

# Appendices

The following are appendices for additional information.

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## **Appendix A – Installation of Red Hat Linux 7.2 or Fedora Core**

### **Objective**

This Appendix presents how to install Red Hat Linux Version 7.2 or Fedora Core system. Minor variations may exist from this outline. It is assumed that at least a 20 GByte drive is utilized.

### **Installation Procedure**

This installation procedure assumes that you have a hard drive that is greater than 5 GBytes.

1. **Welcome screen** Hit < Enter >
2. **Language selection** "English" <Click next>
3. **Keyboard Configuration**
  - a. Select generic 104,
  - b. U.S. English,
  - c. Disable Dead keys. <Click next>
4. **Mouse Configuration**
  - Select 3 button PS2 (should be default) <Click next>
5. **System Installer** <Click next>
6. **Install type**
  - "Custom" <Click next>
7. **Disk Partitioning**
  - Select "manually with Disc Druid" <Click next>
8. **Disk Druid Partitioning**
  - If any partitions exist delete them.
  - a. Click ADD
  - b. Mount Point: leave blank
  - c. Size: 1000 (Mbytes)
  - d. Partition Type: **Linux Swap**
  - e. Drives: **hda** <Click ADD>
9. **Partitioning**
  - If you have a really large drive (greater than 5 GB), you should create a separate partition for booting. To keep things simple, we will create this partition.
  - ADD**
    - a. Mount Point: **/boot**
    - b. Size: **100** (MBytes)
    - c. Partition Type: **Linux Native (ext3)**
    - d. Drives: **hda**
  - ADD**
    - a. Mount Point: **/home**
    - b. Size: **100** (MBytes)
    - c. Partition Type: **Linux Native (ext3)**

d. Drives: **hda**

**ADD**

a. Mount Point: **/data**  
 b. Size: **2000** (MBytes)  
 c. Partition Type: **Linux Native (ext3)**  
 d. Drives: **hda**

**ADD**

a. Mount Point: **/**  
 b. Size: **<Click> Use remaining space**  
 c. Partition Type: **Linux Native (ext3)**  
 d. Drives: **hda**

**\*\* NOTE \*\***-- Drive summary--**hda** should have 0 Bytes of memory remaining.

<Click next>

10. **Partitions to format**

**\*\*NOTE\*\*** Brand new install always format

**\*\*** For upgrades do not format

**\*\*** If using a brand new drive, check for bad blocks “this takes a lot more time”

11. **LILO Configuration**

**\*\*** For lab do not create Boot Disk

a. Install LILO: **<Check>**  
 b. Install LILO on: **(MBR)**  
 c. Do not use linear mode  
 d. Default boot image **Linux** **<Click next>**

12. **Network Configuration**

a. Configure using DHCP: **Deselect**  
 b. IP address: **Assigned by Instructor**  
 c. Subnet mask: **255.255.255.0**  
 d. Network default: **Use default address**  
 e. Broadcast default: **Use default address**  
 f. Host name: **{station ID}.ourlab.com**  
     **(e.g. 49.ourlab.com)**  
 g. Gateway address: **Assigned by Instructor**  
 h. Primary DNS: **Assigned by Instructor**  
     **<Click next>**

13. **Firewall Configuration**

**<Click> “No Firewall”**

**<Click next>**

14. **Language**

a. Select: **English (USA)**  
     **<Click next>**

15. **Location**
- a. Select: World / North America
  - b. Select Time Zone: Central (Chicago)
16. **Root Password** (has to be at least six letters)
- a. \* lab only \* {Station ID}+linux  
(e.g. 45linux)
- \*\* If password is too short – next button will not work \*\*
- <Click next>
- b. Account name: leave blank
17. **Authentication Configuration**
- a. Enable MD5
  - b. Disable shadow passwords (lab use only)  
(We will learn more about this later.)
  - c. NIS: DO NOT ENABLE
  - d. LDAP: DO NOT ENABLE
  - e. KERBEROS: DO NOT ENABLE
- <Click next>
18. **Configuration**
- Select these only if you need to wish to create a special configuration, otherwise select **everything (option b)**.
- a. Specific Installation <Click Packages>
 

I.	Printer	NO
II.	X windows	YES
III.	Gnome	YES
IV.	KDE	YES
V.	Mail	YES
VI.	DOS	YES
VII.	Graphics manipulation	YES
VIII.	Games – (for lab)	NO
IX.	Multimedia support	YES
X.	Laptop support	NO
XI.	Network station	YES
XII.	Dialup station	YES
XIII.	News server	NO
XIV.	NSF server	YES
XV.	SMB	YES
XVI.	IPX	NO
XVII.	FTP	YES
XVIII.	SQL	YES
XIX.	WEB	YES
XX.	DNS	YES
XXI.	Network Management	YES
XXII.	Authoring	YES
XXIII.	Emax	YES
XXIV.	Development	YES
XXV.	Kernel Development	YES

- |    |                   |            |
|----|-------------------|------------|
|    | XXVI. Utility's   | YES        |
|    | XXVII. Everything | NO         |
| b. | <b>Do it all.</b> |            |
|    | <b>Everything</b> | <b>YES</b> |

\*\*\* If you wish, you can click on Everything – which is simpler and requires less thought, but it does require 2.9 Gig to install. The easy consideration is that all is installed and that by default, the server operation is not active by default. You must still activate it when you set it up.

<Click next>

#### 19. **X Configuration – Video Card**

\*\* Red hat will attempt to automatically probe the system for a video card.

\*\*

If it doesn't find it – Good Luck :-)

<Click next>

#### 20. **Install IT**

- During install you will need to insert Disc 2 (if using RH 7.2)
- Exit
- Remove disc when it pops out***
- Machine now reboots
- At login type: **"root"** <Hit Enter>
- At password: type in your password  
<Hit Enter>

#### 21. **X Configuration – Monitor**

\*\* Red hat should automatically select monitor – but does not.

If not. Select Gateway from list, then click on the arrow on the left side, which will open a dropdown menu of models. The monitor for the lab is the Gateway EV700.

Click on **Test Configuration** to insure that the video configuration is operational.

<Click next>

#### 22. **Custom Graphics Configuration**

- Depth: 16 or 24  
(need at least 8MB video card for 24, desire more)
- Resolution: 1024 x 768 or 800 x 600
- Desktop: KDE
- Login: Text
- Memory: 16 Mbytes
- Click on TEST to insure that the graphics mode is properly functioning.

<Click next>

23.   **\*\* To shutdown type:**  
          shutdown -h now  
      **\*\* To start X Windows type:**  
          startx

## **Appendix B – Creating an Installation Boot Disk**

### **Objective**

This Appendix presents how to create an Installation Boot Disk. This procedure requires a High Density Floppy Disk, that will be totally erased and have a boot Linux system installed on it. This process is no longer required for a Fedora Core installation, as the installation must be performed from a CD or DVD.

There are two methods to start the installation of Linux.

The easiest is to set up your computer to boot directly from the CD-ROM. Placing the Linux CD into the drive and booting will automatically start the installation process. This requires the BIOS to be set to boot from the CDRom first.

This requires that the BIOS of the PC be set up to boot from the CD. If this is properly set up, you need to request assistance from the instructor or the lab FA (a system password may have been set).

The second method is required when your computer must boot either from the hard drive or floppy. If this is the case, we must then create a **boot-disk**. The following is the procedure to create the disk from an MS Windows environment.

After inserting the Linux CD on the (Windows) computer, do the following:

1. Change to **(CD):\dosutils** directory
2. Run the program **rawrite**
3. The program will prompt for the source image, specify **(CD):\images\boot.img**
4. The program then prompts for the destination, specify **a:**
5. Finally, a prompt is made to press **ENTER** in order to continue – do it!

Upon completion, you will have an installation boot disk.

When you are ready to install Linux, insert the boot disk and the CD-ROM on the computer that will be configured with Linux, then perform a new boot.

Note: Fedora Core no longer supports the installation by use of a floppy disk, you must have a system that can boot from the CD.



## **Appendix C – Using the Knoppix Linux**

### **Objective**

This Appendix presents how to utilize the Knoppix Linux self-booting CD.

The Knoppix Linux CD is a great way to learn how to use Linux – without having to install it. To enable the CD to boot, you must configure your computer to boot from the CD.

Configuration of your computer is normally performed by setting up the BIOS. When you boot your computer, you normally hit either the DEL or F2 key, depending upon your system. You then set your computer to boot from the CD before the hard drive. Save the settings and reboot the computer. Place the CD in the tray during the initial POST, so that the CD is properly mounted for the boot process.

Two options are available to boot to Knoppix. The first is the default, where when the computer initially sees the bootable CD, it displays the message “boot:” at the bottom of the screen. Simply hit enter to proceed with the boot for a GUI interface. The second option allows one to boot to another level. To do this, click the “F5” key, and a menu will be displayed that provides options for booting. Click on the F2 key to boot to a Command Line Interface.

After the Knoppix CD has been booted, you will have a version of Debian Linux running on your system. You will be able to perform all of the basic Unix / Linux commands after opening a Terminal. To open a Terminal, click on the K, select KNOPPIX, then Terminal. You may now enter all the commands required of the Labs.

To shut down the system, log off of the system by clicking on the K and selecting Logout. The system will then shut down. After removing the CD, you may reboot the computer back up to your MS Windows system.

Knoppix creates a RAM Drive within memory for you to work with. You may create files and directories, but these will be deleted when you power down. You will note on the screen on the left side that Knoppix has detected your hard drive. When you click on the drive icon, you will be able to read the drive’s contents. Depending upon how the drive was formatted, you may or may not be able to write to the drive. Approach this with caution. If you are able to write to the drive, then you will be able to read the data later using MS Windows. It is recommended that you create a separate directory on your hard drive for the transfer of information between the two.

### **X Terminal Access**

Knoppix boots up under the KDE window mode, with the Task Bar at the bottom. The X Terminal icon opens a XTerm window as a normal user, with the \$ prompt. If you need to practice as the administrator, click on the K, select the Knoppix, then select Root User. This will open a new XTerm window as the root user. If you need to perform a command as the administrator, from the administrator Xterm (prompt terminates in a “#”), issue the command “**passwd**”. You will be prompted for a new password. This password is saved only during the presently booted session, it will be deleted after you power down.

**Saving Data**

Knoppix does not access the hard drive directly. In general it is installed in a Read-Only mode unless you are accessing a FAT32 filesystem. If you wish to save the work you have been working on, you need to save it to the floppy drive. If the floppy is formatted as MS FAT, then you need to use the mtools commands. If you format it as ext2 for Linux, then you need to mount it.

---

**Creating the Knoppix CD:**

The Knoppix iso has image has been down-loaded to the following location:  
Galileo Server / Applic1 / TCOM Library / Knoppix folder

Place a blank CD into the computer tray and start the program  
Rixio Easy CD Creator (or whatever the application you have)

After the program has started, perform the following:

1. Open the File Drop Down menu.
2. Select Create CD from CD Image
3. Select the Knoppix file from the server. Make sure you select the file that is 700 Mbytes in size.
4. Click on the Create CD at the top to create a new CD.

Alternatively, one may download an ISO image off of the Internet. To obtain a copy, the primary site will be “knoppix.org”. From that site, one can download the image. It is recommended that one download the English the version from the site in Germany, as it has been the fastest in past experience.

## **Appendix D – Linux Applications**

The following is a short list Linux Applications. There are many more. You are directed to the sites [sourceforge.org](http://sourceforge.org), [rpmfind.net](http://rpmfind.net), [linuxapps.org](http://linuxapps.org), [gnu.org](http://gnu.org), and many others.

adjtime	regulates clock
alch	configuration tool
amanda	network tape backup
anaconda	reconfigure Linux
anacron	periodic command execution
arpwatch	track Ethernet / IP connectivity
arts	analog real time synthesizer
aumix	X audio mixer
bc	precision calculator
bindconf	bind configuration tool
compat-egcs-c++	C++ compiler
chkconfig	CLI utility to check or modify services
cpp	C preprocessor
dia	diagram drawing tool
dip	dip modem dialer
doxygen	creates documentation from C / C++ source code
esound	multi-sources to sound card
extace	multimedia window
fetchmail	email retrieval program
fortune	random message generator
gcc	GNU C compiler
gawk	GNU awk compiler
ghostscript	Postscript program
gimp	photo editor
gnuchess	chess program
gphoto	digital photo manipulator
ImageMagick	image manager
ircii	IRC program
jed	text editor
joe	text editor
joystick	attach and test joystick
kdenetwork	KDE network apps
kdenetwork-ppp	KDE ppp configurator
kgcc	KDE C compiler
lam	Local Area Management of clusters
libpcap	monitor of low level network traffic
licq	icq for chatting on TCP / IP network
mgetty	allow login over serial cable
mgetty-sendfax	send faxes using mgetty
mgetty-viewfax	view faxes in X

mgetty-voice	support for voice communications using mgetty
mkbootdisk	utility for creating a boot disk
mtr	network diagnostic tools
net-tools	network configuring
netcfg	X network configuring (not on RH CDs)
ntp	Network Time Protocol for time synchronization
nut	UPS monitor
octic	tools for performing numerical computation
perl	interpreter language
php	HTML supporting scripting language
printconf	printer configuration
python	interpreter language
rp3	RH ppp management tool
rwall	send messages to users logged on
SDL_mixer	sound mixer
sed	utility for search and edit functions (languages)
setserial	configure and show serial port status
sndconfig	configure sound cards
sox	converts sound files
statserial	displays signals on serial ports
switchdesk	desktop switcher tool (-gnome, -kde)
sysreport	utility to check system for hardware problems
tcpdump	IP network monitor
timetool	utility to configure time and date
tksysv	X utility to check or modify services
traceroute	utility to trace the route of IP packets
tree	displays directory structure in a tree format
tripwire	security tool for monitoring network violations
ued-snmpp	tools for monitoring with SNMP
vnc	virtual network remote desktop viewer
which	shows the full path of an application or file
whois	displays information about a user
wireless-tools	tools for configuring wireless Ethernet interfaces
word	dictionary of English words (/usr/dict directory)
wvdial	intelligent dialer for ppp
x3270	emulation of IBM 3270 terminal
xcdroast	utility to burn CD ROMs
xchat	X IRC utility
xcpustate	X utility to display CPU usage
xdialclock	X utilities to display a digital clock
xfig	X utility to create vector graphics
xinitrc	X configuration script used to specify how X Windows starts
xisdnload	X utility to display isdn load activity
xlispstat	X version of the Lisp language
xmms	X multimedia player
xmorph	X morphing program

xosview	X display of system state, memory usage, cpu usage and other information
xpaint	X utility for editing bitmap images
xpdf	X utility to display pdf files
xsane	X utility for operating a scanner

## **Appendix E – Basic Local Area Network**

### **Basic Local Area Network**

In order to fully understand a LAN configuration, one must be able to first design it on paper. This involves the functional layout of equipment.

There are several levels of designing the layout of equipment, from a very high conceptual level to one that details specific wiring and equipment location. All levels are required to complete the design, but in general we want to start at a top level and “drill” down to the required details.

Lets start by designing a simple Ethernet LAN. For our equipment we will have 3 workstations, one minicomputer and one server. This is shown in Figure 1.

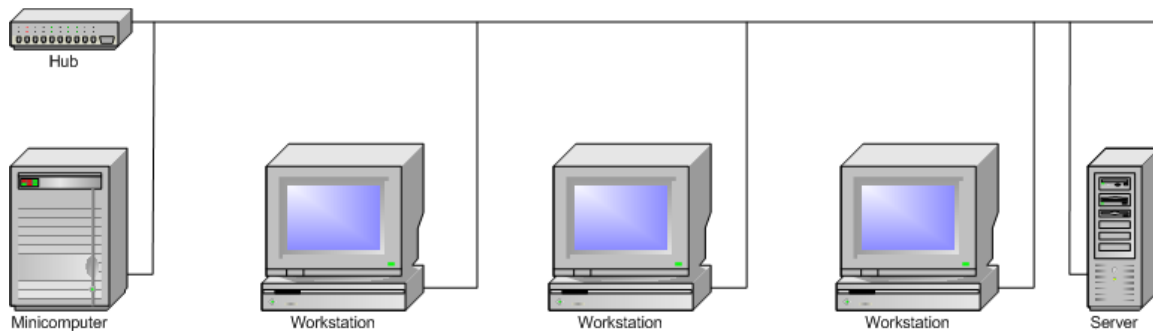


Figure 1: Basic LAN

Notice that it is a very simple drawing. We have a straight line representing the cabling. At this time, noting is said as to whether the LAN is Ethernet or Token Ring – it could be either, but we will assume that it is Ethernet that is now the defacto installation standard. In this case we see that we have a HUB, so we can say that it is not 10Base 2 / 5 (coax). For now, we will assume that the cabling is installed in the walls and run back to the wiring closet in a neat format. This means that it does not necessary take a direct route, and that the wiring is installed in a means where it is properly documented. Recall that Ethernet cabling has a maximum of 100 meters in length, thus we must allow for the cable routing in our length. Today, with the cost of Ethernet Switches, we often purchase them instead of a Hub. Recall that a Switch provides connectivity between individual connections, rather than a bussed connection for all ports in a Hub.

The equipment for this design will consist of the following:

1. Cabling from each station location back to a central location.
2. Station RJ-45 Wall Jack, 110 punchdown for Cat 5 Cable
3. Wiring Closet Patch Panel
4. Ethernet Hub (or Switch)
5. Short patch cables for connections between Patch Panel and Hub.
6. Long patch cables for connections between Station Jack and the computer.

Most often when drawing our high level LAN, the Hub is not included in the drawing, this is because of the line that interconnects the equipment; it is implied.

Notice that we draw a single line to represent the interconnection Hub, and each host has one line that connects up to it. This makes the drawing very easy to read, and is “pleasing to the eye”. The origin of this design goes back to the original coax LAN, and is now generally used. Also if we need to indicate more stations, the conceptual drawing provides all of the basic information without having to add more to the physical drawing, all we need to do is provide text information specifying what is needed.

When we design a larger system, we again lay out the diagram to indicate the functionality. From this we can establish what equipment is necessary, as we did above. Except for equipment quantity, the list is almost identical. For a simple diagram, we might have something like Figure 2. In this case we have shown multiple hubs at each branch and a hub to interconnect the hubs. Also, we have simplified the drawing by just drawing simple blocks, and not yet specifying their function. This design might be useable in your home when you have computers spread around and can only install a limited amount of cabling to interconnect the different locations.

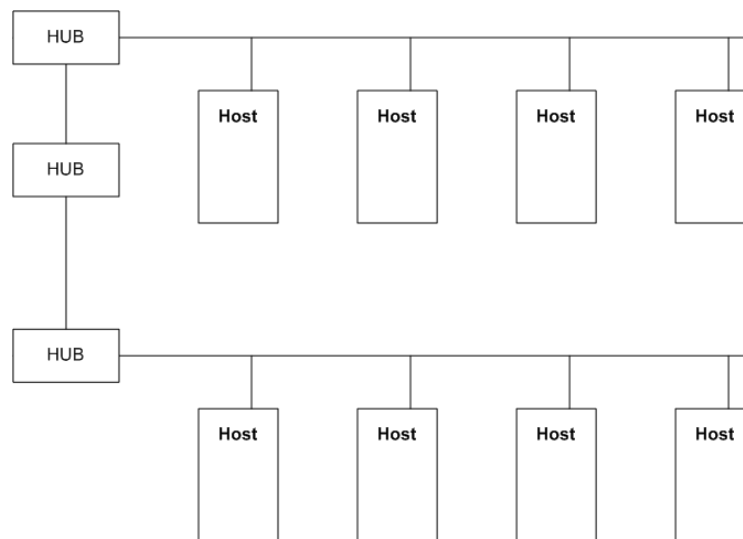


Figure 2: Multi-Hub LAN

Even though the above diagram shows the Hubs, remember that in our drawing we typically do not show them, although when we need to interconnect different segments together, we often show them as depicted above.

Remember that we are talking about general concepts; this is the highest-level diagram that is used to establish our network design.

You have previously learned that a Layer 2 Switch is better than a Hub. For larger networks (well even small ones), this is generally true. A Layer 2 Switch in terms of our diagram is identical to a Hub.

### Basic Routed LAN Design

In the previous assignment, we looked at the basic LAN that established interconnection between hosts by using a Hub or Switch. In this discussion we will utilize a Router.

A router is a device that switches user traffic based on a Layer 3 address rather than a Layer 2 address. And if the router is software configured as a Gateway, then it is capable of converting protocols between different segments.

In a business environment, we can segment a network by utilizing a router rather than a Layer 2 Switch. The benefit of this design is that we can place restrictions on various segments and thus provide an improved level of security. One may also make various segments “invisible” to the normal user, even though they are in fact able to gain access. As an example, one might desire to segment a company by functional departments, such as HR, Sales, Marketing, Accounting, Engineering, Production, and Executive. Naturally we would not want everyone to have access to the HR records, Accounting information should be very restrictive, yet Executive should have access to nearly everything. In this design, we might have something like the design in Figure 1.

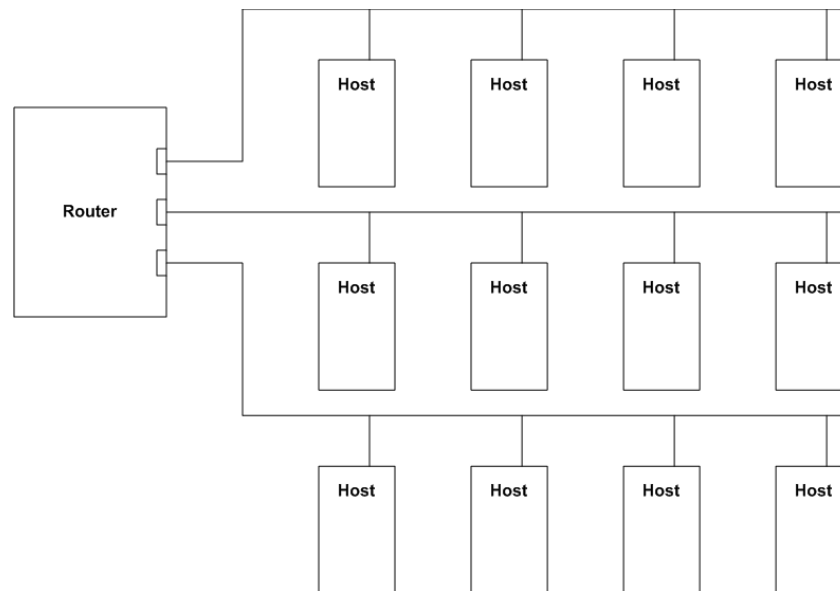


Figure 3: Routed LAN

Here we can see that in order to gain access from one segment to another, we must transit the router. Normally the router will automatically allow access between all segments, but as an administrator, one can limit users that do not have permission.

So far, we have discussed only the local LAN, not discussing the interconnection of multiple LANs via a WAN connection. Let's build a campus complex of building where we have several thousand employees – this is referred to as a Campus Area Network (CAN). This is a very complex situation when you get into the detail of equipment layout. This level of design really requires several layers to show just the basic concept. This simple design is depicted in Figure 2.



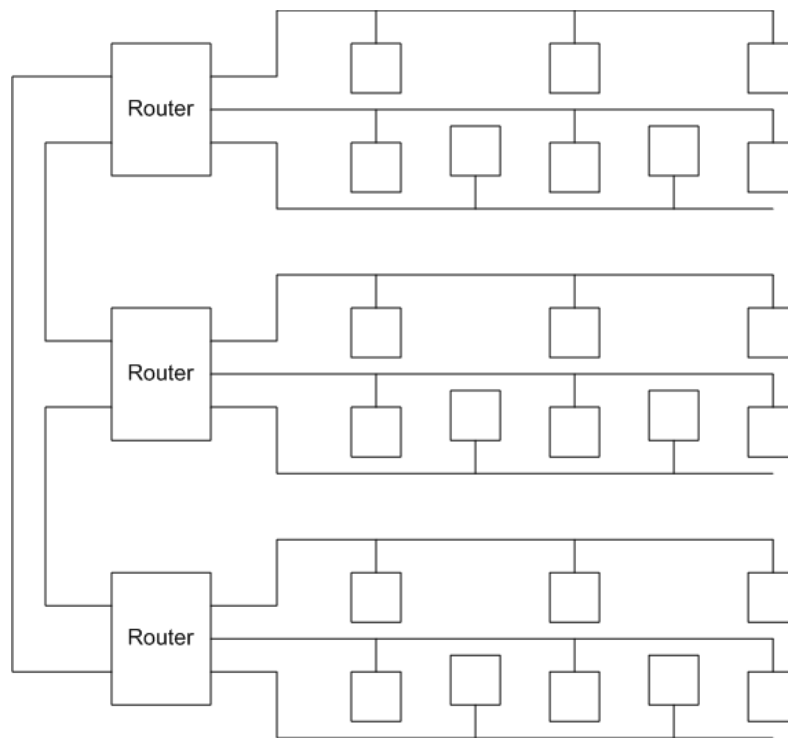


Figure 4: Campus LAN

Recall that in our basic design each segment connects to all of the hosts on that segment via a hub or Layer 2 switch.

Each building will have the following basic equipment list:

1. Station Cabling
2. Station Jack
3. Patch Panel
4. Segment Hubs and / or Switches
5. Building Router equipped with
  - a. Segment Ethernet Ports
  - b. Inter-building WAN ports

In our example diagram, we have created three major building LANs with each building having a WAN connection to both of the other two building networks. This provides either improved routing, or backup in the case of one link failing.

The WAN links may be one of several alternatives as to transmission. They might be as simple as a 56 KB DDS link, a DS-1 / T-1, or even a fiber optic link between the routers.

We often look at routers as a very complex system that requires very complex configuration. To some extent that may be valid, but under all of the talk, lies Unix. Cisco, the number one provider of routers, modifies the instruction set of their systems to support a dedicated function, but it is done using the Unix Operating System.

When we show the design of our building, we should depict some segmentation; specifically that of the different floors and the “server farm”. The server farm is the location(s) of various servers that are utilized to for either individual departments or for the corporate access. We normally desire to separate the servers from the other computer systems because of security and power backup.

### Basic LAN with Internet Access

We have discussed the design of various LAN designs, but all of them only allowed internal access. The Internet was not available. Now we need to add access to the Internet. Initially, this is a very simple extension of the routed LAN. Like the campus design, we add another WAN interface to a router and establish connection to the Internet. As long as we utilize IP addressing, we can access the Internet to send email and to browse the World Wide Web. During this discussion, we will develop a network that will allow us to access and provide Internet services.

Our first design will be to give the local LAN Internet access. This is very basic from our previous discussion, and is shown in Figure 5.

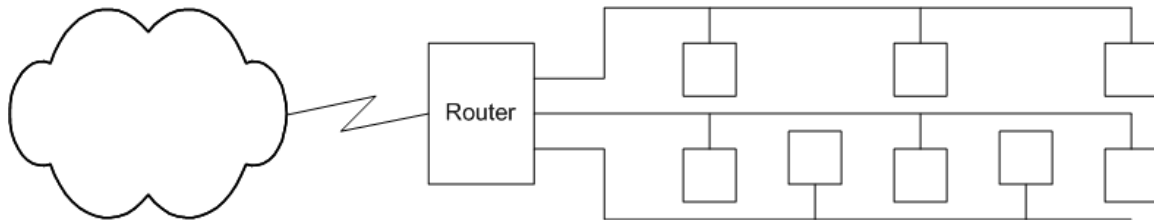


Figure 5: Internet Access

This particular design allows everyone to access the Internet, but at the same time it also allows everyone on the Internet to access every system within the business. A very bad security situation! Outsiders would be able to access your host and possibly destroy your data or infest your host with a virus.

To improve this, we need to add something that will restrict access to our network. Such a device has been developed – called a firewall. In fact a firewall is just a router that add rules that specify what type of traffic may pass through the router. On the surface, this concept is quite simple, but in fact the development and implementation of these rules is quite complex. In this discussion, we will not go into the detail of how a firewall works or the configuration of such.

When we include the firewall, this adds additional complication if we desire to allow the Internet to see our web page. This brings up how they are allowed to see our web page and yet be kept safe on our other hosts. The process of allowing users to see our “Internet” servers and not our local LAN requires even more router configuration.

From the list of equipment in the previous lab, we need only add to our equipment list an additional WAN interface. The complication here is that we must know what our service provider can support and what level of service is

required by our corporate users. This interface may range from a single 56 Kbps circuit to a T-1, or even an OC-48. Each interface has its interface requirements and cost.

This brings up the question of what servers are required. Although not limited to the following list, this covers the majority of Internet server requirements:

Web Server	Accessible from the Internet, provides the web pages that we view when browsing the Internet
FTP Server	Accessible from the Internet, provides the ability to download or upload files
Mail Server	Accessible from the Internet, provides email for users
DNS Server	Accessible from the Internet, provides URL / IP address conversion
Database Server	Not accessible from the Internet, but may need to be accessible from the Internet accessible servers
DHCP Server	Not accessible from the Internet, required to provide an IP address to local hosts on bootup
NFS Server	Not accessible from the Internet, allows various Unix / Linux systems to share directories
Backup Server	Not accessible from the Internet, protects the configuration and data in case of a system failure.
File Server	Not accessible from the Internet, allows various users to share applications or data
Samba Server	Not accessible from the Internet, allows a Unix / Linux system to be seen by MS Windows hosts as a shared directory

What we need to do is come up with a design that provides access from the Internet to those servers that require it, yet limits access to the rest of our LAN. Those servers that normally require Internet access are the Web, FTP, Mail, and DNS servers. Such a design is provided in Figure 2. This design is limited to lower-end high-speed data rates, such as 56 Kbps or DSL / Cable Modem.

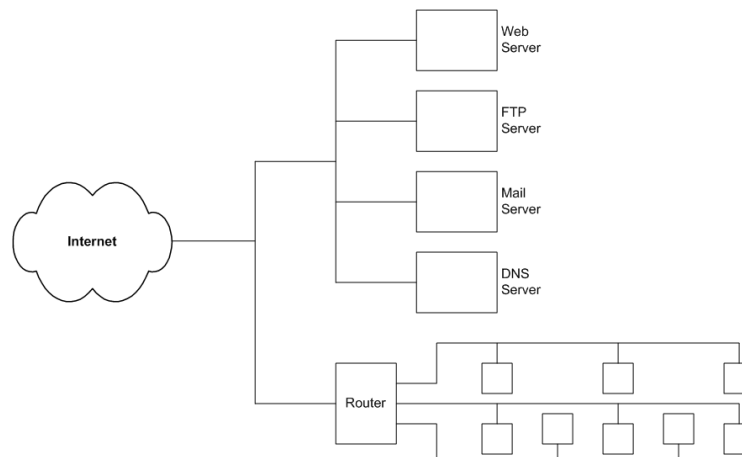


Figure 6: Internet Server Access

The remaining servers are on the right side of the Gateway, being distributed across the various segments as may be best suited.

Sometimes, to add additional protection, we set up a modification of the above design by adding a new router. If we want to have a higher data rate, then we are generally required to put in the router, as it supports the higher data rate interfaces. This is depicted in Figure 3.

The area where the Internet may gain access is called the De-Militarized Zone, or DMZ. This design concept is shown in Figure 7.

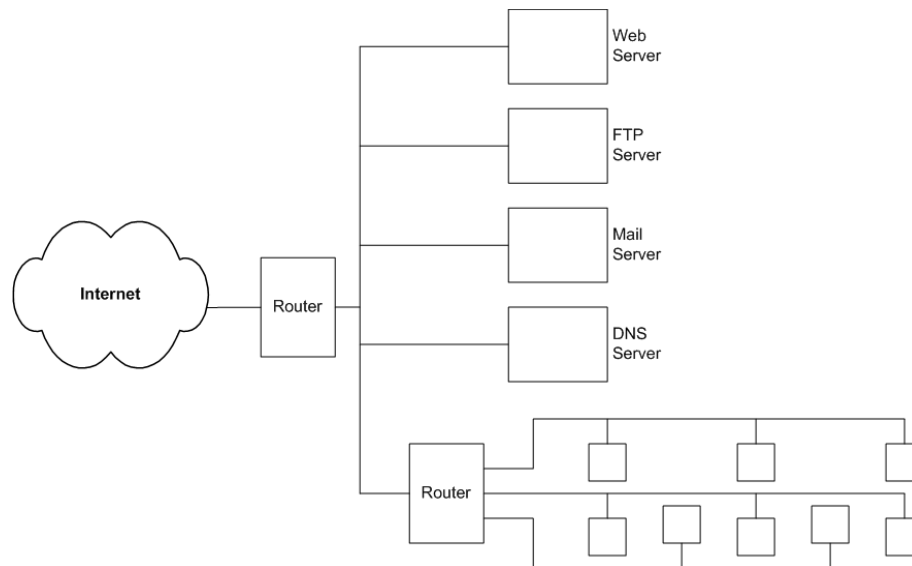


Figure 7: Demilitarized Zone Network

In the above diagram, we have provided the maximum security (assuming we know how to configure our firewall properly), but sometimes we modify our design due to cost, and set up only one router with multiple local Ethernet ports. One port will be set up to allow access from the Internet to the Internet servers (Web, FTP, Mail, and DNS), while the other ports are set up for user access to the Internet and Internet servers. This design reduces cost, but has only one system that a cracker need access, and thus provides a higher security risk.

## **Appendix F – As Data Flows**

How does data flow from one computer application through the OSI 7 Layer model, across the network to another computer? To describe this, we will look at various applications and follow the data as it travels. For this simple example, we will assume data is transferred between systems on a local network, a router is not involved. During this lab, data will be extracted from a captured FTP session, and various amount of detail will be provided as appropriate to illustrate what is happening.

### **Application and Presentation Layer**

Quite often examples are given of data from a word processor or spreadsheet program transferring data from one computer to another. Here we want to take a little more in-depth view of what happens to the data.

Lets assume we have document that we wish to save to another host system. We establish a connection and selected a directory on a remote computer. For our example, we will make the document 300 Kbytes long.

The first step is specifying that we need to save it and have selected the remote host directory. Additionally, we assume that the document will not require encryption or modification for presentation, thus the data will pass through these two layers without action.

The application layer is notified that a file is to be transmitted across the network. The file transfer process is accomplished using the File Transfer Protocol (FTP).

The application “packages” the file, and notifies the Session Layer that a connection is required to the remote host for a file transfer.

### **Session Layer**

The Session Layer first assembles a synchronization segment to the remote host requesting that a session be established. This process requires three frames to be sent across the network – two from the local host and one from the remote.

Each application that is used to transmit data has a unique identifier number, a Protocol Port Number. In our example, we need to use the FTP protocol. The FTP protocol actually utilizes two Protocol IDs, Port 21 for session administration and an assigned port for the data transfer and Port 20 special requirements. In general, Port 21 is always used.

Our first three packets appear as:

1. Local -> Remote Send Sync + Start Value
2. Remote -> Local Receive Local Sync  
Send Acknowledgement  
Send Sync + Start Value
3. Local -> Remote Receive Remote Sync  
Send Acknowledgement

Now that the session has been established, we will look at the data being transferred. As noted, the file has been transferred in total to the Session Layer. It is now transferred in total to the Transport Layer.

### Transport Layer

The first requirement for the Transport Layer is to segment the data. This is really not a simple division, as the size of the segment may vary in size during the transmission. The first segment will be a default size as established by the setup communications.

Next a request is sent to set up a FTP (Port 21) transfer. After this is negotiated, the first segment is transferred to the Network Layer. The segmented data that is transferred to the Network Layer has the format of:

[Segment Number] [Port Number][Segmented Data]

This block of data is called a **Segment**.

### Network Layer

Now that the Segment is in the Network Layer, it needs to be prepped for transmission to the remote host. Here we add on the IP address of the remote host.

The data is formatted as:

[Destination IP] [Source IP] [Segment Number] [Port Number] Segmented Data  
 \ \_\_\_\_\_ /  
 Segment Data

This block of data is called a **Packet**.

The Packet is now forwarded on to the Data Link Layer.

### Data Link Layer

The data is almost ready to transmit across the network, but it still may be too long for transmission using Ethernet. The maximum amount of data that can be transmitted over the Ethernet media is 1500 bytes, plus Data Link protocol. Assuming that the Packet is greater than 1500 bytes, we then have multiple blocks of data.

At this point, we also will assume that the MAC address exists in the ARP Table, stored within the computer. At the moment this is important, because we do not want to detail the obtaining of the MAC Layer address in the discussion.

Now the data will appear as:

[MAC Source Address] [MAC Destination Address] [Frame Number]  
 [Destination IP Address] [Source IP Address] [Segment Data]  
 \ \_\_\_\_\_ /  
 Packet Data

This block of data is called a **Frame**.

## Physical Layer

The final layer of our OSI Layers is the Physical. This layer is only responsible for converting the data into an electrical format for transmission. We most commonly think of the Ethernet interface, so the data is formatted into the Manchester code. The transformation may also be set for data transfer on a serial interface, such as a DS-1, DDS, or V.35 circuit interface.

## Data Transfer Example

The following is a condensed listing of captured data when transmitting a 300 Kbyte file between two systems on the same network. (This data was translated from the Ethereal program, comprehension of all of the fields is not necessarily understood.)

Fields:

Fsour	From Source	br = brown
Fdest	From Destination	lg = longgrain
Sport	Source Port	
Dport	Destination Port	

<u>Frame</u>	<u>length</u>	<u>Fsour</u>	<u>Fdest</u>	<u>Type</u>	<u>Prot</u>	<u>Sport</u>	<u>Dport</u>	<u>Function</u>	<u>Argument</u>
15	67	br	lg	IP	TCP	1044	21	user	drr
16	54	lg	br	IP	TCP	21	1044	win	cksum
17	89	lg	br	IP	TCP	21	1044	resp	pw req
18	70	br	lg	IP	TCP	1044	21	pw	word
19	54	lg	br	IP	TCP	21	1044	win	cksum
20	110	lg	br	IP	TCP	21	1044	resp	log in
21	60	br	lg	IP	TCP	1044	21	pwd	
22	54	lg	br	IP	TCP	21	1044	win	cksum
23	85	lg	br	IP	TCP	21	1044	resp	current dir
24	60	br	lg	IP	TCP	1044	21	SYST	
25	73	lg	br	IP	TCP	21	1044	resp	UNIX/L8
26	60	br	lg	IP	TCP	1044	21	win	cksum
27	60	br	lg	IP	TCP	1044	21	PASV	
28	104	lg	br	IP	TCP	21	1044	resp	passive mode
29	62	br	lg	IP	TCP	1045	34198	seg siz	options
30	62	lg	br	IP	TCP	34198	1045	seg siz	options
31	60	br	lg	IP	TCP	1045	34198	win	cksum
32	60	br	lg	IP	TCP	1045	34198	win	cksum
33	60	br	lg	IP	TCP	1044	21	LIST	
34	117	lg	br	IP	TCP	21	1044	resp	ASCII mode dir list'g
35	131	lg	br	IP	TCP	34198	1045	data	file listing
36	54	lg	br	IP	TCP	34198	1045	win	cksum
37	60	br	lg	IP	TCP	1045	34198	win	cksum
38	60	br	lg	IP	TCP	1045	34198	win	cksum
39	54	lg	br	IP	TCP	34198	1045	win	cksum
40	60	br	lg	IP	TCP	1044	21	win	cksum
41	78	lg	br	IP	TCP	21	1044	resp	xfer complete
42	60	br	lg	IP	TCP	1044	21	win	cksum
45	71	br	lg	IP	TCP	1044	21	DELE	filename
46	84	lg	br	IP	TCP	21	1044	resp	DELE successful

47	60	br	lg	IP	TCP	1044	21	PWD	
48	85	lg	br	IP	TCP	21	1044	resp	current direc
49	60	br	lg	IP	TCP	1044	21	PASV	
50	103	lg	br	IP	TCP	21	1044	resp	passive mode
51	62	br	lg	IP	TCP	1046	49242	win	cksum + seg size
52	62	lg	br	IP	TCP	49242	1046	win	cksum + seg size
53	60	br	lg	IP	TCP	1046	49242	win	cksum
54	60	br	lg	IP	TCP	1046	49242	win	cksum
55	60	br	lg	IP	TCP	1044	21	LIST	
56	117	lg	br	IP	TCP	21	1044	resp	ASCII data listing
57	63	lg	br	IP	TCP	49242	1046	data	file listing
58	54	lg	br	IP	TCP	49242	1046	win	cksum
59	60	br	lg	IP	TCP	1046	49242	win	cksum
60	60	br	lg	IP	TCP	1044	21	win	cksum
61	60	br	lg	IP	TCP	1046	49242	win	cksum
62	54	lg	br	IP	TCP	49242	1046	win	cksum
63	78	lg	br	IP	TCP	21	1044	resp	xfer complete
64	60	br	lg	IP	TCP	1044	21	win	cksum
69	62	br	lg	IP	TCP	1044	21	TYPE	I
70	74	lg	br	IP	TCP	21	1044	resp	Type set to I
71	60	br	lg	IP	TCP	1044	21	PASV	
72	104	lg	br	IP	TCP	21	1044	resp	Passive Mode
73	62	br	lg	IP	TCP	1047	31902	win	cksum + seg size
74	62	lg	br	IP	TCP	31902	1047	win	cksum + seg size
75	60	br	lg	IP	TCP	1047	31902	win	cksum
76	71	br	lg	IP	TCP	1044	21	STOR	filename
77	111	lg	br	IP	TCP	21	1044	resp	Open BINARY con'tn
78	566	br	lg	IP	TCP	1047	31902	DATA	file data
79	54	lg	br	IP	TCP	31902	1047	win	cksum 6432
80	566	br	lg	IP	TCP	1047	31902	DATA	file data
81	54	lg	br	IP	TCP	31902	1047	win	cksum 7504
82	566	br	lg	IP	TCP	1047	31902	DATA	file data
83	54	lg	br	IP	TCP	31902	1047	win	cksum 8576
84	566	br	lg	IP	TCP	1047	31902	DATA	file data
85	54	lg	br	IP	TCP	31902	1047	win	cksum 9648
86	566	br	lg	IP	TCP	1047	31902	DATA	file data
87	54	lg	br	IP	TCP	31902	1047	win	cksum 10720
88	566	br	lg	IP	TCP	1047	31902	DATA	file data
89	54	lg	br	IP	TCP	31902	1047	win	cksum 11792
90	566	br	lg	IP	TCP	1047	31902	DATA	file data
91	54	lg	br	IP	TCP	31902	1047	win	cksum 12864
92	566	br	lg	IP	TCP	1047	31902	DATA	file data
93	54	lg	br	IP	TCP	31902	1047	win	cksum 13036
94	566	br	lg	IP	TCP	1047	31902	DATA	file data
95	54	lg	br	IP	TCP	31902	1047	win	cksum 15008
96	566	br	lg	IP	TCP	1047	31902	DATA	file data
97	54	lg	br	IP	TCP	31902	1047	win	cksum 16080
98	566	br	lg	IP	TCP	1047	31902	DATA	file data
99	54	lg	br	IP	TCP	31902	1047	win	cksum 17152
100	566	br	lg	IP	TCP	1047	31902	DATA	file data
101	54	lg	br	IP	TCP	31902	1047	win	cksum 18224
102	566	br	lg	IP	TCP	1047	31902	DATA	file data



103	54	lg	br	IP	TCP	31902	1047	win	cksum	19296
104	566	br	lg	IP	TCP	1047	31902	DATA	file data	
105	54	lg	br	IP	TCP	31902	1047	win	cksum	20368
106	566	br	lg	IP	TCP	1047	31902	DATA	file data	
107	54	lg	br	IP	TCP	31902	1047	win	cksum	21440
108	566	br	lg	IP	TCP	1047	31902	DATA	file data	
109	54	lg	br	IP	TCP	31902	1047	win	cksum	22512
110	566	br	lg	IP	TCP	1047	31902	DATA	file data	
111	54	lg	br	IP	TCP	31902	1047	win	cksum	23584
112	566	br	lg	IP	TCP	1047	31902	DATA	file data	
113	54	lg	br	IP	TCP	31902	1047	win	cksum	24656
114	566	br	lg	IP	TCP	1047	31902	DATA	file data	
115	54	lg	br	IP	TCP	31902	1047	win	cksum	25728
116	566	br	lg	IP	TCP	1047	31902	DATA	file data	
117	54	lg	br	IP	TCP	31902	1047	win	cksum	26800
118	566	br	lg	IP	TCP	1047	31902	DATA	file data	
119	54	lg	br	IP	TCP	31902	1047	win	cksum	27872
120	1514	br	lg	IP	TCP	1047	31902	DATA	file data	
121	54	lg	br	IP	TCP	31902	1047	win	cksum	30660
122	1544	br	lg	IP	TCP	1047	31902	DATA	file data	
123	54	lg	br	IP	TCP	31902	1047	win	cksum	33580
124	1544	br	lg	IP	TCP	1047	31902	DATA	file data	
125	54	lg	br	IP	TCP	31902	1047	win	cksum	36500
126	1544	br	lg	IP	TCP	1047	31902	DATA	file data	
127	54	lg	br	IP	TCP	31902	1047	win	cksum	39420
128	1544	br	lg	IP	TCP	1047	31902	DATA	file data	
129	54	lg	br	IP	TCP	31902	1047	win	cksum	42340
130	946	br	lg	IP	TCP	1047	31902	DATA	file data	
131	54	lg	br	IP	TCP	31902	1047	win	cksum	45260
132	566	br	lg	IP	TCP	1047	31902	DATA	file data	
133	54	lg	br	IP	TCP	31902	1047	win	cksum	45260
134	566	br	lg	IP	TCP	1047	31902	DATA	file data	
135	60	br	lg	IP	TCP	1047	31902	win	cksum	
136	54	lg	br	IP	TCP	31902	1047	win	cksum	
137	54	lg	br	IP	TCP	31902	1047	win	cksum	
138	60	br	lg	IP	TCP	1047	31902	win	cksum	
139	60	br	lg	IP	TCP	1044	21	win	cksum	
140	78	lg	br	IP	TCP	21	1044	win	cksum	
141	86	br	lg	IP	TCP	1044	21	MDTM	filename	
142	113	lg	br	IP	TCP	21	1044	resp	filename – No such file	
143	60	br	lg	IP	TCP	1044	21	PWD		
144	85	lg	br	IP	TCP	21	1044	resp	dir path	
145	62	br	lg	IP	TCP	1044	21	TYPE	A	
146	75	lg	br	IP	TCP	21	1044	resp	Type set to A	
147	60	br	lg	IP	TCP	1044	21	PASV		
148	103	lg	br	IP	TCP	21	1044	resp	Passive Mode	
149	62	br	lg	IP	TCP	1048	46160	win	cksum + seg size	
150	62	lg	br	IP	TCP	46160	1048	win	cksum	
151	60	br	lg	IP	TCP	1048	46160	win	cksum	
152	60	br	lg	IP	TCP	1048	46160	win	cksum	
153	60	br	lg	IP	TCP	1044	21	LIST		
154	117	lg	br	IP	TCP	21	1044	resp	ASCII mode for listing	

155	131	lg	br	IP	TCP	46160	1048	listing	filename attributes
156	54	lg	br	IP	TCP	46160	1048	win	cksum
157	60	br	lg	IP	TCP	1048	46160	win	cksum
158	60	br	lg	IP	TCP	1048	46160	win	cksum
159	54	lg	br	IP	TCP	46160	1048	win	cksum
160	60	br	lg	IP	TCP	1044	21	win	cksum
161	78	lg	br	IP	TCP	21	1044	resp	xfer complete
162	60	br	lg	IP	TCP	1044	21	win	cksum
163	60	br	lg	IP	TCP	1044	21	QUIT	
164	104	lg	br	IP	TCP	21	1044	resp	xfer n bytes in 1 files
165	191	lg	br	IP	TCP	21	1044	resp	
total traffic for session n bytes in 1 xfer									
Tks for using FTP service on lg									
Goodby									
166	60	br	lg	IP	TCP	1044	21	win	cksum
167	60	br	lg	IP	TCP	1044	21	win	cksum
168	54	lg	br	IP	TCP	21	1044	win	cksum

## **Appendix G – Software Installation**

There are many applications available for Unix and Linux, a significant number are free. The best locations to search for applications is sourceforge.net, freshmeat.net, and rpmfind.net. Check them out, you might be surprised at what is available.

### **G.1            Installation of Postfix Mail Server            (not complete)**

This procedure provides for the installation of the Postfix Mail Server. )

1. Download the source software from the site <http://postfix.com>.
2. Using the command `chkconfig`, disable the sendmail daemon by issuing the command:

**chkconfig sendmail off**

3. Verify that the service is disabled by issuing the command:

**chkconfig --list | grep sendmail**

The run levels for 2 – 5 should be now be set to off, if not, then issue the command:

**chkconfig -level X sendmail off**

This will disable the specified level (where X specifies the desired level).

4. Copy the file that was downloaded from the postfix site (e.g. postfix-2.0.16.tar.gz) to the /opt directory.
5. Change to the /opt directory.
6. Issue the command:

**tar -xvzf postfix-2.0.16.tar.gz**

This will unzip and untar the files to a newly created directory, /opt/postfix-2.0.16 .

7. Change to the /opt/postfix-2.0.16 directory.
8. Issue the command:

**make -f makefile.init** (note that the file Makefile.init exists in the directory)

9. Verify that the following exists in the following files:

User “postfix”            **cat /etc/passwd | grep postfix**

Group “postdrop”        **cat /etc/group | grep postdrop**

If they do not exist, then create them.

**useradd postfix**

**groupadd postdrop**

10. Issue the command:

**make install**

You will be required to answer a series of questions, take the default answer.

Install\_root: [/]

Config\_directory: [/etc/postfix]

Daemon\_directory: [/usr/libexec/postfix]

Command\_directory: [/usr/sbin]

```

Queue_directory: [/usr/sbin]
Sendmail_path: [/usr/sbin/sendmail]
Newaliases_path: [/usr/bin/newaliases]
Mailq_path: [/usr/bin/mailq]
Mail_owner: [postfix]
Setgid_group: [postdrop]
Manpage_directory: [/usr/local/man]
Sample_directory: [/etc/postfix]
Readme_directory: [no]

```

11. Change to the directory /etc/init.d and verify that a file postfix exists. If it does not, then create a new file with the following contents (or use **webmin**, as described in the Appendix X.2).

postfix file

12. Issue the command:  

```
xinetd
```

This will re-read the services file to insure that postfix is activated.
13. Change to the /etc/xinetd.d directory. Print out the files **main.cf** and **master.cf**. Review these files for the information that needs to be modified.  

Fundamental changes to the mail.cf file are:

  - a. INTERNET HOST AND DOMAIN NAMES  

```
#myhostname = host.domain.tld
```

Change to:  

```
myhostname = host.ourlab.com
```
  - b. INTERNET HOST AND DOMAIN NAMES  

```
#mydomain = domain.tld
```

Change to:  

```
mydomain = ourlab.com
```
  - c. DELIVERY TO MAILBOX  

```
#mail_spool_directory = /var/spool/mail
```

Change to:  

```
mail_spool_directory = /var/spool/mail
```
14. Save the file and exit. The postfix mail server is now operational.

## G.2 Installing Webmin (not complete)

This procedure provides for the installation of the **webmin** Web based administrator.

1. Download the RPM binary file from the site: <http://webmin.com> .
2. Copy the file **webmin-1.130-1.noarch.rpm** to the /opt directory. (Later versions may be available.)
3. Issue the command:  

```
rpm -ivh webmin-1.130-1.noarch.rpm
```
4. The application has now been installed.
5. Open a browser.

6. In the URL, enter the site:  
**localhost:10000**
7. The webmin application will now load and be available.

### G.2.1 Activating Postfix using Webmin

To activate the **postfix** mail server after a new installation, follow the following procedure.

1. From within **webmin**, click on the **System** button at the top.
2. Click on the **Bootup and Shutdown** button.
3. Scan through the list of services, if the service “Postfix” does not exist, then continue with Step 4.
4. Click on the line “Create a new bootup and shutdown action”.
5. You will have the following (blank) screen presented. Fill in the sections as noted below.

Image

Name:	Postfix
Description:	Postfix Mail Server
Bootup Command:	/usr/sbin/postfix start
Shutdown Command:	/usr/sbin/postfix stop
Select button:	Start at boot time

### G.3 Installing dhcping

The application “dhcping” is a program to test dhcp servers. The application may be downloaded from <http://www.rpmfine.net>, searching for dhcping . The application that works with RH 7.2 is ‘dhcping-1.2.2.rh73.diag.i386.rpm’. Click on the appropriate file line to download. Installation is performed via a normal rpm installation, there are no dependencies. DHCP servers may now be tested using the command:

```
dhcping -s 192.168.102.255
```

### G.4 Installing net-snmp <sup>1</sup>

Net-snmp is a monitoring software available for the Linux and other platforms. It may be obtained from <http://net-snmp.sourceforge.net> . The home site for the software is <http://net-snmp.org> . The release downloaded for this example is net-snmp-5.1.1.rc1.tar.gz . A later version may be available when you obtain the application. This procedure was obtained from the INSTALL file, which is included in the tar package.

The package as download is a tar source code set of files. For this example, the downloaded file was stored in the /opt/snmp directory. Prior to downloading the file, create the snmp directory.

<sup>1</sup> INSTALL file after un-tarring the source tarball file.

1. `mkdir /opt/snmp`
2. store `net-snmp-5.1.1.rc1.tar.gz` in `/opt/snmp` directory
3. `cd /opt/snmp`
4. `tar -xzvf net-snmp-5.1.1.rc1.tar.gz`
5. This will create a large list of files that are uncompressed and expanded in the `./snmp-5.1.1.rc1` directory.
6. From within the `snmp-5.1.1.rc1` directory:
7. Issue the command: `./configure`
8. During the operation of this command, you may be asked several question and the configure process is determining what your system is, and establishing a setup script of what is required for installation.
9. Although generally unnecessary, it may be worthwhile reviewing the `./include/net-snmp/net-snmp-config.h` file. Advanced users may find it necessary to edit the file.
10. Issue the command: `make`. This compiles the source code.
11. Issue the command: `make test`. This tests the configuration. Hopefully the response will be: 44 tested / 44 succeeded.
12. Make sure you are logged into the system as the administrator.
13. Issue the command: `make install`. This installs the program in various `/usr/local` directories. Commands are in the `/bin` directory and configuration is in the `/share` directory. Other information is in other directories.
14. As an option, to clean up the system, one can issue the command: `make clean` to remove the binary files.
15. To remove the application, issue the command: `make uninstall`.

Refer to Chapter 16 for further configuration of net-snmp.

## G.5 Installing Etherape from Source Code

As an alternative to downloading Etherape in an rpm format, it may be installed from the source code. The following procedure should be used. For later versions of Red Hat and Fedora Core, the following is unnecessary, as it is included in the installation.

1. Download `etherape-0.8.2.tar.gz` from [sourceforge.net](http://sourceforge.net). Store in the directory `/opt/etherape`.
2. Change to the `/opt/etherape` directory.
3. Issue the command:  
`tar xzvf etherape-0.9.1.tar.gz (was .8.2)`
4. Change to the `/opt/etherape/etherape-0.8.2` directory.
5. Issue the command:  
`./configure`
6. Issue the command:  
`make`
7. Issue the command (as the administrator):

**make install**

Etherape is now installed and operational. To apply, from an Xterm window, enter the command **etherape**. In newer versions of Linux, Etherape is included in the installation.

**G.6 Installing Java for Open Office**

The Java run time environment may be downloaded for free and installed. Installing this plugin for Open Office will enhance its operation.

1. Open your browser URL to [www.java.com](http://www.java.com).
2. Click on the “**Get it Now**” button on the right side of the screen.
3. Click on the Linux Self Extracting version (not RPM).
4. Save the file to the `/opt/java` directory.
5. Create a new directory - `/usr/java`.
6. Copy the java file (`j2re-1_4_04-linux.i586.bin`) (latest version) to the `/usr/java` directory.  
`cp /opt/java/j2re-1_4_04-linux.i586.bin /usr/java`
7. Change the permission of the binary file:  
`chmod a+x j2r-1_4_04-linux.i586.bin /usr/java`
8. Issue the command:  
`./j2re-1_4_04-linux.i586.bin /usr/java`
9. Agree to the license.

**G.7 Installing Open Office from Source Code**

To install Open Office from source code, use the following procedure. Prior to installing Open Office, install the **Java** code, as it will be used for Open Office. This is not necessary, but does enhance the features of Open Office.

1. Download source code version (`Ooo-1.1.0.tar.gz`) from OpenOffice.org. Store the file in the directory `/opt/OO`.
2. Change to the `/opt/OO` directory.
3. Issue the command:  
`tar xzvf Ooo-1.1.4_LinuxIntel_install.tar.gz`  
 (download latest version)
4. Accept license.
5. For the window that specifies whether Open Office is to run with Java, click on the **Java** button and click on the **Browse** button.
6. From the Browse menu, select the directory `/usr/java`.
7. Click on OK.
8. The installation will now complete.

To run Open Office, click on the menu button (K or BigFoot), select Open Office, then select which office application you desire.

## G.8 Creating a YUM Repository Server

The following procedure provides for the creation of a YUM Repository Server that may be used for either training or in the maintenance of one's business. The advantage to having one's own repository is to reduce the Internet bandwidth by the business' employees who wish to upgrade their system on a periodic basis.

The following actions need to be performed.

1. Install Fedora Core 3 (FC3) (full installation)
2. Activate the YUM repository server as a client to the default repository sites.
  - a. **cd /usr/share/rhn**
  - b. **rpm --import RPM-GPG-KEY**
  - c. **rpm --import RPM-GPG-KEY-fedora**
3. Update FC (this will require several hours)
  - a. **yum update**
4. The rsync daemon must be activated on both the remote server and the local server in order for the system to work. It is operation on the remote yum repository.
  - a. **chkconfig --list | grep rsync**  
**rsync off**
  - b. **chkconfig rsync on**
  - c. **chkconfig --list | grep rsync**  
**rsync on**
  - d. **xinetd**
5. Test repository, giving only the site URL:
  - a. **# rsync mirror.dulug.duke.edu::** or (note double colon)
  - b. **# rsync fedora.cat.pdx.edu::** or
  - c. **# rsync fedora.gtlib.cc.gatech.edu::**

Note the double colon at the end. (Other sites exist.) You should observe an output similar to the following:

```
rsync mirror.dulug.duke.edu::
mirror.dulug.duke.edu
- This rsync server is currently available to any/all people.
- This is subject to change with little or limited notice.
- We may in the not-so-distant-future restrict rsync access
  to tier2 red hat mirrors.
```

Archive	Main Tree
redhat-ftp	Red Hat FTP Site
redhat-base	Red Hat FTP Site
redhat-beta	Red Hat Linux beta releases
redhat-rawhide	Rawhide FTP Site
redhat-updates	Updates FTP Site
fedora	Fedora
fedora-linux-core	Fedora Linux Core
fedora-linux-extras	Fedora Extras
fedora-linux-core-updates	Fedora Linux Core Updates
fedora-linux-core-development	Fedora Linux Core Development
centos	Centos



Great, we have connection to the site and can proceed with the downloading.

6. Using a web browser, go to one of the above sites and drill down to select a desired version, such as:

mirror.dulug.duke.edu/fedora/pub/fedora/linux/core/3/i386

or

fedora.cat.pdx.edu/linux/core/3

The following site names that have a “X” following it are ones of interest.

The duke.edu site has the following Link(s)

mirror.dulug.duke.edu:

apache/	2003-Dec-23	
centos/	2005-Aug-21	
fedora/	2003-Dec-23	<b>X</b>
lost+found/	2004-Dec-16	
pub/	2005-Jun-01	
redhat/	2004-Mar-12	

mirror.dulug.duke.edu/fedora:

pub/	2003-Dec-23	<b>X</b>
------	-------------	----------

mirror.dulug.duke.edu/fedora/pub

fedora/	2003-Nov-05	<b>X</b>
---------	-------------	----------

mirror.dulug.duke.edu/fedora/pub/fedora:

linux/	2005-Mar-23	<b>X</b>
--------	-------------	----------

mirror.dulug.duke.edu/fedora/pub/fedora/linux:

core/	2005-Jun-09	<b>X</b>
-------	-------------	----------

extras/	2005-Jul-29	
---------	-------------	--

mirror.dulug.duke.edu/fedora/pub/fedora/linux/core:

1/	2004-Mar-03	
----	-------------	--

2/	2004-May-14	
----	-------------	--

3/	2004-Nov-03	<b>X</b>
----	-------------	----------

4/	2005-Jun-09	
----	-------------	--

development/	2004-Jul-23	
--------------	-------------	--

test/	2005-May-06	
-------	-------------	--

updates/	2005-Jun-11	
----------	-------------	--

**X**

mirror.dulug.duke.edu/fedora/pub/fedora/linux/core/3:

SRPMS/	2004-Nov-03	
--------	-------------	--

i386/	2004-Nov-03	<b>X</b>
-------	-------------	----------

x86_64/	2004-Nov-03	
---------	-------------	--

mirror.dulug.duke.edu/fedora/pub/fedora/linux/core/3/i386:

debug/	2004-Nov-03	
--------	-------------	--

iso/	2004-Nov-03	
------	-------------	--

os/	2004-Nov-03	<b>X</b>
-----	-------------	----------

mirror.dulug.duke.edu/fedora/pub/fedora/linux/core/3/i386/os:		
Fedora/	2004-Nov-03	X
SRPMS	2004-Nov-03	
headers/	2004-Nov-03	
images/	2004-Nov-03	
isolinux/	2004-Nov-03	
repodata/	2004-Nov-03	
GPL	2004 Nov-03	
README-Accessibility	2004 Nov-03	
README-en	2004 Nov-03	
README-en.html	2004 Nov-03	
RELEASE-NOTES-en	2004 Nov-03	
RELEASE-NOTES-en.html	2004 Nov-03	
RPM-GPG-KEY	2004 Nov-03	
RPM-GPG-KEY-beta	2004 Nov-03	
RPM-GPG-KEY-fedora	2004 Nov-03	
RPM-GPG-KEY-fedora-rawhide	2004 Nov-03	
RPM-GPG-KEY-fedora-test	2004 Nov-03	
RPM-GPG-KEY-rawhide	2004 Nov-03	
autorun	2004 Nov-03	
eula.txt	2004 Nov-03	
mirror.dulug.duke.edu/fedora/pub/fedora/linux/core/3/i386/os/Fedora:		
RPMS/	2004-Nov-03	X
base/	2004-Nov-03	
mirror.dulug.duke.edu/fedora/pub/fedora/linux/core/3/i386/os/Fedora/RPMS:		
... list of base RPM files		<b>ALL RPMs</b>
mirror.dulug.duke.edu/fedora/pub/fedora/linux/core/updates:		
1/	2004-Mar-04	
2/	2004-May-18	
3/	2004-Nov-5	X
4/	2005-Jun-07	
mirror.dulug.duke.edu/fedora/pub/fedora/linux/core/updates/3:		
SRPMS	2005-Sep-21	
i386/	2005-Sep-20	X
x86_64	2005-Sep-21	
mirror.dulug.duke.edu/fedora/pub/fedora/linux/core/updates/3/i386:		
debug/	2005-Sep-21	
headers/	2005-Sep-21	
repodata/	2005-Sep-21	
... list of updated rpm files		<b>ALL RPMs</b>
mirror.dulug.duke.edu/fedora/pub/fedora/linux/extras:		
3/	2005-Feb-01	X
4/	2005-May-16	
5/	2005-Jul-28	
development/	2005-May-16	
...		

mirror.dulug.duke.edu/fedora/pub/fedora/linux/extras/3:		
SRPMS/	2005-Sep-28	
build-logs/	2005-Jan-25	
i386/	2005-Sep-28	X
x86_64	2005-Sep-28	
mirror.dulug.duke.edu/fedora/pub/fedora/linux/extras/3/i386:		
debug/	2005-Sep-28	
headers/	2005-Jun-12	
repodata/	2005-Sep-28	
... list of extras rpm files		ALL RPMs

Note that in the listing for Desired Listings, the directory of **/fedora/pub** is not “X”ed. These two directories are taken as a default for download purposes (I really do not know how to explain it!).

7. For example, on the duke site, we find the directory tree:  
**.../fedora/pub/fedora/linux/core/3/i386/os/Fedora/RPMS**  
 If we were to select **.../core/3/**, the directories and files below would be synchronized to our repository. The problem with this is that you are downloading much more data than is required.
8. Now one needs to decide what part of the remote repository is to be downloaded, as several options exist.
  - a. Base Core applications  
 This consists of the basic applications that are available for the general operation of the system. There is a subdirectory called “headers”, which is also needed.  
**.../ fedora / linux / core / 3 / i386 / os / Fedora / RPMS**  
 This is the core of the base RPMs.  
**.../ fedora / linux / core / 3 / i386 / os / headers**  
 This subdirectory contains required headers for the download process; we will recreate this directory later. This directory is not required.  
**.../ fedora / linux / core / 3 / i386 / iso**  
 This subdirectory contains iso images of the installation, if one desired to burn their own CDs. We do not need to download this directory.
9. Because we wish to include the headers for the system, we need to select the base download of **.../fedora / linux / core / 3 / i386 / os**
10. Before we can download the repository, we need to create the directory chain where we wish to have the data stored. We need to create the following directory structure:
 

```

/var/www/html/yum/
    /Fedora/
    /Core
    /3
        /base
        /extras
        /updates

```

Issue the commands (note that there are extra spaces around the “/” for clarity only):

```
mkdir -p / var / www / html / yum / Fedora / Core / 3 /  
base and  
mkdir / var / www / html / yum / Fedora / Core / 3 /  
updates and  
mkdir / var / www / html / yum / Fedora / Core / 3 /  
extras
```

Now change to the directory:

```
cd / var / www / html / yum / Fedora / Core / 3 / base
```

11. The rsync command is used to download the remote repository to one's local repository. Several (of many) options exist:
 

a	archive
v	verbose, tell what is happening
n	dry run, do not download
r	recursive, drill down to subdirectories and copy
p	progress, show the general status of the download
H	preserve Hard Links, do not delete linked file, but rather maintain the link.

Issue the command:

```
rsync -avH mirror.dulug.duke.edu::fedora / linux / core /  
3 / i386 / os / Fedora / RPMS .
```

Note the ending period, it specifies that the download is to be in the current directory (where you changed to from above), alternatively, instead of changing to the correct directory and placing a “dot”, one could replace it with “/var/www/html”.

Alternatively, one can use the wget command to download the desired directory structure by issuing the command:

```
wget -r -nH -np mirror.dulug.duke.edu / fedora / pub /  
fedora / linux / core / 3 / i386 / os / Fedora / RPMS
```

where :

-r	Recursive, drill down into the structure
-nH	Do not create a host directory, i.e. do not create a directory by the name of mirror.dulug.duke.edu
-np	Do not climb the directory tree, i.e. do not create directories below i386, other than the one specified – RPMS.

12. Now sit back and wait. It will take several (to many) hours to download all of the files, as there many GigaBytes of files! This should only download the RPMs and the base/ directory.
13. Recall that we specified another directory chain that needed to be downloaded, “updates”. Again look to how we drilled down to the desired directory. The directory required to download is

“fedora/linux/core/updates/3/i386”. But this directory also contains additional directories (debug/, headers/, and repodata/) that are not required (specifically, debug/ contains rpm files that are not required). To not download those directories, we need to issue the command:

```
rsync -avH - --exclude "debug/" - --exclude "headers/"  
- --exclude "repodata" mirror.dulug.duke.edu::fedora /  
linux / core / updates / 3 / i386 / var / www / html /  
yum / Fedora / Core / 3 / updates
```

Not only will a remote user be able to download the original files, but they will also be able to update the system. When a package is installed, it will automatically be updated if an update exists.

This download may take 3 or more hours to complete. If for some reason, one should have to quit in the middle of the download (using a CTRL-C), then the next time rsync is executed; it will start up from where it left off.

14. Another directory that can optionally be downloaded; this one contains extra files that are not included in the normal distribution. The user is obligated to research what each of these applications do, there are a lot. To download this directory, issue the command:

```
rsync -avH - --exclude "debug/" - --exclude "headers/"  
- --exclude "repodata" mirror.dulug.duke.edu::fedora /  
linux / extras / 3 / i386  
/ var / www / html / yum / Fedora / Core / 3 / extras
```

15. Before another host can install or update applications from the repository server, the repodata directory and its XML metadata contents must be created. This is accomplished using the createrepo utility. This file is normally not included on the distribution CDs, so must be downloaded, issue the command:

```
yum install createrepo
```

16. To create the three repodirectory directories and update the contents, issue the commands:

```
createrepo / var / www / html / yum / Fedora / Core / 3 /  
base
```

and

```
createrepo / var / www / html / yum / Fedora / Core / 3 /  
updates
```

and

```
createrepo / var / www / html / yum / Fedora / Core / 3 /  
extras
```

optional

17. Finally, in order for a host to update from the repository server, the apache server must be operational. Issue the following commands:

```
chkconfig httpd on
xinetd
service httpd restart
```

18. On the client host, the following modifications are required to have it point to the server that was just created.

- a. Install Fedora Core 3 as a Workstation.
- b. Select the following functions per the installation guide.
- c. Activate YUM as client, as shown in step 2.
- d. `cd /etc/yum.repos.d`
- e. Edit the two files, `fedora.repo` and `fedora-updates.repo` by modifying the content as:

**fedora.repo**

```
[base]
name=Fedora Core $releasever - $basearch - Base
#baseurl=http://download.fedora.redhat.com/pub/fedora
linux/core/$releasever/$basearch/os/
mirrorlist=http://fedora.redhat.com/download/mirrors/
fedora-core-$releasever
enabled=1
gpgcheck=1
```

Note that the first site has been commented out. We need to perform the same modification the mirrored site and to point to our repository.

```
[base]
name=Fedora Core $releasever - $basearch - Base
#baseurl=http://download.fedora.redhat.com/pub/fedora/
linux/core/$releasever/$basearch/os/
#mirrorlist=http://fedora.redhat.com/download/mirrors/
fedora-core-$releasever
baseurl=http://192.168.102.201/yum/Fedora/Core/3/base
enabled=1
gpgcheck=1
```

- f. Modify the `fedora-updates.repo` file in like manner to read:

**Fedora-updates.repo**

```
[base]
name=Fedora Core $releasever - $basearch - Base
#baseurl=http://download.fedora.redhat.com/pub/fedora/
linux/core/updates/$releasever/$basearch/os/
#mirrorlist=http://fedora.redhat.com/download/mirrors/
updates-released-fc$releasever
baseurl=http://192.168.102.201/yum/Fedora/Core/3/updates
enabled=1
gpgcheck=1
```

Note that an IP address has been specified rather than a URL. Substitute in the appropriate IP address for your system.

- g. Create a new file with the following contents:

```
Fedora-extras.repo
```

```
[base]
```

```
name=Fedora Core $releasever - $basearch - Base
```

```
baseurl=http://192.168.102.201/yum/Fedora/Core/3/extras
```

```
enabled=1
```

```
gpgcheck=1
```

Note that an IP address has been specified rather than a URL. Substitute in the appropriate IP address for your system.

19. To update a new installation of Fedora, issue the command:

```
yum update
```

or

```
yum -y update
```

The first option requires that one provide an affirmative answer (Yes) to complete the update process, the second option automatically supplies the answer and does not require intervention.

20. Everything should now be set up correctly and be operational. To test the configuration on the server and client, issue the command from the client host:

```
yum list
```

The following response should be seen (abbreviated):

```
[root@localhost ~]# yum list
```

```
Setting up Repos
```

```
base 100% |=====| 1.1 kB 00:00
```

```
updates-released 100% |=====| 951 B 00:00
```

```
Reading repository metadata in from local files
```

```
base : #####
```

```
2622/2622
```

```
updates-re: #####
```

```
1000/1000
```

```
Installed Packages
```

```
4Suite.i386 1.0-3 installed
```

```
Canna-libs.i386 3.7p3-6 installed
```

```
FreeWnn-libs.i386 1:1.10pl020-5 installed
```

```
Gconf2.i386 2.8.1-1 installed
```

```
...
```

```
amanda.i386 2.4.4p3-1 installed
```

```
amanda-client.i386 2.4.4p3-1 installed
```

```
anacron.i386 2.3-32 installed
```

```
apel-xemacs.noarch 10.6-5 installed
```

```
...
```

```
fonts-xorg-ISO8859-2-100dpi.noarch 6.8.2-0.FC3.1 updates-released
```

```

fonts-xorg-ISO8859-2-75dpi.noarch 6.8.2-0.FC3.1 updates-
released
fonts-xorg-ISO8859-9-100dpi.noarch 6.8.2-0.FC3.1 updates-
released
fonts-xorg-syriac.noarch          6.8.2-0.FC3.1 updates-released
...
nabi.i386                        0.14-3      base
namazu.i386                      2.0.14-0.FC3.0 updates-released
namazu-cgi.i386                  2.0.14-0.FC3.0 updates-released
namazu-debuginfo.i386           2.0.14-0.FC3.0 updates-released
namazu-devel.i386                2.0.14-0.FC3.0 updates-released
nasm-debuginfo.i386              0.98.38-3.FC3 updates-released
nasm-doc.i386                    0.98.38-3.FC3 updates-released
nasm-rdoff.i386                  0.98.38-3.FC3 updates-released
nautilus-cd-burner-devel.i386    2.8.3-6     base
ncompress.i386                   4.2.4-40    base

```

21. After some time, the repository server files will require updating. This is accomplished by issuing the command:

```

rsync -avH - --exclude "debug/" --exclude "headers/"
- --exclude "repodata" mirror.dulug.duke.edu::fedora /
linux / core / updates / 3 / i386 /
/ var / www / html / yum / Fedora / Core / 3 /
updates
and
rsync -avH - --exclude "debug/" --exclude "headers/"
- --exclude "repodata" mirror.dulug.duke.edu::fedora /
linux / extras / 3 / i386
/ var / www / html / yum / Fedora / Core / 3 / extras

```

After the files have been updated, the repo must again be updated. Issue the commands:

```

createrepo / var / www / html / yum / Fedora / Core / 3 /
base
and
createrepo / var / www / html / yum / Fedora / Core / 3 /
updates
and
createrepo / var / www / html / yum / Fedora / Core / 3 /
extras
optional

```

The optimum way to update an existing system is by using cron. A typical cron configuration might be:

```

5 1 1 * * rsync -avH - --exclude "debug/" -
--exclude "headers/" --exclude "repodata"
mirror.dulug.duke.edu::fedora/ linux/ core/ updates/ 3/
i386/
/ var/ www/ html/ yum/ Fedora/ Cor/ 3/ updates

```



```

5 1 2 * * rsync -avH - -exclude "debug/" -
  -exclude "headers/" - -exclude "repodata"
  mirror.dulug.duke.edu::fedora/ linux/ extras/ 3/ i386
5 1 3 * * rsync -avH - -exclude "debug/" -
  -exclude "headers/" - -exclude "repodata"
  mirror.dulug.duke.edu::fedora/ linux/ extras/ 3/ i386/
  /var/ www/ html/ yum/ Fedora/ Core/ 3/ extras
5 1 1 * * createrepo /var/ www/ html/ yum/
  Fedora/ Core/ 3/ base
5 1 2 * * createrepo /var/ www/ html/ yum/
  Fedora/ Core/ 3/ updates
5 1 3 * * createrepo /var/ www/ html/ yum/
  Fedora/ Core/ 3/ extras

```

**Installation Guide for Fedora Core 3 Workstation:**

1. Boot computer with CD Disk 1
2. Welcome Click the start button
3. Language Select English
4. Dialect Select US English
5. Proceed with Installation Install
6. Installation Type: Select Workstation
7. Partitioning Partition using Disk Druid
8. Create the following partitions:
 

a. SWAP	512 MB
b. /home	1000 MB
c. /boot	100 MB
d. /	remainder of disk
9. Loader GRUB boot loader
10. Network Configuration:
 

a. Edit	192.168.102.(100+SID) / 255.255.255.0
b. Hostname	{SID}.ourlab.com
c. Gateway	192.168.102.1
d. DNS Address	205.240.70.176
	205.240.70.177
11. Set the Firewall as:
 

a. Firewall Enable	NO
b. SELinux	Disable
12. Language English (USA)
13. Time (America – Chicago)
14. Password: {Instructor Specified}
15. Packages: Customize
 

a. Add:	
i. KDE	
b. Remove:	
i. Games	
ii. Development Tools	
iii. X Software Development	
iv. GNOME Software Development	
16. The packages installation takes about 30 minutes, requires disks 1, 2, 3.
17. After booting, open a terminal window, from the prompt,
 

**Menu à System Tools à Terminal**

Issue the commands (note that this is a text editor, not a word processor):

a.	<b>switchdesk kde</b>
b.	<b>cd / etc</b>
c.	<b>nano inittab</b>
d.	<b>find the line:</b>
	<b>id:5:initdefault</b>

using the arrow keys, move the cursor down to the 5, and

- e.     **change to:**  
          **id:3:initdefault**

**Application Installation:**

In order to install a specific application on a workstation, issue the following command:

```
yum install application_name
```

The application name is shown in the following table for servers:

<b><u>Server Application</u></b>	<b><u>Application Name</u></b>
DHCP	dhcp*
DNS	bind*
FTP	vsftp*
HTTP	http*
MySQL	mysql*
NFS	nfs*
Samba	samba*
Sendmail	sendmail*
SSH	openssh*
Telnet	telnet*
TFTP	tftp*

Many server applications are comprised of multiple files, therefore the asterisk (\*) is used as a wild card to download all appropriate files from the repository server.

## **Appendix H – Linux Download Sites**

The following Internet sites maintain copies of Linux.

- Debian** [www.debian.org/distrib/ftplist](http://www.debian.org/distrib/ftplist)  
The Debian distribution seeks to both develop and keep the distribution commercial free. Therefore it is not for sale directly from the organization (if you really can call it that). There is no problem paying a small fee to others for obtaining a CD copy. It is available to in various version to support Intel, SPARC, Alpha, and Motorola platforms.
- Georgia Tech FTP Site** [ftp-linux.cc.gatech.edu/pub/linux](ftp://linux.cc.gatech.edu/pub/linux)  
Maintains copies of Slackware, Red Hat, and Debian.
- Mandrake** [www.linux-mandrake.com](http://www.linux-mandrake.com)  
Download Site: [www.linux-mandrake.com/en/ftp.php3](http://www.linux-mandrake.com/en/ftp.php3)  
Mandrake was originally built on top of Red Hat Linux, but has since developed its own version. It forte is ease of use for the user for both the desktop and server operation. It includes extra features and including Corel WordPerfect, IBM's Lotus eSuite and other software applications.
- Red Hat** [www.redhat.com](http://www.redhat.com)  
Mirror site: [www.redhat.com/download/mirror.html](http://www.redhat.com/download/mirror.html)  
Probably the most popular of the distributions, available in various versions, although this has recently changed due to a corporate change is business plans. Red Hat has recently given corporate support to Fedora to carry on the end user development and support.
- Slackware** [www.slackware.com](http://www.slackware.com)  
Download Site: [ftp.slackware.com/pub/slackware/slackware](http://ftp.slackware.com/pub/slackware/slackware)  
Slackware was the first commercial distribution that was developed specifically for the Intel platform.
- SuSE** [www.suse.com](http://www.suse.com)  
Download Site: [www.suse.com/us/support/download/index.html](http://www.suse.com/us/support/download/index.html)  
SuSE, now owned by Novell, works closely with various other open source developers to maintain a strong business platform while providing an excellent base for the end user.
- TurboLinux** [www.turbolinux.com](http://www.turbolinux.com)  
Download Site: [www.turbolinux.com/download](http://www.turbolinux.com/download)  
TurboLinux distributes several forms of the Linux product, including Workstation for single users; Server for support of various servers including DNS, web, news, caching and others; and TurboCluster, designed for the support of cluster server networks.

Various Linux Images <ftp.kando.hu/pub/CDROM-Images>  
Various distributions are available from this site.

## **Appendix I – References**

### **I.1 Written References**

The following is a limited list of references that have been utilized in the preparation of some of the class handouts. It should not be considered complete nor inclusive. We are always looking for additional information, and if you are aware of a good source, we would appreciate your input.

This list is not necessarily in a specific order, although the books at the top of the list tend to be utilized more often.

**Red Hat Linux 7 Server**, Mohammed J. Kabir, IDG Books

ISBN: 0-7645-4786-0

**Linux Administration – A Beginner's Guide**, Steve Shah, Osborne / McGraw Hill

ISBN: 0-07-213136

**Red Hat Linux 6 Server**, Mohammed J. Kabir, IDG Books

ISBN: 0-7645-3337-1

**Red Hat Linux 6 in Small Business**, Paul Sery and Eric Harper, M&T / IDG Books

ISBN: 0-7645-3335-5

**Red Hat Linux Bible**, Christopher Negus, IDG Books

ISBN: 0-7645-4574-4

**Setting Up a Linux Internet Server – Visual Black Book**, Hidenori Tsuji, Takashi Watanabe, Coriolis

ISBN: 1-57610-569-5

**Practical Linux**, M. Drew Streib & Michael Turner, Que

ISBN: 0-7897-2251-8

**Linux in a Nutshell**, Ellen Siever, O'Reilly

ISBN: 1-56592-585-8

**Red Hat Network Management Tools**, Steve Maxwell, McGraw Hill

ISBN: 0-07-2212262-5

**Red Hat Linux Administrative Tools**, Charles Fisher, McGraw Hill

ISBN: 0-07-134746-1

**Building Linux and OpenBSD Firewalls**, Wes Sonnenreich & Tom Yates, Wiley

ISBN: 0-471-353666-3

**Firewalls – A Complete Guide**, Marcus Goncalves, McGraw Hill

ISBN: 0-07-135639-8

**Master Red Hat Linux Visually**, Michael Bellomo, IDG Books

ISBN: 0-7645-3436-X

**Sams Teach Yourself Linux in 24 Hours – 2ed ED**, Bill Ball, SAMS/Macmillan,

ISBN: 0-672-31526-2

**Red Hat Linux Unleashed – 3rd Ed**, David Pitts & Bill Ball, SAMS/Macmillan,

ISBN: 0-672-31410-X

**Red Hat Linux Secrets – 2ed Ed**, Naba Barkakati, IDG Books,

ISBN: 0-7645-3175-1

**Sams Teach Yourself Samba in 24 Hours**, Gerald Carter, Sams / Macmillan,

ISBN 0-672-31609-9

**Using Linux – Special Edition – 4th Ed**, Jack Tackett & Steven Burnett, Que

ISBN: 0-7897-1748-8 (later editions probably available)

**Linux: A Network Solution for Your Office**, Viktor Toth, SAMS/Macmillan,

ISBN: 0-672-31628-5

- DNS and BIND – 3<sup>rd</sup> Ed**, Paul Albitz & Cricket Liu, O'Reilly  
ISBN: 1-56592-512-2
- Sendmail**, Bryan Costales & Eric Allman, O'Reilly  
ISBN 1-56592-222-0
- Linux – The Complete Reference, 3<sup>rd</sup> Ed**, Richard Petersen, Osborne;  
ISBN 0-07-212164-5
- Linux System Administration Handbook**, Mark Komarinski & Cary Collett, Prentice Hall,  
ISBN: 0-13-680596-5
- Linux A-Z**, Phil Cornes, Prentice Hall,  
ISBN: 0-13-742867-7
- Waite Group's UNIX Primer Plus**, Waite, Martin, & Prata, SAMS/Macmillan  
ISBN: 0-672-22729-0
- Linux Programmer's Reference**, Richard Petersen, Osborne,  
ISBN: 0-07-882587-3
- Sams Teach Yourself Star Office 5 for Linux in 24 Hours**, Nicholas Wells &  
R. Dean Taylor, SAMS/Macmillan, ISBN: 0-672-31412-6
- Sams Teach Yourself GIMP in 24 Hours**, Joshua Pruitt & Romona Pruitt,  
SAMS/Macmillan, ISBN: 0-672-31509-2
- Sams Teach Yourself Emacs in 24 Hours**, Jesper Pedersen, SAMS / Macmillan  
ISBN: 0-672-31594-7
- Linux - User's Resource**, James Mohr, Prentice Hall,  
ISBN: 0-13-842378-4
- Linux – Installation, Configuration, Use**, Michael Kofler, Addison-Wesley,  
ISBN: 0-201-596228-8
- StarOffice 5 for Linux in 24 Hours**, Nicholas D. Wells & R. Dean Taylor,  
SAMS/Macmillan, ISBN: 0-672-31412-6
- KDE 1.1 in 24 Hours**, Nicholas D. Wells, SAMS/Macmillan,  
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Osborne, ISBN: 0-07-882446-X
- Get Linux Certified & Get Ahead**, Anne Martinez, McGraw Hill  
ISBN: 0-07-212333-8
- Linux Shells by Example**, Ellie Quigley, Prentice Hall,  
ISBN 0-13-014711-7
- Linux to go**, Rich Grace and Tim Parker, Prentice Hall,  
ISBN 0-13-999269-3



## **I.2 Web Sites**

The following are a few of the many sources of information available online from the Internet on Linux.

### **Web Sites**

**<http://basiclinux.hypermart.net/basic/>**

Provides basic Linux training.

Free, online introduction to Linux course with lessons and assignments.

**<http://learn.ibm.be/linux>**

What is Linux by IBM.

Free online presentation.

**<http://linux.miningco.compute/os/linux/>**

Focus on Linux.

Articles, news, technical information, forum, and tutorials on Linux.

**<http://searchlinux.com>**

Database of over 250,000 Linux questions and answers.

**[www.justlinux.com](http://www.justlinux.com)**

Online Linux resource with applications, documentation and more.

**<http://www.linuxdoc.org/FAQ/Linux-FAQ.html>**

Extensive list of FAQs.

**<http://www.linuxlinks.com/>**

Linux portal site. Sections for beginners and advanced users.

**<http://www.linux.com/>**

Repository of Linux documentation, news, and resources.

**<http://www.linuxhq.com/>**

Linux documentation and information, kernel patches, newsgroup archives.

**<http://www.linuxdoc.org/>**

Repository of Linux documentation including man pages, howtos, tutorials, and FAQs.

**<http://ipmasq.cjb.net>**

Information on IP Masquerading and the latest information.

**<http://metalab.unc.edu/mdw/LDP/nag/nag.html>**

Network Administrations Guide in electronic format. You can also buy it from O'Reilly

**<http://www.linuxapps.com>**

Linux applications. Great place to start and has links for more information. Includes application description.

**<http://www.redhat.com/appindex>**

Includes pointers to commercial applicatons. Free application are also available.

**<http://www.xnet.com/~blatura/linuxapps.shtml>**

Has links to a variety of linux applications that are freeware, shareware and commercial.

**<http://linuxrising.com>****<http://ugu.com>****<http://penguinmagazine.com>****<http://freshmeat.com>****<http://linux.tucows.com>****<http://linuxjournal.com>****<http://rpmfind.net/linux/RPM>****<http://slashdot.org>****<http://mandrakecampus.net>****<http://linuxnewbie.org>****<http://linuxexcite.com>****<http://firstlinux.com>****<http://anime.net/linuxisp.com>****<http://www.ibiblio.org/mdw/index.html>**

Linux Documentation Project

**<http://www.linuxhq.com>**

Linux HeadQuarters

**<http://www.kernel.org>**

Linux Kernel Archives

**<http://www.slackware.com>**

Slackware Linux Web site

**<http://www.linuxbase.org>**

Linux Standard Base

**<http://www.gnu.org>**

GNU / Linux open software project

**<http://www.tuxedo.org/~esr/writings/cathedral-bazaar/>**

Writings of Eric Raymond

**<http://opensource.org/history.html>**

History of the Open Source Initiative

**<http://memalpha.cx/Linux/Kernel>**

Linux Kernel version history

**<http://www.wired.com/wired/archive/5.08/linux.html>**

Article on Linus Torvalds and Linux

**<http://www.bitkeeper.com/history/history.gif>**

Graph of the Kernel releases

**<http://www.counter.li.org>**

Statistics and graphs on Linux use and growth rates worldwide

**I.3                Newsgroups:****alt.os.linux**

General Linux discussion

**alt.os.linux.caldera**

Caldera distribution

**alt.os.linux.slackware**

Slackware distribution

**comp.os.linux.admin**

Administering Linux systems

**comp.os.linux.advocacy**

Merits of Linux vs other operating systems.

**comp.os.linux.announce**

Announcements of general interest to the Linux community.

**comp.os.linux.answers**

Linux FAQs, HOWTOs, and other help documents.

**comp.os.linux.hardware**

Linux hardware compatibility and configuration.

**comp.os.linux.help**

Questions and advice regarding Linux.

**comp.os.linux.misc**

General Linux discussion.

**comp.os.linux.networking**

Networking with Linux discussion

**comp.os.linux.questions**

Questions and advice regarding Linux.

**comp.os.linux.setup**

Setup, installation, and configuration discussions.

**comp.os.linux.x**

Discussion related to the X Window system.

**I.4 Self Study Vendors (\$\$)**

**<http://www.bfq.com/linux.html>**

BeachFront Quizzer

**[www.baddogcomputer.com/cisco\\_training/cisco\\_training.html](http://www.baddogcomputer.com/cisco_training/cisco_training.html)**

Bad Dog Computer and Internet Services

Numerous self study titles including videos, CBTs, and training bundles.

**<http://www.cbtsys.com/catalog/curricula/linux.htm>**

CBT Systems

**<http://www.computerprep.com/>**

ComputerPREP

Linux courseware.

**<http://www.digitalthink.com/catalog/topics/unix.html>**

DigitalThink

Online Linux courses.

**<http://klscorp.com>**

Keystone Learning Systems

Learning Linux Video series

**<http://magellan.edu/TechEd/Linux/default.htm>**

Magellan University

Online Linux courses

**<http://www.msldepot.com/products/linux/default.htm>**

Media@Soft Learning Depot

Red Hat Linux training set on video.

**[http://www.wavetech.com/whats\\_new/linux/](http://www.wavetech.com/whats_new/linux/)**

Wave Technologies

Self Study pack.

**[http://www.yggdrasil.com/Products/intro\\_video.html](http://www.yggdrasil.com/Products/intro_video.html)**

Yggdrasil Computing

Linux Installation & Beyond video

**<http://www.zdu.com>**

ZD (Ziff Davis) University

Online Linux training (look under Unix)

## I.5 CD Vendors

The following is a list of some vendors that sell various distributions of Linux in either CD or DVD format. This list is highly subject to change.

LinuxISO	linuxiso.org
Free Linux CD Project	freelinuxcd.org
Cheapbytes	chepbytes.com
LinuxCD	linuxcd.org
CheapISO	cheapiso.com

## I.6 Live CD's

The following are live versions of Linux. Most are built on the Debian distribution. There are many more than listed here, and many changes will be seen in the future. Do a google search on “live cd”.

Knoppix	general	knoppix.net
SLAX	Desktop	slaxlinux-live.net
Ubuntu	Desktop	ubuntulinux.org
Damn Small Linux	Small distro	
Clusterix	Clustering	clusterixlivecd.net
Knoppix-STD	Security	knoppix-std.org
Audiotr	Security	remote-
exploit.org/index.php/operator		
Local Area Security	Security	localareasecuierty.org
Operator	Security	ussysadmin.com/operator
Phlak	Security	phlak.org
Plac	Forensics	sourceforge.net/projects/plac
Public IP Zone CD	WiFi Hotspots	publicip.net
Stress Linux	Diagnostics	stresslinux.org

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