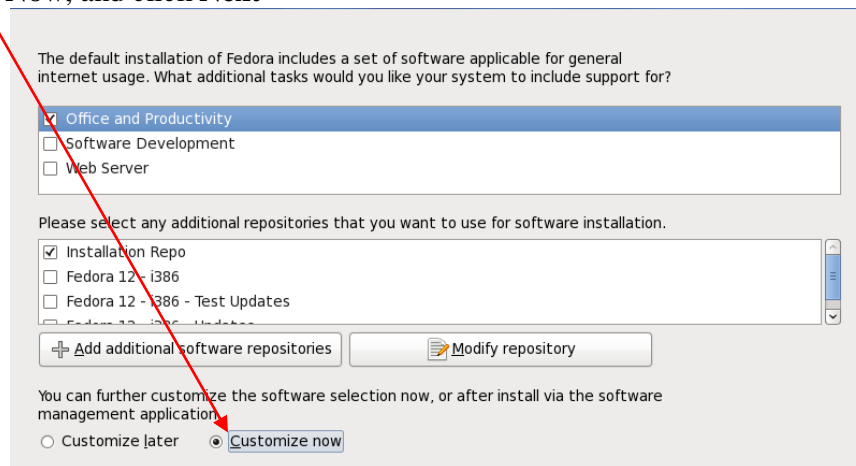
Device	Mount Point/ RAID/Volume	Type	Format	Size (MB)
LVM Volume Groups				
VolGroup				
lv_root	/	ext4	✓	14132
lv_swap		swap	✓	1024
Hard Drives				

Hide RAID device/LVM Volume Group members

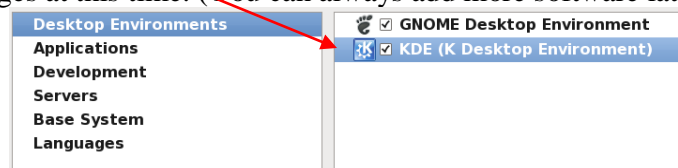
13. A **Format Warnings** dialog will appear for the **sda** (first) disk. Click **Format** and then **Write changes to disk**. The formatting may take a minute or two to finish.



14. 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**.
15. Select **Customize Now**, and click **Next**

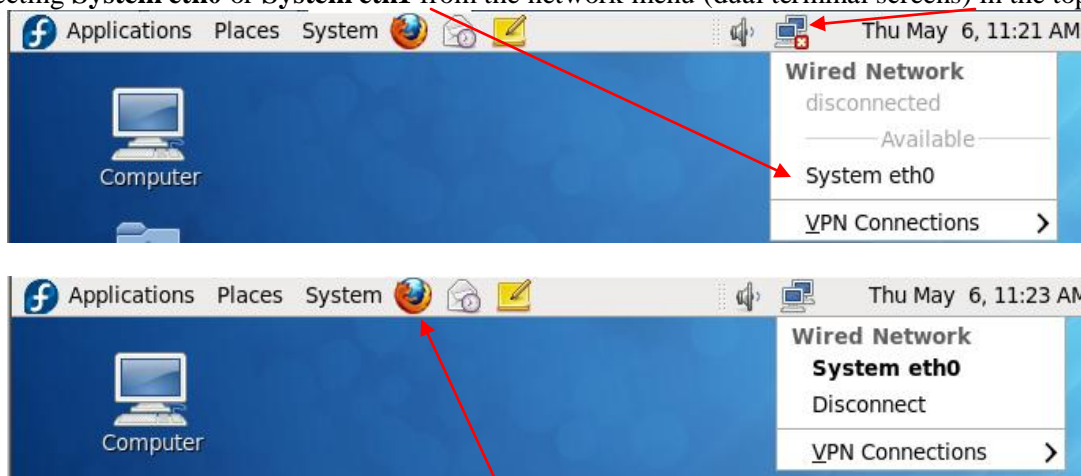


16. Make sure *both* **GNOME and KDE** are selected in the group of **Desktop Environments**. Do not select any other software packages at this time. (You can always add more software later.) Click **Next**.



17. Click **Next** to start the software installation, which may take 30 to 60 minutes. Wait until it finishes.
18. 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.
19. Select to **Reboot** the Fedora Linux virtual machine. (Do **not** reboot your Windows XP host system!)
20. When the Linux virtual machine reboots from the hard drive, it will be running Fedora 12 Linux. The first time it boots, you will be asked a few questions before you can log in.
21. You must create a non-administrative user. Use your eight-character **Algonquin College** userid.
22. Now log in to Linux Fedora using your eight-character Algonquin College userid.
23. 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 **DVD Method**, your virtual CD/DVD is already connected to the physical drive.)

24. 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:



25. Open a Linux Firefox web browser (Fox icon) and go to the Blackboard home page for this course.  
 26. Find there and follow the instructions for installing **VMware Tools** into your Linux machine.  
 27. Find there and follow the instructions on configuring Linux access to the printer in this lab (**T126**).  
 28. Use VMware to create a “**Snapshot**” (backup) of the current system. 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.  
 29. **You are now ready to have your Fedora Linux Installation checked by the professor.** Showing the Linux configured printer and the Blackboard home page in Linux are worth two of the three lab marks.  
 30. 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 XP system *before* you power off your hard drive caddy.

## I. Post an Introductory Message about Yourself

Post an introduction about yourself and your interests to the Blackboard Discussion Board: “**Introductions**”. **This step is the last mark in this lab.** Many students forget to do this.

## J. How to correctly shut down a VMware caddy 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) Inside VMware, shut down or pause *every* running virtual machine and wait until every virtual machine fully stops or pauses. **Failure to do this will result in corrupted and locked virtual machines!**
- 2) Close the VMware application (*after* you have shut down or paused all virtual machines).
- 3) Shut down the Windows XP host and wait until the power goes off.
- 4) After the Windows XP host computer turns off (wait for it!), only then turn off the 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.

## K. How to unlock virtual machines

Lock files are left behind when you fail to shut down or pause your virtual machines before closing VMware or before shutting down your Windows XP host. Locked virtual machines may be corrupted, since they did not shut down cleanly. To unlock locked virtual machines: close the VMware application and in your Windows XP host, navigate to where you keep your virtual machines (likely on your **D:** drive), go into the VMware folder, find every file and directory ending in “.**lock**” and remove it. Re-open VMware. All your machines should be unlocked; some may be corrupted or damaged and may not work properly. Do not remove the lock files of running virtual machines! **Follow correct shutdown procedures!**