Installing Linux on JMU Computer-Science Department Removable Hard Drives for CS-450 and CS-550

Introduction: The purpose of this exercise is to give you the experience of doing a complete ***Linux*** installation, as well as to give you a basis for both experimenting with and learning about this very interesting and useful operating system. Students are assigned in groups of usually two, occasionally three, to a hard drive. **Each** student needs to get the experience of doing a complete ***Linux*** installation. In case one member of the group has already had the experience of installing ***Linux*** sufficiently recently to remember it well, then that person does not have to repeat the installation on our hard drive for the CS Department machine; the other member(s) of the group should do it. If both or all members of the group are inexperienced, then **each student** should go through the installation procedure separately. Just wipe out the partitions left on the hard disk from the previous installation, and start all over again. Feel free to play around as much as you like. Re-install many times, if that is what you feel you need to do in order to become thoroughly familiar with the installation program.

The departmental laboratory facilities are organized as follows: ISAT/CS Room 150 is designated for use for CS-460 preferentially. HHS Room 3022 is designated for use preferentially for CS-450 and CS-550. Please use the appropriate room for whichever course you are working on, in order to minimize the incidence of overcrowding.

One key for the insertable/removable hard-disk drive is provided in the laboratory for each pair of machines. The keys are tied down either to the desks or to the machines with string. This is done to serve as a gentle reminder to you not to absent-mindedly put the key into your pocket and take it out of the lab. The string is NOT intended to serve as a secure tether. Please do NOT intentionally separate the key from its tie-down.

(1) Be advised that the complete installation of ***Linux*** takes at least slightly in excess of one hour, so don't start unless you have enough time available to carry through to completion. In order to complete the installation properly, you will need the three Red Hat installation CDs, and also a blank diskette which you will use towards the end of the installation process to make a boot

diskette to be used to boot up the machine in emergencies where booting from the hard disk will not work. NOTE: Be sure to write your name and telephone number on your boot diskette, as well as identifying it as a ***Linux*** boot diskette.

(2) Insert your removable hard drive into the matching computer slot, insert the key and turn it ¼-turn counterclockwise to lock the hard drive into place.

(3) You will do a **custom installation** of ***Linux,*** with the following partitions:

(a) a 100-MB partition (Mount Point: **/boot**);
(b) a root partition (Mount Point: **/**) of slightly more than 2GB in size ; and
(c) a swap partition of size 512-MB (because all of the lab machines are equipped with 256-MB of Main Memory).

(4) Make sure the floppy disk drive is empty, and insert "Red-Hat ***Linux*** Installation Disk 1" into the CD drive.

(5) Initiate a hard boot by pressing either once or twice the top button on the System Unit (turns the electrical power on or off).

(6) During the Power-On Self-Test (POST), you will see the blue DELL logo displayed on a black screen, with a little while bar graph below it. After a few seconds of this display, the words "F2 = Setup" appear in the upper right hand corner of the screen. During this phase of the boot process, press the <F2> function key. The display in the upper right-hand corner should change immediately to the words "Entering Setup", but the Setup screen does not usually appear until after several more seconds have passed.

(7) Confirm the amount of memory installed in the system at 256 MB.

(8) Scroll down to "Boot Sequence" and press <ENTER>. Use the space bar and the '+' and '–' keys to set the boot sequence to:

1. IDE CD-ROM Device
2. Diskette Drive
3. Hard-Disk Drive C:

(9) Press <ENTER> to continue, and then <ESCAPE> to exit. If you made any changes to the existing boot sequence, you will be given three choices. Select "Save Changes and Exit", and press <ENTER>. When you exit from Setup, the boot sequence continues.

(10) In response to the first "Red Hat" screen, type nothing and just press <ENTER> to continue with the installation in graphical mode. If you do nothing, instead of pressing <ENTER>, you will also proceed in graphical mode, but a perceptible delay will occur before any progress occurs.

(11) You will be given the option of performing a media test of the Compact Disk. This takes about four minutes per CD. Take your choice of either performing the test or skipping it.

(12) Following the media test, beneath the graphics display there will appear a black text area on which it will say, "Running anaconda, the Red Hat Linux system installer - please wait…." Observe the sequence of messages that will subsequently be displayed at the bottom of the screen.

(13) At the "Welcome" screen, read the entire "Online Help" frame, and then click on "Next". Note that most of the subsequent screens will also have "Online Help" frames. These contain very useful information, so it is a good idea to read them all as you go through the installation process.

(14) For each of the following labeled screens, make the indicated choice:

(a) Language Selection: English (English)

(b) Keyboard Selection: US English

(c) Mouse Configuration: Wheel Mouse (PS/2), **<u>and also</u>** check the "Emulate 3 buttons" box.

(d) Upgrade Examine: Perform a new Red Hat Linux installation

(e) Installation Type: Custom

(f) Disk Partitioning Setup: Automatically partition; you will have the option of reviewing and modifying the automatically-generated partition sizes

(g) Automatic Partitioning: Whichever choice is most appropriate:

Remove all Linux Partitions (pick this option even if there are no pre-existing partitions)

or

Remove all partitions on this system (if your hard disk had another operating system installed previously)

<u>And also</u>, click on "Review (and modify if needed) the partitions created"

(h) Partitioning: Edit the entry for each partition, as follows:

(i) Do **NOT** force any of the partitions to be a primary partition.

(ii) **DO** request "Check for bad blocks" for each and every partition. The check should take about 4-1/2 minutes total for all three partitions, but will not take place until installation begins, which occurs after all choices have been specified several screens down the road.

(15) The entry for the boot partition (Mount Point: **/boot**) should specify type "ext3" and a fixed size of approximately 100 MB. Remember to check for bad blocks.

(16) There should be an entry for a swap partition (entry for Mount Point left blank) with a size of 512 MB (twice the size of Main Memory). Remember to check for bad blocks.

(17) Edit the entry for root partition (Mount Point: **/**) by selecting type "ext3" and "Fixed Size", and adjust the size of this partition to about 2500 MB, **if** you have enough space on the disk. However, after setting up the other partitions, check and be sure to leave at least 50 MB of free space on the hard disk for possible use later. If necessary, make the root partition a bit smaller than 2500 MB in order to do this. Remember to check for bad blocks.

(18) Other choices for variously labeled screens:

(i) Boot Loader Configuration:	Install GRUB **without** a boot loader password, and check the box to "Configure advanced boot loader options"
(j) Advanced Boot Loader Configuration:	Put the Boot Loader record on the Master Boot Record (MBR), and under "General kernel parameters" fill in: **mini_watchdog=1**
(k) Network Configuration:	Leave as is
(l) Firewall Configuration:	No Firewall
(m) Additional Language Support:	Whatever languages anyone in your group understands
(n) Time Zone:	America/New York Eastern Time
(o) Set Root Password:	"**5440orFight**" (no spaces, and watch the capitalization)
(p) Authentication Configuration:	Enable MD5 passwords **and also** Enable shadow passwords[1]; skip all 4 tabs (NIS, LDAP, Kerberos, SMB)

[1] These two options are absolutely useless in a machine that is not connected to a network, but they constitute basic security procedure for a networked machine, and therefore we would like you to get at least a little bit of experience working with them.

(19) Package Group Selection.

(a) You MUST include all of these packages:

Editors
Development Tools
Kernel Development
System Tools
Administrative Tools: Click on "Details", and accept ONLY:
authconfig.gth
redhat-config-packages
redhat-config-proc
redhat-config-users
redhat-logviewer

Check the box for each package indicated, and take the default members that come with each package, **except** as noted above under "Administrative Tools". Some packages other than those listed here might appear already checked by default, and therefore need to be unchecked before proceeding.

(b) If space allows, also include:

X Window System
GNOME Desktop Environment

(c) If there is sufficient additional space, then also include:

Office/Productivity
Authoring and Publishing
Games and Entertainment

(d) Check "Select individual packages".

Before clicking on "Next", note the "Total install size" shown at the bottom of the screen. The amount of space shown is only an estimate; for all of the packages under items (a), (b), and (c) above, the estimate comes to just a little under 2,100 MB. The actual amount of space taken up by the selected packages may well exceed the estimated amount, so it is best to allow for 200 MB or more over the indicated space required. If you attempt to install onto a disk partition exactly equal to or only slightly larger than the estimated installation size, then the installation might fail after continuing for over thirty minutes beyond the current point, at the point just before it is nearly complete. This can be very costly to you. Therefore, it is better to install fewer items, and to add to the installation later by means of an installation update, rather than risk having the installation abort after it is nearly complete.

(20) Individual Package Selection:

(a) Select "Tree View.

(b) Scroll down to "System Environment", expand the display, and highlight "Shells"

(c) In the right-hand frame, check "pdksh", "tcsh", and "zsh".

(21) Click twice on "Next" to begin the installation. Note as the installation proceeds that the time estimates shown on the screen are also inaccurate. The packages shown above take between 30 minutes to an hour to install from this point to the end. You will be prompted eventually to replace the CD with Red Hat installation Disk 2 and Disk 3.

(22) The final step in installation is the generation of a boot diskette. Do select the option to do this so that in the event any problems might arise later, you will be able to boot up your system. Once the boot diskette has been created, write-protect it and leave it in the floppy drive, so that when your system reboots you will be testing that the reboot from the diskette works properly.

(23) On the various post-installation configuration screens, choose the default values, and proceed to the end:

(a) Graphical Interface (X) Configuration:	Intel 810; Video card RAM: 16 MB
(b) Monitor Configuration:	DDC Probed Monitor; 30-70 kHz Horizontal Sync, 50-160 Hz Vertical Sync
(c) Customize Graphical Configuration:	Color Depth: True Color (24-bit); Screen Resolution: 1024 x 768; Choose Your Login Type: **Text**[2]

(24) When you have finished your basic installation, the installer program will reboot your computer. Look up in the documentation to learn how to shut down the computer, and practice booting up and shutting down. Reinstall ***Linux*** as many times as you like, until all members of the group are thoroughly familiar with installation. Once the entire group has obtained enough practice at installation to be totally comfortable with it, then you will want to agree to leave the last installation intact, and thereafter everyone must exercise care what they do when logged in as **root** , since the superuser has an enormous amount of power to damage the system.

(25) After your group has finalized their ***Linux*** installation, each member of the group needs to set up at least three new accounts for him/herself. Note that each student in the group should log in separately as **root** to set up his/her own three accounts, to get the practice. The examples below are accounts that I created for my personal use. You need to proceed similarly (including entirely in lower-case), as follows:

[2] One of my major goals in having you work with ***Linux*** is to accustom you to using a Command-Line Interface. Therefore, I want your system to boot up in text mode. You can always start up graphics mode manually if you need it for something. However, I require that you learn to carry out certain manipulations using the command line interface, and you must, therefore, prepare should I decide to test you on your mastery of the command line interface.

(a) `useradd charlie-bash –m –n –s /bin/bash`
(b) `useradd charlie-tcsh –m –s /bin/tcsh`
(c) `useradd charlie-zsh -m –s /bin/zsh`
(d) `passwd -f charlie-bash` Then press <ENTER> and respond to the prompts to set whatever password you like for this account.
(e) `passwd -f charlie-tcsh` Then press <ENTER> and respond to the prompts to set whatever password you like for this account. Note that it would probably be most convenient for you to use the same password for all three of your accounts.

(f) `passwd -f charlie-zsh` Then press <ENTER> and respond to the prompts to set whatever password you like for this account. Note again that it would probably be most convenient for you to use the same password for all three of your accounts.

(g) Look up somewhere in the documentation to understand what each of the above commands accomplishes. The purpose of these accounts is to give you the opportunity not only to practice using the most important shells available for ***Linux,*** but also to set up the supporting shell scripts appropriate to the use of each shell, e.g., `.login`, `.profile`, etc.

(h) You may, if you like, similarly set up additional accounts for yourself for the Public-Domain Korn shell (pdksh) and for any other shells that you might like to learn, although I think the three shells that I have specified already constitute a hefty basis for learning and practice. I therefore suggest that you wait until you have exploited the first three accounts to the fullest before generating additional accounts.

(26) Feel free to play around as much as you like with your personal accounts on the system. Remember that the entire reason we are having you do all this is to give you the opportunity to practice and learn. Have at it and enjoy.

Further instructions to follow.